Coos County Emergency Management

COOS COUNTY NATURAL HAZARDS MITIGATION PLAN

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TSUNAMI INFORMATION

Emergency Management Contact Information

Address	**Coos County Emergency Management** **Coos County Sheriff's Office** **(Mailing Address)** **250 N. Baxter** **Coquille, OR 97423** **(Physical Address)** **350 E 2nd Street** **Coquille, OR 97423**

Telephone	**Glenda Hales** **Emergency Management Program Manager** **(541) 396-3121 ext. 398** **ghales@co.coos.or.us** **Desiree Garcia** **Emergency Management Program Coordinator** **(541) 396-3121 ext. 312** **dgarcia@co.coos.or.us**

The Coos County Web Site is managed by the Coos County Information Technology Department.
Feel free to send information, comments, and suggestions to the staff.

The *Coos County Natural Hazards Mitigation Plan* is a collaborative plan for:

Coos County

The City of Bandon

The City of Coos Bay

The City of Coquille

The City of Lakeside

The City of Myrtle Point

The City of North Bend

The City of Powers

Libby Drainage District

Englewood Diking District

Prepared by:

Diversified Safety Management
54446 Arago Fishtrap Rd.
Myrtle Point, OR 97458
(541) 396-5944
diversifiedsafetymanagement@webenet.net

&

Wolf Creek Design & Research
21495C Big Bend Rd.
Montgomery Creek, CA 96065
(530) 337-6405

STAKEHOLDERS & STEERING COMMITTEE

The *Coos County Natural Hazard Mitigation Plan* is a comprehensive plan encompassing all of the incorporated cities, special districts and communities of Coos County.

Capt. Dave McDaniel	Coos County Sheriff's Department
Glenda Hales	Coos County Emergency Management Program Manager
Debby Darling	Coos County Planning
Shannon Hunt	Coos County Roads
Don Beebe	Coos County Roads
Esther Williams	South Coos Hospital – Bandon
Karen Luedecke	South Coos Hospital – Bandon
Charli Davis	City of Bandon – City Planner
Dennis Bork	City of Bandon – Public Works
Karen Turner	City of Coos Bay, Engineering Services Coord.
Steve Doty	City of Coos Bay, Engineering Services Coord.
Fran Capehart	City of Coquille – City Councilor
Terence O'Connor	City of Coquille – City Manager
Susan Chauncey	City of Lakeside – City Administrator
Randy Whobrey	City of Myrtle Point – City Manager
Jan Willis	City of North Bend – City Administrator
Matt Whitty	City of North Bend – City Engineer
Ben McMakin	City of Powers – City Manager
Mike Gray	Oregon Department of Fish and Wildlife
Jim Walker	Coos Forest Protection Association
Jim Young	Oregon Department of Forestry
Virgil Williams	Fairview Rural Fire Protection District
Mick Sneddon	Charlston Fire Protection District
Paul Heibert	U.S. Forest Service – Powers
Joan Morrison	Representative for Residents – Englewood Diking District, Libby Drainage District

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LETTER OF PROMULGATION

As the governing body for the County of Coos, 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 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44 CFR, Part 201.

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

_____ _____

_____ _____

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SECTION 2

COMMUNITY PROFILE

COMMUNITY PROFILE

Natural hazards impact citizens, property, the environment, and the economy of Coos County. Flooding, landslides, windstorms, severe winter storms, volcanic activity, and earthquakes have exposed Coos County residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural 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 natural 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 hazard's mitigation plan that addresses the potential impacts of natural hazard events.

GEOGRAPHY AND THE ENVIRONMENT

Coos County is located in the southwest portion of Oregon. Approximately 68 miles long and 38 miles wide, the county encompasses 1,806 square miles between the Coast Range Mountains and the Pacific Ocean. Of that total area, 1,600 square miles are land, with the remaining 206 square miles covered in water. Coos County is bordered on the north and east sides by Douglas County, and by Curry County on the south, and Pacific Ocean to the west.

Approximately 900,000 acres, 87.4% of the total land area, are devoted to commercial forests. The acreage is divided among the public, small private parcels, and forest industry ownership. The majority of standing saw timber in the county (55%) is located on public lands as opposed to 29% on forest industry lands and 16% on small private lots. Bays and wetlands provide 11.40% of the

county's water. The Coos and Coquille rivers and their tributaries run westerly through the county to the sea and the river valleys the only level agricultural areas in the county.

The terrain of Coos County rises from sea level along the coast to 4,319 feet on Mt. Bolivar in the rugged Klamath Mountains Province in the southern part of the county. Elevations along the western edge of the Coast Range to the north are somewhat lower, averaging 1,600 feet in the Blue Ridge area and peaking at elevations of 3,361 feet at Bone Mountain, 3,294 feet at Kenyon Mountain, and 2,241 feet at Coos Mountain. The slopes are steep and the ridge tops are characteristically narrow and sinuous. Near tidewater, the valleys are broad and flat, owing to the rise in sea level and consequent valley flooding and sedimentation, which accompanied the meeting of the continental ice at the close of the last Ice Age. The jagged coastline at Cape Arago was produced by wave erosion of tilted sedimentary rocks. Hard sandstone beds from steep cliffs or project into the sea in long parallel lines. Less resistant layers have been gouged out to form small bays. Arches and sea caves are some of the other erosional features that have developed along the Coos County coastline.

The southern part of the county is drained by the Coquille River and its principal tributaries. This includes the South Fork, which rises in Eden Valley, the Middle Fork, which rises east of the county border in Camas Valley, and the North and East Forks, which rise along the eastern margin of the Coast Range. The Coos River and its tributaries, including the Millacoma River, several sloughs and smaller streams such as Haynes, Larsen, Tenmile, and Eel Creeks drain the northern part of the county.

The Coastal plain is as much as 4 miles in width and consists of low marine terraces. North of Coos Bay the terraces are largely covered by sand dunes; the smaller dunes are active, but the older dunes are stabilized by protective vegetation. The terraces south of Coos Bay generally are higher than those to the north and are free of dunes. Logging operations have removed much of the forest cover.

Along the valleys, many of the tidal flats are protected by tidal gates in the levees. During the rainy season, however, local runoff and the accumulation of rainwater flood broad valleys such as that of the Coquille River. In many of the low-lying areas, natural levees have developed where the swifter sediment-laden floodwaters of the channel spill onto the relatively quiet water of the flood plains and drop their sediment. The levees are marked by rows of trees and shrubs, which line the edge of the channels. Because of their relatively high elevation within the flood plain, natural levees are commonly used for home sites. (DOGAMI Report)

CLIMATE

Coos County has a marine climate, mild and humid, resulting from the moderating influences of the Pacific Ocean and from rainfall induced by the coast mountain range. Rainfall along the coast averages about 60 inches per year. That rate increases inland with elevation to as much as 100 inches or more at various points in the coast range. Rainfall in Coos County comes throughout the year with the least amounts falling in the summer months of July, August and September. Rainfall data from Coquille shows an average of 7.4 inches of rainfall per month for the months of January, February and March. April, May, and June average a much lower 2.7 inches per month, while July, August and September averaged a mere 1 inch per month. Although the climate is generally considered temperate, there are exceptions. In most winters, one or two storms over the shore area bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding. Storms coming in from the coast can be slowed or stopped against the coast range peaks and drop considerable amounts of precipitation in short periods of time. During the 1951 to 1978 time period, the heaviest single-day rainfall was 4.54 inches recorded at North Bend on November 24, 1960.

From March through October the coastal area is subject to prevailing northwest winds. November through February southwest winds are the norm, often bringing heavy rain and strong winds.

Summer temperatures average with highs in the 70's and lows down to 48°F. Winter weather can expect highs in the mid-50's with low temperatures in the low-to mid 30's.

The growing season averages 200 days per year along the coast and in the river valleys. Higher elevations along the eastern county boundary average about 150 days per year. The first frost of the season is usually expected the first of October, and the last frost can be considered past by March 30.

MAJOR WATERWAYS

The rivers and estuaries of Coos County play a critical role in the health and economy of the county.

Rivers and streams are parts of almost all the estuaries on the Oregon coast. Coastal rivers often reach sea level many miles inland while still confined by mountains and narrow river valleys. It is here, the tide begins to affect the flow of the river. However, it is not until much further downstream that tide flats begin to appear along the edges of the river and the bay subsystem characteristics prevail. On the Coquille River, for instance, this riverine portion extends to near Myrtle Point, over thirty-river miles inland.

The riverine subsystem dominates where the river flows from the mountains into the estuary. This wide single channel meanders through marshlands, many of which have been diked for pasture. A slough subsystem occurs where small tributary streams with very little flow make their way toward the main channel. Salt marshes fringe these drainage ways. The bay is dominated by broad tidal flats of mud and sand. This area will be covered by water at high tide. At the mouth of the estuary, the surging flood tide brings the marine environment into the estuary.

The shallow edge of the estuary is submerged for only a short time at high tide. Woody debris and recently eroded sandstone rocks provides habitat for algae, barnacles, worms, and amphipods. At high tide, crabs and sculpins (locally called bullheads) scavenge in the jumble of rocks and sticks. At low tide, large algae like Fucus (seaweed's) lie limp on the mud and rocks to be grazed by

small invertebrates. Above the water, marshes ring the edges of sloughs, bays and rivers where the soil is wet at least part of the year. Plants which have developed a tolerance for saltwater take advantage of the varying degrees of salinity nearer or farther from the marine dominated waters. These salt marshes are particularly productive. The combination of sunlight and saline waters yields a rich crop of marsh grass that dies in the fall, is harvested by winter high tides and is distributed as nutrient debris to the estuarine food web. Across the broad tide flats, eelgrass meadows provide sheltered habitat and act as a nursery for a variety of fish, crabs, and other creatures. Its rhizomes are buried in the mud and so stabilize sediments and prevent erosion. Eelgrass grows rapidly in sunlight, fixes nutrients from mud and water, and generates detritus, which releases nutrients to the food web as it decays. Eelgrass growth is adversely affected by turbidity. Flats are the result of thousands of years of sedimentary deposit onto the bottom of the estuary. As rivers and streams reach sea level, they lose energy necessary to retain their load of sand, clay and organic debris. Logging and road building in the watershed during modern times hastened erosion, added to the sediment load, and contributed to rapid filling of estuaries over the last century. Continuously submerged, the deep channels of the estuary are conduits for many species of marine life to enter and leave the bay. In these channels, salmon and shad migrate downstream through the estuary to the ocean. The dendritic pattern of channels covers every portion of the mud flats and extends into the fringing salt marshes. The meander of these channels is influences by the energy of the flow in them. The lower the energy the more the meander.

Estuaries are not a single habitat, but rather a complex and interrelated web of habitats defined and distinguished by the interplay of geology, river-flows, tides and other factors. Together these factors affect the composition, distribution and productivity of the biological communities that make up the living part of Oregon’s estuaries. A major change in any single factor can create an environment suited to a wholly different set of species. In addition, the environmental requirements of a species may vary considerably throughout its

life cycle and activities. For example, the environments in which a single species feeds, rests and spawns will usually differ. Distinguishing between different habitats is important to understanding the effects of different kinds of activities and managing their impacts. Through the estuary classification scheme it is possible to identify unique environments that tend to control the production and composition of the communities that utilize them. Classification of habitats and their communities is useful in evaluating the potential environmental impacts of site-specific proposal on an estuary. The ODFW estuarine habitat classification system incorporates tidal regime, landform, and sediment or vegetation type. These have been identified as primary factors controlling the composition of biological communities. The distribution of fishes and other mobile species is dependent at least in part on the availability of feeding and spawning areas and protective cover along the estuary bottom. Sediment distribution indicates both the source of the parent material and the velocity and direction of tidal or river forces transporting the sediment. Estuaries with a greater marine influence typically have large amounts of intertidal habitat and a mixture of both marine and riverine sediments. Consequently, they offer greater diversity of habitat types and, in turn, probably support a greater diversity of species.

It is possible to broadly define four types of subsystems in Oregon's estuaries, which are distinguished by geologic, riverine, and tidal forces. These forces determine the shape and depth of the estuarine basin and the distribution of salt and other material throughout the system.

Marine

The marine subsystem is a high-energy zone located near the estuary mouth. The bottom is influenced by strong currents and the substrate is primarily coarse marine sand, cobble, or rock. Salinity is generally high due to the dominance of ocean water, but may be greatly reduced during high river flows in winter. Kelp and other alga species often cover the rock substrates and form

microhabitats for may species. Benthic invertebrates may include marine and estuarine species and fish utilizing the marine subsystem are marine species.

Bay

The bay subsystem is a relatively protected environment, often characterized by a broad embayment between the estuary mouth and narrow upriver reaches of tidewater. Normally the bay subsystem has a large percentage of inter-tidal land. Since it is influenced by both the marine and the riverine systems, bay sediments are primarily a mixture of coarse marine sands and fine river-borne silts and clays. Salinity during the summer is moderate to high, depending on the basin size, but may vary considerably with tidal stage and freshwater flow. Most bays have a wide diversity of habitats with extensive intertidal flats, eelgrass beds, alegal beds, and marshes.

Riverine

The riverine subsystem includes the upper tidewater portions of the larger tributaries which enter the estuary. A large percentage of the subsystem is narrow, sub-tidal river channel. Current velocities exhibit dramatic seasonal changes, which influence Benthic communities. Salinity is low most of the year and portions of the subsystem may be entirely fresh water. Sediments range from fine silts and clays to cobble and gravel. Small fringing marshes frequently occur on narrow, inter-tidal portions of the river-bank, riparian vegetation typically lines river banks where there are no marshes.

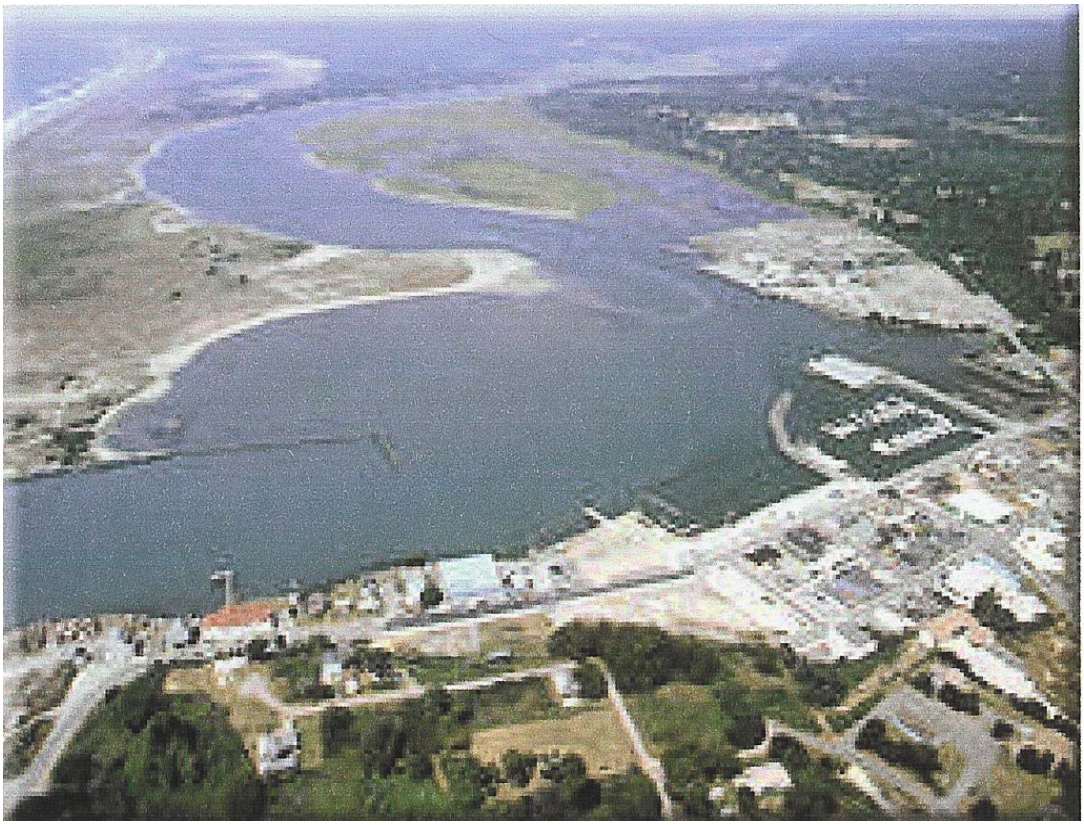
Slough

The slough subsystem is a sheltered environment, which is usually a narrow, isolated arm of the estuary with a very limited freshwater flow from uplands. Salinity is influenced by the proximity of the slough to the estuary

mouth. Sloughs usually have fine organic sediments and high percentages of inter-tidal land consisting of flats, eelgrass beds, and marshes.

Coquille River

The Coquille River enters the Pacific Ocean at the City of Bandon. The Coquille is one of the smaller estuaries in the Oregon Coastal Zone and is approximately 1082 acres in area. The Coquille River is designated as Shallow Draft Development; an estuary with maintained jetties and a main channel (not entrance channel) maintained by dredging at 22 feet or less. Shallow draft development estuaries have development, conservation and natural management units. The geomorphology is that of a Drowned River Mouth estuary.



Aerial view of the Coquille River estuary at Bandon

Coos River

The South Fork Coos and the Millicoma Rivers drain the majority of the Coos watershed. These rivers meet to form the Coos River, which flows westward four miles from the confluence to empty into Coos Bay. Stream flows vary greatly between the winter and summer months and are mainly affected by precipitation. Since little snow falls in the watershed, stream flows mainly vary with rainfall. There are more than 30 direct tributaries to Coos Bay. Twelve of these streams become sloughs, 10 to 12 miles in length, as they enter the estuary. In an undisturbed state these sloughs are shallow inlets fringed with marshland vegetation and they are very productive areas for fish and wildlife.

Coos Bay

Coos Bay enters the Pacific Ocean seven miles west of the city of Coos Bay in northern Coos County. Approximately 13,348 acres in area, Coos Bay has a watershed of approximately 1,058 square miles.

Aerial view of the entrance to Coos Bay

The Coos Bay estuary is designated a Deep Draft Development Estuary under the Oregon Estuary Classification system. Such estuaries have maintained jetties and main channel maintained by dredging to deeper than 22 feet are designated deep draft development estuaries. They have development, conservation and natural management units. The geomorphology of Coos Bay is that of a Drowned River Mouth estuary.

The Oregon Estuary Plan Book covers Oregon's seventeen largest estuaries. Four smaller "major" estuaries and seventeen "minor" estuaries are not covered because detailed mapping and habitat information is not available for them. Minor estuaries are formed where smaller rivers and creeks meet the ocean. Despite their small size, most minor estuaries do have valuable estuarine habitat and support anadromous fish runs. In addition, most of them are largely unaltered by human development. Minor estuaries, are required to be placed in either conservation or natural classification in an estuary plan. Tenmile Creek, Two-mile Creek, Four-mile Creek, Floras Creek / New River are examples of minor estuaries.

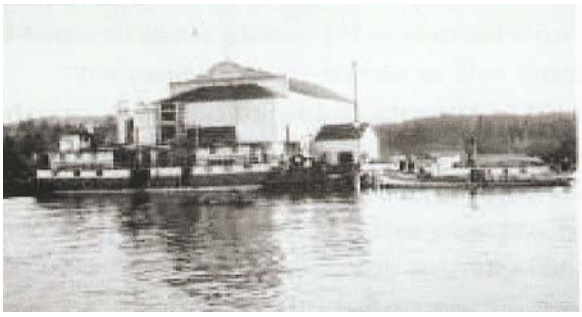
WATERSHEDS

Physically, a watershed is any area of land that drains water to a specific point, such as a lake, river, or ocean. All land is a watershed, since precipitation falls everywhere and drains somewhere. Energy inputs of sunlight, wind, and the water cycle interact with the landforms and the living species in ways that affect both the quality and quantity of water.

Different landscape types within the watershed have different roles in the capture, storage, and slow release of water. For example, wetlands and floodplains slow down the movement of water, allowing time for groundwater recharge. Vegetation, especially forests, holds the topsoil in place and is crucial providers of humus in the form of decaying plant material. Healthy topsoil is not only the source of our food supply, it also provides clean, abundant water.

The Coos Bay estuary is the largest estuary in Oregon. The tidal influence extends upriver to mile 37 of the South Fork Coos River, and to mile 34 on the Millicoma River. The river and slough valleys in the lower watershed are relatively narrow. Most of the low gradient areas are, or were, wetlands, and the bay and sloughs were historically surrounded by freshwater wetlands. The estuary and the lower watershed contain a wide assortment of productive habitats, including eelgrass beds, mud flats, sandy beaches, fresh and saltwater marshes, as well as seasonal wetlands, which include farmed wetland pastures. South Slough, located at the less populated west end of the bay, is an important natural area and the site of the South Slough Estuarine Research Reserve.

Because of wide variations in terrain and extreme density of vegetation, much of the early transportation was by boat.



Coos River Creamery with boats unloading milk.

Coos River School Boat

Eighty percent of the Coos watershed is forest-land. These timbered areas support populations of wildlife, freshwater and anadromous fish species. The most densely populated areas are on the flood plains along the main stem, four forks, and large order streams. Land uses in this area include industrial and residential sites, commercial and service businesses, and gravel extraction. Agriculture uses 15% of the land. In some areas, pasture-lands extend into the hills above the flood plain.

The original natural estuarine environments have been altered by the community's dependence on wetland and estuarine resources and the need for flat, dry land. Diking, draining, and filling of marshes began in the 1870's to

create the present city of Coos Bay, expand rail and road routes, and accommodate more ranches and homes. In 1970, when only 15% of the original marsh remained, state and federal laws slowed the conversion process.

The eastern two-thirds of the Coos watershed is sparsely populated and is made up of steep forested slopes. This area has been managed exclusively for timber since the late 1800's and the majority is the second growth in various stages. Currently, about 36,000 people live in the Coos watershed, with the bulk of the population clustered about the eastern half of the estuary and lower river-banks. Until the late 1980's, the area was heavily reliant on natural resource extraction, such as timber production, fishing, and agricultural activities. Many family wage jobs have been lost as these industries saw a decline in availability of resources. The area is struggling with a transition to utilize other economic opportunities, such as tourism.

The Coquille Watershed

The Coquille River has three major tributaries, the North Fork (including the East Fork) the Middle Fork, and the South Fork. All three forks join the main stem of the Coquille River within a few miles of the town of Myrtle Point and then flow into the Pacific Ocean at Bandon. The Coquille River is 99 miles long from the headwaters of the South Fork of the Coquille to the mouth. The majority of the watershed is located in Coos County. The steep hill slopes above the Coquille valley are sparsely populated. About 70% of the watershed is forested. Private industrial forest holdings make up 40% of the watershed. The remaining 30% of forested lands in the watershed are federal, state, and county lands. Two federal agencies, the Bureau of Land Management and the U.S. Forest Service, administer the largest of these public holdings.

Tenmile Lakes Watershed

The Tenmile Lakes watershed is located in the northwest corner of Coos County and extends into Douglas County. The watershed is approximately 86 square miles in size and is predominantly forested uplands. Most of the steep upper forested, slopes and their forested headwater streams are found in the Elliott State Forest, which is managed by the Oregon Department of Forestry.

The native fishery in the Tenmile lakes was primarily Coho salmon, steelhead, and sea-run cutthroat trout. In the 1930's, yellow perch, small mouth bass, brown bullhead catfish and other non-native fish were introduced to the lakes. In 1996, the Tenmile lakes were placed on the Department of Environmental Quality's 303(d) list for water quality problems with bacteria, aquatic weeds, temperature, and algae.

Two-mile and Four-mile Watersheds

These watershed areas are located in the extreme southwestern part of Coos County and borders Curry County. Two-mile Creek currently flows into New River slightly northwest of Laurel Lake. The configuration of New River and Two-mile Creek has changed over the past 25 years. The mouth of New River has moved north, and the mouth of Two-mile Creek has moved south during the past few years until it meets the New River. Two-mile Creek is approximately six miles long and has three tributary streams; Lower Two-mile Creek, South Two-mile Creek, and Redibaugh Creek. The drainage area is approximately 15 square miles in size.

Four-mile Creek currently flows into New River slightly southwest of Laurel Lake and approximately one mile from the New River mouth at the Pacific Ocean. Four-mile Creek is approximately 10 miles long, with two tributary streams; South Fork Four-mile Creek and North Four-mile Creek. The drainage area covers 19 square miles.

Historical Interest

The Coos, Coquille, and Tenmile watersheds are known statewide for their high fishery production, and the existing conditions give hope for the successful restoration and enhancement of a viable fishery. Agriculture has been a part of the Coos and Coquille watersheds for over a century. The estuaries in the watershed provide access to miles of navigable river and adjacent flat bottomlands. Surveys conducted in the late 1800's describe extensive marshes and wetlands that were later diked, drained, and converted to fertile agriculture lands. Pasture and hay lands remain the main use of lands in the valleys in the Coos and Coquille watersheds. River bottom pastures are mainly grazed and/or hayed from late spring to fall. Many of these areas are flooded in winter.

*Coos and Coquille Area Agricultural Water Quality Management Plan.

MITIGATION AND RESTORATION SITES

One of the major objectives of estuary planning is to identify ways to repair the damage done to estuaries by past alterations. Mitigation and restoration planning identify shore-land sites that can be added to the estuary to increase estuarine values or offset effects of new development. The number and type of mitigation sites designated in plans must generally correspond to areas designated for development in the plan, which would require mitigation. Mitigation and restoration involve the same types of activities but are done for slightly different reasons. Both involve actions, which restore an area to the estuary, create a new estuarine area, or enhance an existing estuarine area. However, mitigation is done to compensate for damage done by new development, while restoration is done to offset historical losses and reestablish past values. Mitigation is required whenever inter-tidal dredge or fill is permitted. The type and amount of mitigation generally must replace the habitats and values lost at the development site. There is no specific goal requirement to carry out restoration. Consequently, restoration projects are usually undertaken

by resource of land management agencies to provide for overall enhancement of estuarine values. It is important to note that the term “mitigation” has different meanings under state and federal law. In Oregon, mitigation only includes compensating for unavoidable losses through habitat creation, restoration, or enhancement. Federal agencies define mitigation much more broadly. They consider any method of reducing impacts of a proposed development project to be mitigation. Mitigation measures under federal law include redesign or relocation, as well as “compensation” for unavoidable habitat losses through creation or restoration of new areas. In terms of the Federal definition of mitigation, Oregon’s mitigation is considered a compensation requirement.

Shoreline Habitats

Significant shore-land habitats are areas which are especially important because of their proximity to the estuary. For example, bald eagles, which feed in the estuary, often depend on large trees and snags in nearby shore-lands for perches and nesting sites. This category of shore-land resources also includes ”major marshes”. These are wetlands which are close to the estuary but are not subject to tidal influence. Not all habitat or marshes within the shore-land boundary are significant or major. To qualify as “major” or “significant”, a marsh or habitat must be large relative to other similar areas around the estuary, or possess some unique or special value, which merits added special protection. For example, habitats of threatened or endangered species typically qualify because of the importance of protecting these species. Significant shore-land habitats and major marshes are designated in the planning process. Uses which would conflict with protection of wetland or habitat values, are not allowed. Other uses are allowed only if it is demonstrated that they will not conflict with protection of natural values.

Riparian vegetation is a dense narrow band of trees and shrubs at the edge of a water body. Riparian vegetation buffers estuarine waters from adjacent land uses and is an important wildlife habitat. Riparian vegetation is

probably most important because it is a concentration point for a great variety of wildlife, providing food and cover near water. It also protects the quality and quantity of water for wildlife, and often is an important shelter and food source for fish. Riparian vegetation also permits greater use of open agricultural lands as wildlife feeding areas by providing needed cover. Most fur-bearing animals inhabit this zone. It also provides important nesting areas for song-birds, osprey, and wood ducks. Elk and deer use riparian vegetation for cover. A wide variety of man's activities, including logging, road construction, and steam-bank protection have destroyed and damaged riparian habitat in the past. Because of its importance to water quality, Goal 17 requires that riparian vegetation be retained and protected. Permanent removal of riparian vegetation is usually only allowed for water-dependent uses. Most local ordinances require that development in shore-lands be set back from the shoreline and that riparian vegetation not be removed. Where bank stabilization is required to prevent erosion, most ordinances require that riparian vegetation be replanted.

Natural Management Units

Areas included: Major tracts of salt marsh, tide-flats, sea-grass and algae beds. Management Objective: To assure the protection of significant fish and wildlife habitats, continued biological productivity in the estuary, and scientific research and educational needs. These areas are to be managed to preserve the natural resources in recognition of dynamic natural, geological and evolutionary processes.

Permissible Uses:

a. Undeveloped low-intensity, water-dependent recreation.
b. Research and educational observation.
c. Navigation aids, such as beacons and buoys.
d. Protection of habitat, nutrient, fish, wildlife and aesthetic resources.
e. Passive restoration measures.
f. Dredging necessary for on-site maintenance of existing functional tide

gates and associated drainage channels.

g. Riprap for protection of uses existing as of October 7, 1977, unique natural resources, historical and archeological values, and public facilities.
h. Bridge crossings support structures.

Resource Capability Uses:

a. Aquaculture which does not involve dredge or fill or other estuarine alteration, or other than incidental dredging for harvest of Benthic species or removable in-water structures such as stakes or racks.
b. Communication facilities.
b. Active restoration of fish and wildlife habitat or water quality and estuarine enhancement.
d. Boat ramps for public use where no dredging, fill, or navigational access is needed.
e. Pipelines, cables and utility crossings, including incidental dredging. necessary for their installation.
f. Installation of tide-gates in existing functional dikes.
g. Temporary alterations.
h. Bridge crossing support structures and dredging necessary for their Installation.

Conservation Management Units

Areas included: Tracts of significant habitat smaller or of less biological importance than those included in natural management units, and recreational or commercial oyster and clam beds not included in natural management units. Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units are also included in this classification.

Management Objective: To provide for long-term uses of renewable resources which do not require major alterations to the estuary, except for the purpose of restoration. These areas are to be managed to conserve natural resources and benefits.

Permissible Uses:

a. High-intensity water-dependent recreation, including boat ramps marinas and new dredging for boat ramps and marinas.
b. Minor navigational improvements.
b. Mining and mineral extraction, including dredging necessary for mineral extraction.
c. Other water-dependent uses requiring occupation of water surface area by means of other than dredge or fill.
e. Aquaculture requiring dredge or fill or other alteration of the estuary.
f. Active restoration for purposes other than protection of habitat nutrient, fish, wildlife and aesthetic resources.
g. Temporary alterations.

Development Management Unit Requirements

Areas included: Deep-water areas adjacent or in proximity to the shoreline, navigation channels, sub-tidal areas for in-water disposal of dredged material, and areas of minimal biological significance needed for uses requiring alteration of the estuary.

Management Objective: To provide for navigation and public, commercial, and industrial water-dependent uses consistent with the level of alteration allowed by the overall estuary classification.

Permissible Uses:

a. Dredge or fill, as allowed elsewhere in the goal.
b. Navigation and water-dependent commercial enterprises and activities
d. Water transport channels where dredging may be necessary.

e. Flow-lane disposal of dredged material, monitored to assure that estuarine sedimentation is consistent with the resource capabilities and purposes of affected natural and conservation management units.
f. Water storage areas where needed for products used in or resulting from industry, commerce, and recreation.
f. Marinas.
g. Aquaculture.
h. Extrication of aggregate resources.
i. Restoration.

*Oregon Department of Land Conservation & Development, Coastal-Ocean Management Program

MINERALS AND SOILS

Recent soil surveys have given Coos County soils the taxonomic designation of haplohumlult, a group of Humult, which is a sub-order of Ultisols. Ultsols 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 Coos County reflects a subsurface horizon of clay and or weather able materials formed in a temperate climate zone.

OTHER SIGNIFICANT GEOLOGIC FEATURES

Oregon's continental margins composed of three major features: The continental shelf, the continental slope, and the submarine canyons bissecting 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 rock blocks, which form these banks have been uplifted by the underthrusting process at the base of the continental shelf. 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 face of the continental slope is characterized by sloping benches and low-relief hills. Blocks of rocky material have been rapidly uplifted by the under thrust 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 of the south coast of Oregon and the northern California coast.

The outer edge of the continental shelf and continental slope are 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 lowered 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 receding directly down the continental slope onto the deep ocean floor.

Ancient metamorphic rocks form the cliffs, offshore rocks and reefs such as Cape Blanco and Cape Sebastian. 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 away. 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.

HISTORY

Coos County is rich in history as well as natural resources. Exploration and trapping in the area occurred as early as 1828. The first settlement was established at Empire City, now part of Coos Bay, in 1853 by members of the Coos Bay Company. It was named after a local Indian tribe, the Coos, which has been variously translated to mean “lake” or “place of pines”.

Coos County was created by the Territorial Legislature from parts of Umpqua County, Oregon and Jackson County, Oregon on December 22, 1853. The size of the county was reduced with the creation of Curry County in 1855. The county seat was originally at Empire City. In 1895, the legislature permitted the citizens of the county to choose a new county seat. The 1896 vote resulted in moving the seat to Coquille.

The Territorial Legislature granted permission for the development of wagon roads from Coos Bay to Jacksonville in 1854 and to Roseburg in 1857. Deposits of gold initially attracted people to the county in the nineteenth century. Between 1890 and 1910, large amounts of coal were mined in the county and shipped to California. Production decreased after oil was discovered in that state, and no coal mines in the county have been in production since 1950. These coal fields have been explored for natural gas since 1938.

Beef cattle, sheep, and dairy are the main livestock enterprises in Coos County. Coos County ranks fourth in Oregon for sheep production and ninth in milk production. As of 2000 there, were approximately 23 dairies in the Coos and Coquille watersheds.

Coos County ranks first in cranberry production in the state. Most cranberry growers belong to the Ocean Spray Cooperative. Most cranberry beds are constructed in sandy soils, but some beds may be constructed in other soils with the addition of sand. Cranberry vines are perennial and, once established, will produce annually for an indefinite period. The first beds were planted in Hauser in 1893 and are still producing fruit.

Recreational and commercial shellfish harvesting is widespread in the Coos and Coquille estuaries. Nursery crops such as dahlias, holly, ornamental grasses and bedding plants, garlic, blueberries, hay, small vegetable and orchard crops are grown on local farms.

POPULATION AND DEMOGRAPHICS

The 2000 Census showed a countywide population of 62,779. The general population increased 4.2% from 1990. Census statistics also show high percentages of juvenile (21.9%) and senior (19.1%) populations, as well as large numbers of persons with disabilities (24%) compared to statewide counts. Two cities, Bandon and Lakeside, show significantly wide increases, in the median age group, being 49.3 and 53.3 years, respectively. This is a trend that appears to be mirrored throughout the county in the Census statistics for 1990 – 2000.

Population Percentages by Age Group

	<15	16-24	25-44	45-64	>65
Bandon	15.3	8.5	19.4	27.5	29.4
Coos Bay	18.5	13.3	25.2	23.8	19.2
Coquille	18.1	12.3	25.3	24.1	20.1
Lakeside	11.9	7	17.9	33.2	30.1
Myrtle Point	20.9	12.1	23.4	23.9	19.7
North Bend	19.6	12.9	25.8	24.6	17.1
Powers	17.8	11.6	21.3	27.5	21.8
Oregon	20.4	13.9	29.1	23.7	22.0
National	21.4	13.9	30.2	22	12.4

Change in Median Age of Population for Coos County Cities

Census	Bandon	Coos Bay	Coquille	Lakeside	Myrtle Point	North Bend	Powers
1990	47	36	35	41	34	35	39
2000	49.3	40.1	41.5	53.3	40.9	39.6	44.7

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 personal income.
- Average pay per worker.
- Population change and percent of population receiving unemployment insurance benefits.
- Industrial diversity based on distribution of employment 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. Coos County had an index of 1.22, making it one of the 19 counties in Oregon to receive a designation of countywide distress. Median household income can be used as an indicator for the strength of a region’s economic stability.

MEDIAN INCOME BY AGE

	<25	25-34	35-44	45-54	55-64
Bandon	$14,519	$29,803	$32,011	$39,779	$31,429
Coos Bay	$12,545	$37,100	$37,151	$41,731	$33,919
Coquille	$12,708	$45,000	$32,237	$43,533	$31,750
Lakeside	$27,917	$22,000	$31,250	$35,625	$31,875
Myrtle Point	$14,643	$27,361	$36,875	$31,150	$32,206
North Bend	$12,917	$27,198	$36,603	$50,458	$45,540
Powers	$30,750	$20,625	$29,028	$35,250	$30,000
Curry County	$24,412	$33,462	$39,071	$37,455	$33,221
Oregon Average	$22,636	$40,325	$48,538	$53,916	$46,535
National Average	$22,679	$41,414	$50,654	$56,300	$47,447

The ability of any given community to recover from major natural disasters can be estimated by comparing community-specific median household income and other factors such as residents with disabilities, median age, and poverty statistics, with overall regional, state and national figures.

Oregon State has a median household income of $40,916. The national average is $41,433. Coos County's median household income falls well below those figures at $31,542.

- US Bureau of the Census, Profile of Economic Characteristics 2000

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 in the Pacific Northwest is publicly managed and land use on millions of acres, is decided by government management rather than individual land ownership.

CRITICAL INFRASTRUCTURE

Critical and essential facilities are those facilities, which are vital to the continued delivery of key services to the public. These services are most times every day functions taken for granted and include electrical service, water treatment, gas, sanitation systems and emergency medical care. Facilities critical to government response and recovery include police and fire stations, hospitals, public works facilities, sewer, water, and shelters to name a few. Roads and bridges are also considered critical infrastructure, for without them emergency response is delayed or even halted entirely. If any of these facilities are incapacitated during a natural hazard event, the secondary impact on the community might also be considered critical.

Coos County has nine dams, which have hazard ratings of low, significant, or high, used to define the downstream consequences of a sudden dam failure. Only two of the dams have a low rating. Five are listed as significant, and two (Merrit Dam on Lower Pony Creek, and Upper Pony Creek have high hazard ratings).

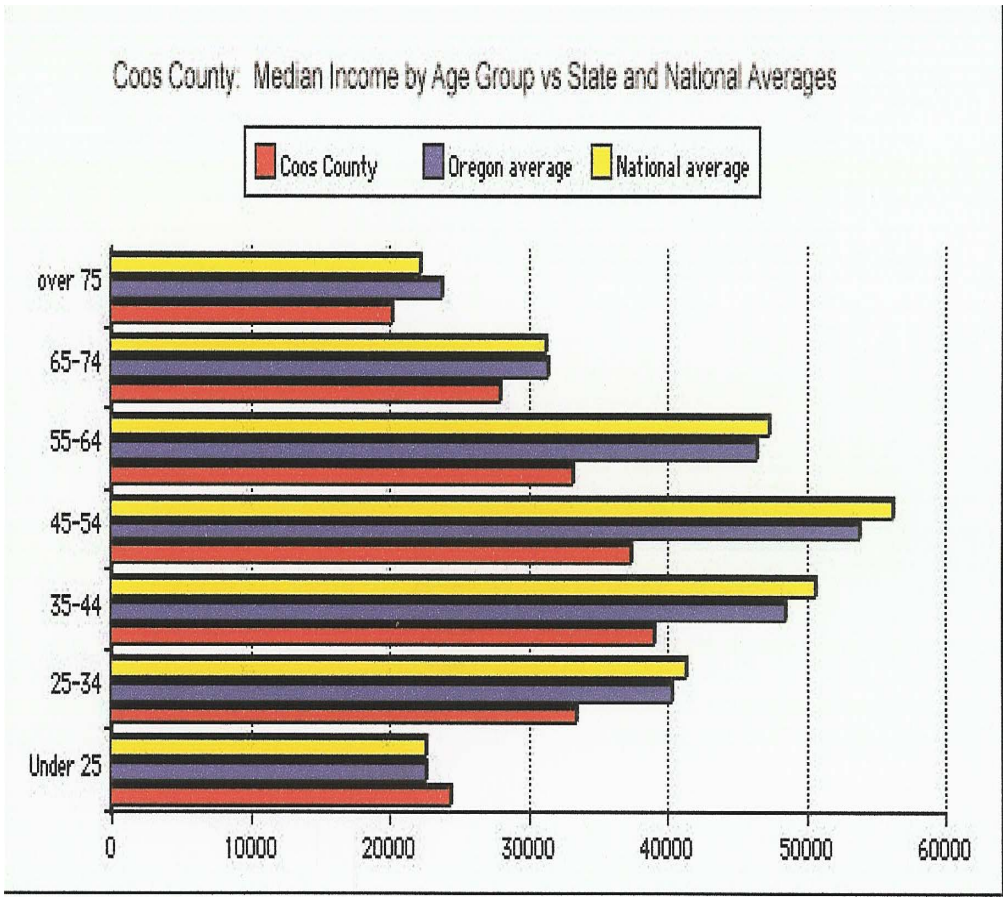
Housing

Housing is a major consideration in planning for hazard mitigation. The location of homes, the year-built date, and the installation year and condition of amenities such as plumbing and power supplies can greatly affect the risk of damage from natural hazards. For instance, it wasn't until the late 1960's that construction techniques and designs in the Pacific Northwest were required to comply with earthquake-resistant restrictions. In the 1970's FEMA began assisting communities with floodplain mapping and communities developed ordinances for the elevation of homes within floodplain boundaries. Homes built in earlier years stand a far greater risk of damage during a hazard event.

The U.S. Census of 2000 cites Coos County as having 29,247 total housing units. Of these, 11,184 (38%) were built before 1959, and 4,214 (14%) were built before 1939. Eight percent (8%) of the residents have lived in the same home since before 1970. Many of these homes were built in what is now known as flood plain or an earthquake liquefaction zone, or on slopes that may be prone to landslide in the event of earthquake or deforestation.

Employment and Industry

Forest products, tourism, fishing and agriculture dominate the Coos County economy. Boating, dairy farming, myrtle wood manufacturing, shipbuilding and repair, and the production of agricultural specialty products such as cranberries also play an important role.



Employment opportunities experienced a nationwide downtrend in the years 2001 and 2002. The Oregon Coast has been no exception. In 2001, the region experiences an overall unemployment rate of 6.6%, compared to the state average of 6.3% in 2001. Events in the 1990's related to the Environmental Species Act and the Forest Practices Act, have caused a decline in employment opportunities in the lumber and fishing industries.

Transportation

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 the early years of the territory, Oregon was separated from other American population centers by vast distances, and connected only by a few trails and rivers. In the fall of 1853, the Coos Bay Company men brought their families by way of the Umpqua River to the ocean, thence along the beach and across a sand spit to Coos Bay. In less than a year, on July 3, 1854, this highway which the ocean made was designated the first official road. This road, known simply as the Beach Route, continued to be one of the main arteries of travel into and out of Coos Bay until the coming of the Southern Pacific railroad in 1916. The Coos Bay Wagon Road, built in 1873, traveled from Roseburg through Looking Glass and Ten Mile in Douglas County, over the Coast Range to Sitkum on the East Fork of the Coquille, and ended on Isthmus Slough at Coos City. Getting into Coos Bay was a choice of this thoroughfare or the Beach Route. For weeks at a time, winter closed the Wagon Road with mud, snow, and fallen trees, while the Beach Road was always open.

This forced the state to be relatively self-sufficient economically. Since 1917, when the Legislature designated 4,317 miles of unpaved county roads as the state highway system, Oregon's state highways have been a critical part of the transportation network, linking Oregon's widespread towns and cities with each other and with other states. As transportation improved, Oregon became increasingly interconnected with other parts of the country and eventually the world. The 5,337 foot Conde McCullough Bridge was completed in September of 1936 at a cost of $2,143,390.

Today, the state highway system is made up of 7,483 miles of roads; 99.6% of these are paved. The 20th century has been the era of the highway in America. Access to the automobile and the freedom it provides has changed the way Americans live and the way the country looks. Highways have enabled people to work, shop, and play long distances from where they live. However, Oregonians are moving into a new era. With few exceptions, it is unlikely that many new roads will be constructed. Rather, the focus will be on maintaining the

existing highway system and increasing its efficiency. One of the major challenges for the future is deciding how to balance the needs of different users and modes of transportation. Another is the fact that there has been no increase the gas tax for six years, so highway spending is not keeping up with inflation. The Oregon Department of Transportation (ODOT) will not be able to maintain highways at their current condition unless maintenance and preservation funding increases in the future.

There are two major highways in Coos County. U.S. Highway 101 spans the north-south length of the county along the coastline. The county is bisected east to west by State Highway 42, which runs from Winston in Douglas County to join with U.S. Highway 101 near the city of Coos Bay. Minor county-maintained roads serve most transportation routes with large portions of the county accessible only by primitive roads.

There are 258 bridges in Coos County, of which 138 are in use by state highways and 115 used by county highways. Most bridges are out of date and are not seismically retrofitted; a fact, which creates a significant risk to Coos County's land transportation system.

Conde McCullough Bridge, North Bend, built in 1936

Oregon has an increased number of bridges with weight restrictions for heavy trucks and vehicles such as large recreational vehicles. These weight restrictions do not affect cars unless the bridge is closed completely, although the detours can have significant impacts on local communities and traffic. Oregon's bridges were designed to be replaced after about 50 years, and the state has over 350 bridges that are nearing the end of their planned use. These bridges were not built to be maintained indefinitely, nor were they designed for today's weights, volumes, and traffic speeds. Insufficient investment over many years has prevented the bridges from being replaced on schedule. As a result, the average age of Oregon's bridges is 39 years, and 20 percent are more than 50 years old.

Earthquakes, flooding, landslides, wildfires, and other natural and man-made disasters may destroy or block key access routes to emergency facilities and create episodic demand for highway routes into and out of stricken areas. ODOT's strategy should recognize the critical role that highway facilities in Coos County, particularly bridges, play in emergency response and evacuation.

HAZARDOUS MATERIALS

Coos County has potential for major events in the transportation of hazardous materials on Highway 101 (north/south) and Highway 42 (east/west). In addition there is air travel with a municipal airport in the City of North Bend, and three major Port Districts: Port of Coos Bay, founded in 1909; Port of Coquille, founded in 1912; and Port of Bandon, founded in 1913. The International Port of Coos Bay is the world's largest forest product shipping port and is considered the best natural harbor between San Francisco and Puget Sound. In addition to the ports and rivers, Coos County has one railway used primarily for transport of forest and light industry products. This presents numerous potentially hazardous materials in areas of both fuels and cargo.

Recent documented events:

10/21/1998 Charleston Boat Basin - #50 of anhydrous ammonia released into ocean.

02/04/1999 Grounding of the New Carissa and subsequent oil spill.

03/24/1999 Fishing vessel 'Miss Linda' diesel fuel spill into Charleston Harbor.

06/29/1999 Fuel tank truck damaged – fuel spill.

08/16/1999 Fishing vessel 'Kangaroo' – fuel spill / engine problems.

10/06/1999 Heavy rain washed oil from deck of dredge.

11/05/1999 Trucking company lost bags of sodium bentonite into river.

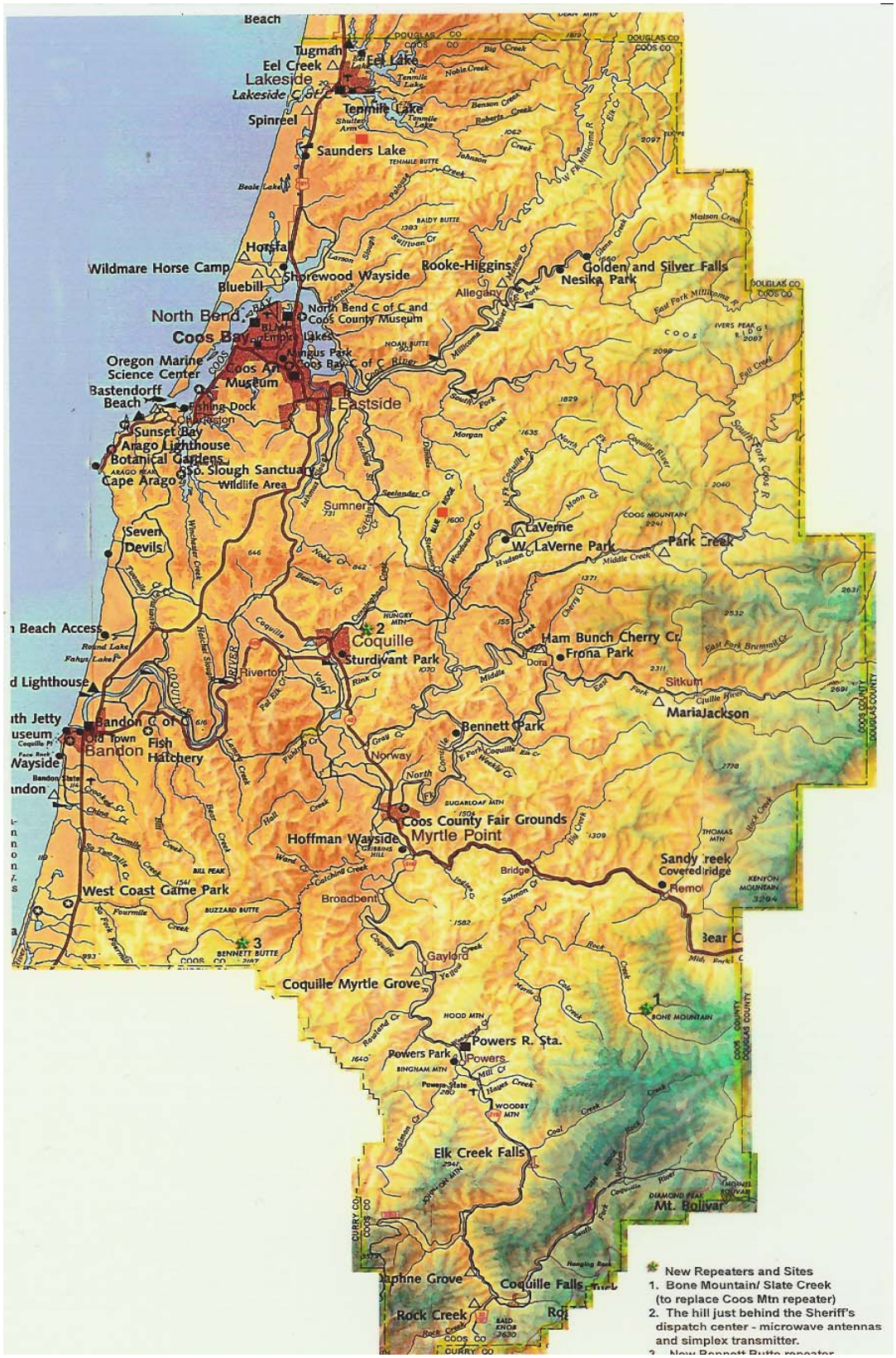
01/11/2000 Fuel tanker accident on Highway 101.

05/31/2002 Fishing vessel 'American Triumph' small oil spill.

03/23/2001 Truck and pick up truck collision, diesel spill.

04/02/2001 Oil slick apparently coming from a barge on Coquille River.

Identified fixed facilities that may also present a risk are Coos County Waste Disposal Site; Hauser Conrad Wood Treatment Plant; Durawood; Weyerhaeuser; Oregon Institute of Marine Biology; all sewage treatment plants, seafood plants, and water treatment plants.


Beach
Tugman
Eel Creek
Lakeside
Eel Lake
Tenmile Lake
Spinreel
Saunders Lake
Wildmare Horse Camp
Bluebill
Shorewood Wayside
Booke-Higgins
Golden and Silver Falls
Nesika Park
Allegany
North Bend
North Bend C of C and Coos County Museum
Coos Bay
Empire Lakes
Oregon Marine Science Center
Coos Art Museum
Bastendorff Beach
Fishing Dock
Charleston
Eastside
Sunset Bay
Arago Lighthouse
Botanical Gardens
So. Slough Sanctuary
Wildlife Area
Cape Arago
Sumner
Seven Devils
LaVerne
W. LaVerne Park
Park Creek
Beach Access
Coquille
Sturdivant Park
Riverton
Ham Bunch Cherry Cr
Frona Park
Dora
Sitkum
Maria Jackson
Lighthouse
Bandon C of C
Old Town
Bandon
Fish Hatchery
Wayside
Bennett Park
Norway
Coos County Fair Grounds
Myrtle Point
Hoffman Wayside
Sandy Creek Coveredbridge
Remo
West Coast Game Park
Broadbent
Gaylord
Coquille Myrtle Grove
Powers R. Sta.
Powers Park
Powers
Elk Creek Falls
Mt. Bolivar
Rock Creek
Coquille Falls
New Repeaters and Sites
1. Bone Mountain/ Slate Creek (to replace Coos Mtn repeater)
2. The hill just behind the Sheriff's dispatch center - microwave antennas and simplex transmitter.

SECTION 3 SPECIFIC NATURAL HAZARDS

Tab 1 - WILDFIRE & WILDLAND / URBAN INTERFACE

CHARACTERISTICS OF WILDFIRE

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 Coos County as far back as 1868 when fires raged throughout the state, burning an estimated 300,000 acres. 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 bio-diversity.

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 acres and thousands of communities at risk. The forests and grasslands may look robust, but the past century's activity has created a national tinderbox. 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 under-story vegetation. However, as burns such as the Biscuit fire and the 2003 Southern California fires show, each fire season brings proof that wildfires can and will happen, often regardless of preventative measures.

Wildfires, generally defined as the uncontrolled burning of forest, brush, or grassland, can be caused by many sources. When oxygen and fuel meet in the presence of an ignition source, fire is the result. Natural ignition is usually a result of weather conditions and fuel. Human-caused fires add another dimension. Causes such as lightning strikes, faulty mufflers, catalytic converters, sparking logging equipment, and broken bottles can become so heated in the sun that they ignite dry materials nearby. In agricultural areas, livestock operations have been surprised by flash-fires when manure heaps generate enough heat to spontaneously combust. 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 decade 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.

PROBABILITY

In Oregon, wildfires are inevitable. Although thought of as a summer occurrence, wildland fires can and do occur during any month of the year. The vast majority of wildfires burn during the July to October time period. Dry spells during the winter months, especially when combined with winds or with dead fuels, result in fires that burn with intensity and a rate of speed that often surprises people.

During a typical year, in excess of 2,500 wildland fires are ignited on protected forestlands in Oregon. ODF statistics show that approximately two-thirds of these fires are caused by human activity and the others are due to lightning.

WILDLAND-URBAN INTERFACE (WUI)

The wildland-urban interface (WUI) is the area or zone where structures and other human development meet or intermingle with wildland or vegetative fuels. As more people have moved into wildland interface areas, whether for lifestyle or economic reasons, the number of large wildfires impacting homes has escalated dramatically. Many in the population migrating to rural Oregon from urban areas bring with them an expectation of structural fire protection similar to the high-density urban areas they were leaving. Rural fire departments combined with local mutual aid agreements and the Conflagration Act attempt to fulfill these expectations. But many homes are still located within areas with little or no structural fire protection at hand.

Educational efforts are a must to implement preparedness programs and risk reduction and should include a coordinated effort of planning for fire protection. Individual property owners have a major role to play in this coordinated effort, especially in the wildland interface areas.

TYPES OF FIRE

A. ***Surface fire*** burns litter, grass and low bushes. The flames travel slowly, with the line of fire often breaking then reforming, creating patches that are skipped. Because of these breaks, surface fires can be crossed easily by animals. The heat will kill some trees depending on their sensitivity, size, and the amount of fuel surrounding them. Surface fire is the most common form of fire in natural communities, being found in all savanna, woodland, and open forests such as those dominating western mountains. Communities adapted to surface fire typically burn once every 2 to 10 years. Surface fires can be easily controlled.

Trees adapted to surface fire typically:

1. Are not shade-tolerant
2. Have thick, protective bark

3. Require a mineral soil for sprouting.

   Examples include:

   a. Gray Pine
   b. Ponderosa Pine
   c. Douglas Fir
   d. Redwood
   e. Giant Sequoia

B. ***Crown fires*** occur when the tops of trees (or high brush) are heated sufficiently to ignite so that the fire travels explosively from tree to tree. Essentially all vegetation is killed; some areas of ground may even be heated sufficiently to burn out humus and kill roots and kill many animals. While crown fires do not occur commonly as a consequence of fuel accumulation due to fire prevention in areas that would naturally burn with surface fire, a number of communities naturally burn with crown fires. In such communities, fire will kill all aboveground vegetation, but the community is resilient, that is, it will quickly regenerate from root-sprouts or seeds. Most common, locally, is the chaparral. Forests of lodge pole pine, bishop pine, sand pine and jack pine also typically burn with crown fires. In these species, the cones are waxy and don't open to drop seeds until a crown fire burns off the needles and heats the cone enough to melt the wax. Then, over a few days, the cones gradually open, dropping millions of seeds into the fresh ash. The result is a dense, evenly aged, straight-growing stand, which gradually self-thins by competition, until the next fire, which typically occurs on a cycle of 20 to 300 years. Crown fires can be controlled only at natural firebreaks and with great difficulty.

C. ***Firestorms*** develop when a very large area with abundant fuel gets burning in the presence of a strong wind. With a large enough area, the fire may create its own wind which can sometimes reach hurricane strength. Firestorms occur in areas where chaparrals or forests have been protected from fire for many years. In the sense that fuel would never accumulate to the extent to support such an intense fire, firestorms are a product of modern fire prevention. Firestorms are not controllable.

They will burn until the fuel runs out. Firestorms have also been ignited in cities by saturation bombing during warfare. During World War II, both Berlin and Tokyo suffered firestorms. More people died in the Tokyo firestorm than died in the Nuclear blast at Nagasaki.

D. ***Underground or peat fires*** sometimes develop in areas where litter has built up for hundreds of years, usually in colder climates where decomposition is slow, but sometimes in swampy areas which have been drained. They smolder underground, burning without flame and may continue for years, occasionally breaking through to the surface and igniting a surface fire.

Wildfire can be divided into three categories:

- ***Interface fires***
- ***Wildland fires***
- ***Prescribed fires***

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*** has more in common with the problems created by isolated homes, subdivisions and small communities situated predominantly in wildland settings. Both of these situations exist in Coos 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.

Prescribed fires are carefully selected parcels which are burned intentionally to control natural fuel and eliminate the potential for horrific fires. Fire frequency and severity respond to variables such as temperature, moisture, wind, and ignition source. 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. 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.

Biscuit Fire 2002

LOCAL HISTORICAL FIRES

1800 – 1899	Wildfires burn through the state. 90% of Elliott State Forest was lost in the Coos Bay Fire. The fire is stopped when it reaches the ocean after burning through an estimated 300,000 acres. Wildfires swept through and destroy Port Orford.
September 1872	Fire rages from South Slough, burning as far east as Coalbank Slough, and north to Coos Bay.
1892	Coquille's Front Street business district destroyed by fire.
1914	Three block area of downtown Bandon destroyed by fire of unknown origin. Damage estimated at close to half a million dollars. Less than one fifth of businesses had insurance.
March 17, 1918	Coquille destroyed by fire.
January 20, 1921	Front Street fire in Marshfield. 23 businesses and 4 residences destroyed. Estimate damage to be $200,000. Unknown source of ignition in J. Guildeshim's Junk store.
September 1936	Temperatures soar to 90 degrees and humidity drops to 6% Sparking wildfires that rage throughout Coos and Curry Counties.
Sept. 26, 1936	Fires surged through Bandon, destroying the town. Thirteen people died. Over 2000 were left homeless. A few days later losses were estimated at $1,600,000 with only $600,000 covered by insurance. Real property destruction was placed at $1,000,000 dollars; public buildings, schools and utilities at $350,000; personal property at $250,000; and autos at $50,000. Three mayors sent the following telegraph to President Roosevelt from neighboring towns: "The City of Bandon has been destroyed by fire. Twenty-five hundred people are homeless and destitute; municipal water and power system is greatly damaged; docks and municipal buildings are completely destroyed. Paved streets are terribly damaged and surrounding timber, the principal

support of the city is gutted. Bandon needs at least $3 million immediately for defense, relief, and rehabilitation".

June 24, 1945	Coos Bay waterfront fire.
Aug 15, 1999	Wildfire
Aug 12, 2001	Wildfire
Sept 6, 2001	Wildfire
Oct 17, 2001	Wildfire
July 26, 2002	Wildfire
Aug 7, 2002	Wildfire
Aug 26, 2002	Wildfire
Sept 1, 2002	Wildfire
Sept 23, 2002	Wildfire
Oct 5, 2002	Wildfire
Oct 11, 2002	Wildfire
Nov 1, 2002	Wildfire

VULNERABILITY AND RISK

Property Identification

As wildfire can have an obvious effect on development, development can also play an influencing role on wildfire. Coos County's environment provides a tremendous challenge with approximately 900,000 acres, 87.4% of the total land area covered in commercial forests. Of that 87.4%, 55% is located on public lands, 29% on forest industry lands and 16% on small private stands.

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 by long curving driveways or unpaved roads and stands of trees. There is a tendency to not properly identify their driveways, private lanes, or even their mail boxes, 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 inter-agency 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 areas 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, if necessary, 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. (Oregon Technical Resource Guide)

GORSE

The exotic invader from Europe

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 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, Australia, and at high altitudes in Hawaii.

Gorse grows well on 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 60 to 80 years, creating a very sizable seedbank. Fire, soil disturbance, and 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 increase erosion on steep slopes where gorse has replaced grasses and other vegetation. Spiny and mostly unpalatable when mature, gorse reduces pasture quality where it invades rangeland. Gorse under story 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 City of Bandon, as well as the surrounding County area, is of major concern. Ongoing efforts are being made to suppress the hazard by both Coos County and the City of Bandon and have become a concerted effort as evidenced in the mitigation action items.

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 rainfall for a several year period. To date, the average rainfall for southwest Oregon is still in a recession - creating an earlier dry season.

COMMUNITY ISSUES

Growth and Development in the Interface

The forested land that makes up the majority of Coos County can be considered interface area. With the existing older rural homes and the influx of retirees looking for serenity and isolation, exceptional beauty and natural 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 the applicable building codes which limit developmental patterns outside of incorporated cities.

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 nightmare. Fire fighters must make the decision to save structures based on their accessibility as well as surrounding fuels and building materials. Life saving has become, in many cases, the only recourse for fire fighters as they can no longer guarantee structure protection.

Water Supply

With bays and wetlands providing 11.40% of the county's water base, water supply and lack of hydrant taps is a major issue for fire fighting. 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.

Another area of importance for Coos County communities is these current water supply issues and the inability to fight a wildfire or urban-interface fire. This will be an action item for several of the communities subscribing to this report.

In the more rural areas water systems do not exist because residents and small communities depend on well water. 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 Coos 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, 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.

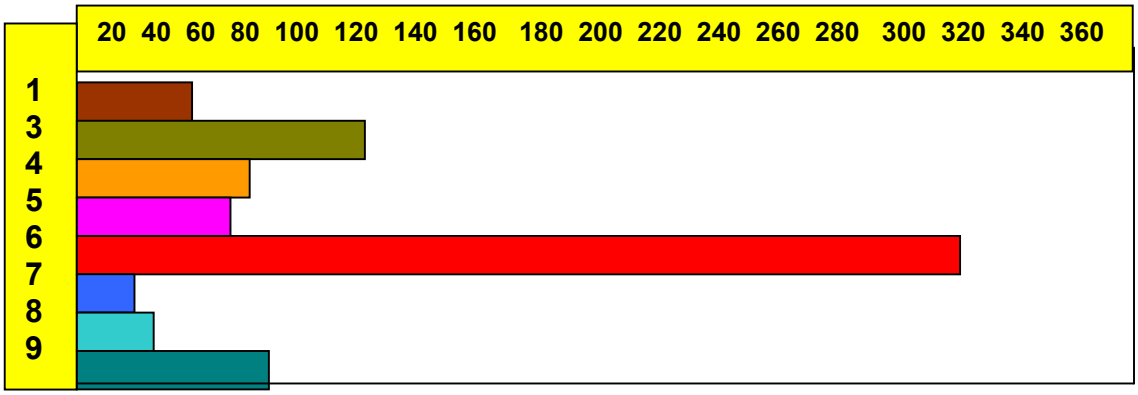
Current statistics prove that natural ignition sources for wildland fires in Coos County are far below that of accidental or human causes. The statistics prove the need for continual public education and awareness as growth and development in rural areas continue to impact the wildland-urban interface. Coos County being a paradise for sport fishing and hunting, the presence of man also impacts the rural areas.

Coos Forest Protection Association

Fires by Cause 1983 – 2003
(The category numbers are fire reporting codes)

Fire Code – By Cause

1 – Lightning	**3 – Equipment**	**4– Recreation**
5 – Smoking	**6 – Debris Burn**	**7 – Arson**
8 - Juvenile	**9 – Misc. Causes**	



Fires By Cause

1. Lightning: Lightning strikes Oregon thousands of times each year. The frequency of lightning and lightning-ignited fires is lower in the northwest portion of the state compared to the remainder of the state.

3. Equipment Use: Equipment, ranging from small weed eaters to large logging equipment, can readily ignite a wildfire, especially if used improperly. The frequency of fires caused by equipment has been rising in recent years. This increase may be related to the expansion of the wildland interface, which results in more people and equipment in close proximity with forest fuels.

4. Recreation: Fires caused by people recreating in and near Oregon's forests have grown moderately over the past ten years. This trend may reflect the state's growing population and a greater interest in recreation and tourist opportunities.

5. Smoking: The trend in wildland fires caused by smoking and improperly discarded cigarettes has decreased dramatically. It is not know if this desirable situation is due to fewer people smoking, better investigation of fire causes, or some combination of the two.

6. Debris Burning: Historically, and currently, fires from debris burning activities are the leading cause of wildfires. Aggressive prevention activities coupled with an increasing use of local burning bans during fire season have resulted in a reduction of such fires.

7. Arson: Oregon experienced a rapid rise in the frequency of arson-caused wildfires in the early 1990's. In response, the wildland protection agencies and the Oregon State Police instituted a series of aggressive arson prevention activities. In Coos County the occurrence of arson-caused fires is the lowest statistical cause for the twenty year period indicated.

8. Juvenile: The incidence of juveniles starting wildland fires has decreased in recent years. The Oregon Department of Forestry attributes this reduction to a concerted effort by local fire prevention cooperatives delivering fire prevention messages directly to school classrooms, especially through Smoky the Bear programs.

9. Miscellaneous: The "miscellaneous" fire cause category is a catchall classification for fires resulting from a wide array of causes. Automobile accidents, burning homes, and electric fence use are but a few of the causes in this category.

Hazardous Fuel Builders

In the forested areas of Coos County, Oregon Department of Forestry is concerned with several blights that are affecting the local forest growth. One of the factors that are 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 this foliage disease has become a great concern to forest managers.

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 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 progressing. 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 with other species.
The resulting addition of tender dry fuel in the forested areas of Coos and surrounding Counties is of major concern. Research and Management programs are ongoing to check the possible devastation of this natural resource.
United States Department of Agriculture

CURRENT MITIGATION ACTIVITIES

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

All of the fire service providers in Coos 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 Home Show.
- Fire prevention and safety information for annual County Fair.
- Burn permit inspections (over 4,000 in 2003).

- Coordinating educational programs with other agencies, hospitals, and schools.
- Answering citizens questions regarding fire hazards.
- CERT Training for the general public.

County Zoning and Land Development Codes

The Coos County Zoning and Land Development Codes detail the zoning districts, setback parameters, coverage, depth, structure height, and fire resistant standards in regard to roofing, enforcement and safety in commercial structures. The following sections refer to forest dwellings only. Pursuant to Oregon Revised Statues 215.730; 477.015-061; 478.120; 478.140; 478.910; 478.920 and 478.927, the following Coos County Ordinances have been adopted.

Section 4.4.400. <u>General Standards for Rural Residential Zoning Districts</u>
4.4.400 D. <u>Setbacks</u>:

- All buildings or structures with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline, or five (5) feet from right-of-way line, whichever is greater.
- Firebreak: New or replacement dwellings on lots, parcels, or tracts abutting the "Forest" zone shall establish and maintain a fire break for a distance of at least 30 feet in all directions.
  Vegetation within this firebreak may include mowed grasses, low shrubs (less than ground floor window height), and trees that are spaced with more than 15 feet between the crowns and pruned to remove dead and low (less than 8 feet from the ground) branches. Accumulated needles, limbs and other dead vegetation should be removed from beneath trees. [ORD 95-05-006PL 11/29/95]

<u>Compatibility with Forest and Agricultural Management Practices and Production</u>: Any applicant for a rural residential dwelling building or septic permit

adjacent to a forest or agriculture zone shall sign a statement on the Zoning Clearance Letter acknowledging that: “the normal intensive management practices occurring on adjacent resource land will not conflict with the rural residential landowner’s enjoyment of his or her property”.

- **Riparian Vegetation Protection:**

A. Riparian vegetation within 50 feet of a wetland, stream, lake, or river, as identified on the Coastal Shoreland and Fish and Wildlife habitat inventory maps, shall be maintained except that:

1. Trees certified by the Coos Soil and Water Conservation District, a Port district, or U.S. Soil Conservation Service posing an erosion or safety hazard may be removed to minimize said hazard; or
2. Riparian vegetation may be removed to provide direct access for a water-dependant use; or
3. Riparian vegetation may be removed in order to allow establishment of authorized structural shoreline stabilization measures; or
4. Riparian vegetation may be removed to facilitate stream or stream bank clearance projects under a Port district, ODFW, BLM, Soil & Water Conservation District, or a USFS stream enhancement plan; or
5. Riparian vegetation may be removed in order to site or properly maintain public utilities and road right-of-ways provided that the vegetation to be removed is the minimum necessary to accomplish the purpose; or
6. Riparian vegetation may be removed in conjunction with existing agricultural operations (e.g., to site or maintain irrigation pumps, to limit encroaching brush, to allow harvesting farm crops

customarily grown within riparian corridors, etc,) provided that such vegetation removal does not encroach further into the vegetation buffer except as needed to provide an access to the water to site or maintain irrigation pumps.

B. The 50 foot riparian vegetation setback shall not apply in any instance where an existing structure was lawfully established and an addition or alteration to said structure is to be sited not closer to the wetland, stream, lake, or river than the existing structure and said addition or alteration represents not more than 100% of the size of the existing structure's "footprint". (ORD 92-05-009PL)

Section 4.8.700 Fire Siting and Safety Standards. All new dwellings and permanent structures and replacement dwellings and structures shall, at a minimum, meet the following standards. The Planning Director may authorize alternative forms of fire protection when it is determined that these standards are impractical.

The dwelling shall be located within a fire protection district or shall be provided with residential fire protection by contract. 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 applicant is outside the rural fire protection district, the applicant shall provide evidence that he has contacted the Department of Forestry of the proposed development.

A. Firebreak:

1. A firebreak shall be established and maintained around all structures, including decks, for a distance of at least 30 feet in all directions.

This firebreak will be a primary safety zone around all structures. Vegetation within this primary safety zone may include mowed grasses, low shrubs (less than

ground floor window height), and trees that are spaced with more than 15 feet between the crowns and pruned to remove dead and low (less that 8 feet from the ground) branches. Accumulated needles, limbs and other dead vegetation should be removed from beneath trees.

2. Sufficient garden hose to reach the perimeter of the primary safety zone shall be available at all times.
3. A secondary fire break of at least 100 feet radius around the primary safety zone shall be established and maintained. Vegetation should be pruned and spaced so that fire will not spread between the crowns of trees. Accumulated needles, limbs and other dead vegetation should be removed from beneath trees.

   The primary fuel-free break and secondary break areas shall be provided and maintained on land surrounding the dwelling that is owned or controlled by the owner. A variance application will not be required if the parcel's configuration (shape and/or size) does not allow the primary or secondary fire break to be met. (OR-98-01-002PL)

B. All new and replacement structures shall use non-combustible or fire resistant roofing materials, as may be approved by the certified official responsible for the building permit.

C. If a water supply exceeding 4,000 gallons is suitable and available (within 100 feet of the driveway or road) for fire suppression, then road access and turning space shall be provided for fire protection pumping units to the source during fire season. This includes water supplies such as a swimming pool, tank or natural water supply (e.g. pond).

D. The dwelling shall not be sited on a slope of greater than 40%.

E. The dwelling has a chimney or chimneys, each chimney shall have a spark arrester.

F. If dwelling shall be located upon a parcel within a fire protection district it shall be provided with residential fire protection by contract. 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.

G. Except for private roads and bridges accessing only commercial forest uses, public roads, bridges, private roads and driveways shall be constructed so as to provide adequate access for fire fighting equipment.

H. Access to new dwellings shall meet road and driveway standards in Chapter VII.

Section 4.9.700. Development Standards.

- **Setbacks:**

A. All building or structures with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline or five (5) feet from any right-of-way centerline, whichever is greater.

1. Firebreak: New or replacement dwellings on lots, parcels, or tracts abutting the “Forest” zone shall establish and maintain a firebreak for a distance of at least 30 feet in all directions.

   Vegetation within this firebreak may include mowed grasses, low shrubs (less than ground floor window height), and trees that are spaced with more than 15 feet between the crowns and pruned to remove dead and low (less than 8 feet from the ground) branches.

Accumulated needles, limbs and other dead vegetation should be removed from beneath trees.

Oregon Department of Forestry (ODF)

ODF 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.

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 forest lands. 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 forest lands.

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 coastal ranges. Prescribed burning is also used by, municipalities to remove homes (demolitions).

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 available at no charge.

Fire Free 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.

Coos County Citizens Corps Council

The Coos County Citizens Corps Council is working with Southwest Oregon Community College sponsored Retired Senior Volunteer Program (RSVP) to secure grant funding to establish 'Senior Community Action Groups'. The Senior Community Action Groups will be providing public outreach activities to locate and identify 'at risk' urban-wildland interface residents in Coos County and build a data base of information which will be provided to corresponding fire districts. This action will facilitate contact and evacuations should the need arise as well as provide critical information for pre-fire run plans for the fire districts.

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

Implementation Strategy:

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

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

Timeline: 5 years

Plan Goals Addressed: Emergency Services

Wildfire #2

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

Implementation Strategy:

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

Coordinating Agencies:	Hazard Mitigation Planning Committee Oregon Department of Forestry U.S. Department of Forestry Coos Forest Protection Association Coos County Road Department Industrial Partners (Logging) BLM
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Public Awareness

Wildfire #3

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water trucks.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies:	Hazard Mitigation Planning Committee Coos County Sheriff Oregon Department of Forestry Coos Forest Protective Association Coos County Roads Department The City of Bandon
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property

SECTION 3 SPECIFIC NATURAL HAZARDS

TAB 2 - FLOODING

CHARACTERISTICS OF FLOODING

Erosion, landslides, and floods have occurred for millennia along the Oregon coast and continue to shape the shoreline today. Although these geologic processes only affect a narrow band of coastline, it is the same narrow band in which increasing numbers of people live, work, and play. High cliffs and coastal bluffs, estuary floodplains and exposed beaches, when combined with severe Pacific storms and periodic earthquakes, form a natural setting for geologic hazards in the Northwest. Storms and waves erode beaches, redistribute sediment and undermine bluffs. Heavy rainstorms weaken slopes and send torrents down coastal watersheds.

The Oregon Coast is characterized by high rocky headlands, broad beaches, and large river-mouth estuaries.

Oregon's "Coastal Zone' extends from the crest of the Coast Range mountains out three miles to the limit of the state's territorial sea, and from the Washington border south to the California border. The upland or "dry-land" portion of the Oregon coastal zone totals about 5 million acres (7,800 sq. mi.). The coastal uplands enjoy a mild marine climate which is ideal for growing lush forests. The area is set off from the eastern valleys of the state by the coastal range mountains. Winters are cool and rainy; summers are cool but less rainy. Average winter temperatures, range from 41 to 47 degrees Fahrenheit. Average July temperatures range from 57 to 71 degrees Fahrenheit. Extreme variations are rare; only occasionally do winter storms bring freezing temperatures and high winds, while fog up to about the 500 foot elevation moderates the summer temperatures. Of great significance is the annual rainfall, which ranges from 50 to 60 inches along the immediate coastline upwards to 120 inches along the eastern boundary (which is the mountain crest). The runoff is into the wetlands, constantly altering the shape and extent of the bodies.

Over the millennia, Oregon's coastal rivers and estuaries have attracted people and invited settlement along their edges. Prehistoric and later indigenous people found abundant fish and shellfish, birds and waterfowl, marine and land mammals, and densely vegetated riparian areas and flood plains; all of which provided essential food, clothing, and shelter. Early explorers, fur traders, Euro-American settlers, and developers were drawn to these pristine watersheds by the abundant exploitable natural resources and the many advantages the coastal waterways offered.

In the Original Land Survey of 1857, Daniel Gilles (printed in the book 'Pioneers and Incidents of the Upper Coquille Valley') reports,

"**The river bottom was covered with maple, myrtle, ash and many other kinds of timber . . ." ". . . and, when white man arrived on the scene [tidal Coquille], in places their tops met and interlaced above the stream. Travel upon the Coquille is through scenes of enchantment, and the sluggish river seems like dim aisles in ancient cathedrals."**

The comment by John Flanagan, quoted in 'A Century of Coos and Curry' by Peterson and Powers, summed up the 1860 historical scene on the lower

Coquille River:

"When we got to the river the salmon were jumping by the thousands . . . Old Jim . . . said, Begorra, Sir, it's a pity to see all those fish go to waste. Somebody ought to catch them."

The abundance of quality fish habitats was reflected by the large and successful early fishery industry on the Coquille River. The U.S. Army Corps of Engineers 1879 Annual Report to Congress commented, **"The salmon fishery business is growing rapidly on the river, three firms being now engaged in it."**

The 2001 Assessment reporting the results of several recent publications sponsored by the Oregon Ocean and Coastal Management Project (OOCMP) indicate that very recently it has been recognized that in addition to El Niño events, there are other inter-annual, inter-decade, and even longer variations in storminess affecting the flooding and erosion along the coast. So called Pacific Decadal Oscillation (PDO) events are characterized by a shift between warm-dry and cool-wet climatic phases over a period of 20-30 years. It appears that the warm-dry phase favors El Niño conditions. Conversely, the cool-wet phase favors La Niña conditions. What is particularly important is the suggestion that a phase change from warm-dry to cool-wet conditions may have occurred in the mid 1990's. Because the cool-wet phase favors La Niña conditions, and La Niña conditions are associated with an increase in the frequency and intensity of storms in the Pacific Northwest, the Oregon coast may be expected to experience an increase in flooding and erosion.

Over the years, conservationists and developers have been at odds on many issues, including the economic, functional, and aesthetic values of wetlands. Residential, industrial, municipal, and agricultural developers have mainly viewed wetlands as unproductive wastelands to be drained, filled, and diked for economic exploitation, while conservationists have seen them as crucial habitats to be preserved for the benefit of innumerable species of wildlife, some of which are threatened or endangered. Now it seems this age-old point of contention might well be a rallying issue for both sides. It turns out that what's good for wildlife is also good for people and their property. Wetlands do a much better job of protecting people and property from flood danger and damage than any of the structures built for the purpose of flood control. What's more, wetlands don't require expensive maintenance and repair. Even the U.S. Army Corps of

Engineers, the agency responsible for building most of America's flood-control structures, recognizes the value of wetlands and their flood-control functions. The ability of upstream wetlands to temporarily store and gradually convey floodwaters is a crucial aspect of the flow of fresh water to the estuary. Where the construction of dikes, levees, and other structures cuts off side channels and wetland areas from the main stem river, the imprint natural functions of these areas are impaired or lost altogether. In effect, the structures built to control floodwaters may, indeed, compound the impacts of flooding by increasing downstream flow velocities, flood peaks, and erosion; the most dangerous and damaging aspects of any flood. Clearly, any coastal Oregon community developing a plan for floodplain management must make wetland preservation and restoration key elements. Not only must coastal residents insist on the protection of all remaining wetlands, but wherever possible, should also identify any previously converted wetlands that can be restored to their original functions. From the salt marshes bordering the estuaries to the freshwater wetlands scattered along the floodplains, these natural areas are far too valuable to squander.

PROBABILITY

Historical Marshlands and Adjacent Upland Landscape

Every winter extensive sections of the lower Coquille River valley are frequently flooded by rainfall, surface and subsurface runoff, into the bottomlands from the uplands or by higher river flows. As a child in the 1940's, Carol Wood visited her aunt who lived in Arago. She recalled that during the winter, the community was sometimes virtually water-bound by the flooding river, and that in those times the only practical way to leave or return to Arago was by boat. Apparently the road that hugged the southwestern hills was usually passable, but the route was a lengthy and impractical way to reach Coquille or Myrtle Point. **(Personal conversation, 1990; Historical Reconstruction of the Coquille River and Surrounding Landscape – Prepared by Patricia Benner)**

Current aerial photographs taken of the valley show that today all but a few areas of this land to the south and west of Arago are part of the agricultural network of the valley. One hundred and fifty years ago the landscape was different. In September of 1858, when Surveyor Truax walked across these Coquille bottomlands just to the south of the current day Arago, he described what he had surveyed.

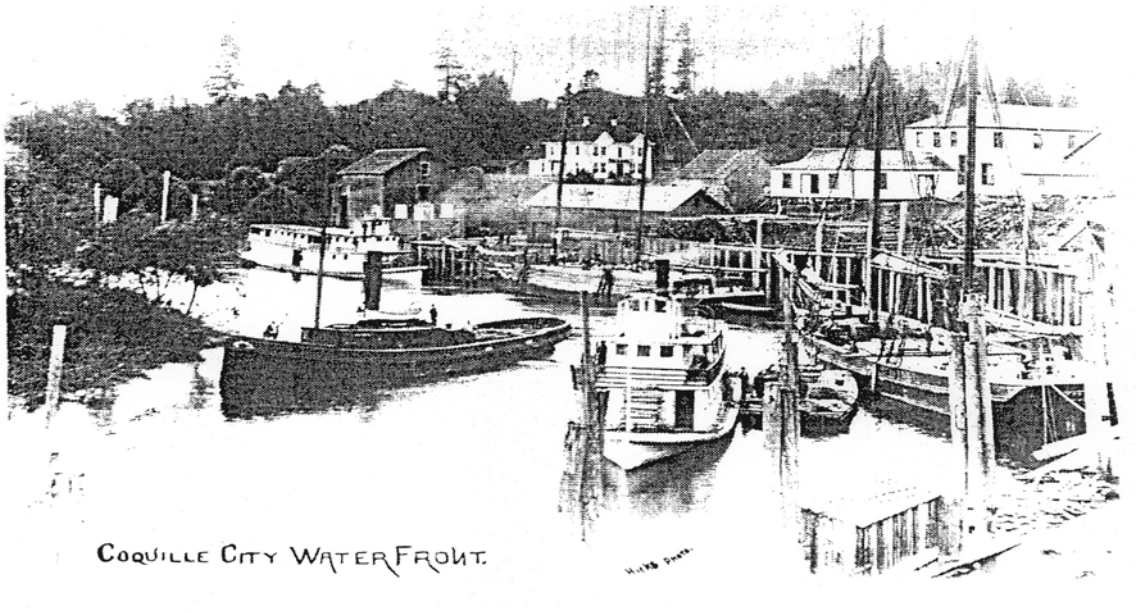
"Surface level, mostly swamp; water from 6 to 24 inches deep. Soil first rate. Timber, (in swamp), Ash, Alder, Willow, Maple and Myrtle. Undergrowth Crab-Apple, Salmon [berry], Vine Maple and Willow."

This section of the report is a compilation of archival material that reconstructs some of the historical features of the tidal Coquille River bottomlands in the mid 1800's, at the time of Euro-American settlement of the valley. At the time of Euro-American settlement, 70% or 14,440 acres of the Coquille bottomlands along the tidal portion of the channel were swampy or marshy in nature. The majority of the remaining bottomland was in floodplain. Surveyors noted that the bottomland acreage was **"wet and miry," or "covered with water three-quarters of the year."**

The Forks of the Coquille and their tributaries, for many years prior to the construction of forest roads, were the only attractive options for logging companies for the transportation of logs down river to the mills or to regional railroads and main transportation routes. The Smith and Powers Logging Company was the exception in the Coquille watershed when they chose to build railroads to transport their cut timber, but other logging companies preferred less expensive options for the transport of their logs. The transport of logs down the tributaries was an activity that could only occur in the winter season during high flow events. "Freshets", as they were called, were the naturally occurring river floods that historically had transported downed trees and brush that had fallen into tributary channels or had rested on streamside lands, to the lower river. These winter flood waters were enlisted to transport logs. Naturally, however, there were problems associated with relying on nature's high water events, including issues with channel pile-up jams, and the inability to select the day and frequency of such flows.

Coquille Waterfront 1890

The forested slopes of the foothills and coastal mountains furnished a seemingly endless supply of timber, first for putting up cabins and other essential structures, then for erecting mills and docks, building boats and ships, and ultimately exporting forest products to other parts of the world.



The rich alluvial soils of the floodplains proved ideal for raising crops and pasturing livestock. In an era with no roads, the waterways themselves were important transportation corridors, as many still are. Several different types of commercial and industrial activities brought more development to Oregon's estuaries, especially the larger ones. For example, coal mining near Coos Bay, dairy farming in the Coquille Valley and elsewhere, a growing pulp and paper industry, expanding wood-products operations, and coast-wide development of commercial fisheries, began in the late 19th century and continued into the 20th century. With these activities came residential and municipal expansion and the building of railroads, highways, and bridges. Urban areas, with all their buildings, roofs, streets, parking lots, driveways, and other impervious surfaces, spread from the riverbanks and estuary shores throughout much of the lower floodplains

of Oregon's coastal rivers. To accommodate all this growth, people have greatly modified the rivers, estuaries, and riparian areas and disrupted or displaced vast floodplain natural areas and their important functions, leading to increased potential for floods. Development for short-term benefits has had long-term consequences that probably weren't apparent until the latter part of the 20th century. When people began to gain a better understanding of the effects their actions might have on future generations, wildlife habitat, the health of our rivers and estuaries, and the quality of coastal life, community planning had to change to protect the environment.

"Rivers and their floodplains are dynamic and complex natural systems that can provide important societal benefits, both economic and environmental. By adapting to the natural phenomenon of flooding, rather than trying to control floodwaters, we can reduce the loss of life and property, protect critical natural and cultural resources, and contribute to the sustainable development of our communities". (John H. McShane, Acting Chair, Federal Interagency Floodplain Management Task Force.)

Periodic flooding is a natural and beneficial process in a relatively undisturbed watershed; the natural, recurring process of flooding would have few, if any, long-term detrimental effects on the environment. In fact, seasonal and periodic flooding is beneficial to plant and animal communities throughout the watershed and is essential to certain estuarine functions. For 10,000 years, rivers have carved out their floodplains, and leveled lowland areas adjacent to their channels to act as catch basins for storing and conveying excess floodwaters. Along the Oregon coast, floodplains are relatively narrow and densely vegetated, gradually widening as the river approaches the estuary. Various and diverse floodplain ecosystems range from the riparian forests and forested wetlands that characterize the river's upper and middle reaches to the salt marshes that border the estuary. In between, lush meadows, off stream side channels, backwaters, freshwater marshes, and intertidal creeks and sloughs provide wildlife habitat and natural flood control. Oregon's estuaries are subject to periodic and seasonal flooding from both marine and riverine sources. The incoming tide, or flood tide, visits estuaries twice daily, inundating intertidal flats

and low salt marshes with waters bearing nutrients and sediments from the ocean that are crucial to the health of estuarine plant and animal assemblages. Equally important are the seasonal floods resulting from winter storms and spring runoff, which carry land based sediments and organic matter and trigger chemical processes that are beneficial to floodplain soils and vegetation. Seasonal flooding of lowlands along the coast creates resting, feeding, and over wintering areas for many species of shorebirds, wading birds, and waterfowl, some of which are listed as threatened or endangered species. Nearly all of the ducks that migrate along the Pacific Flyway use Oregon's estuaries and floodplains at some time from early autumn to late spring. Some waterfowl remain all winter, attracted by the moderate climate and abundant food. Local ducks, geese, and wading birds stall all year, nesting and raising fluffy broods in floodplain marshes and vegetated riparian areas. They often find food and refuge from predators in ponds and potholes left by receding floodwaters. Flooding also moves large wood debris through the watershed, depositing it along banks and in channels from headwater streams to the estuaries. Downed trees, large branches, and rood wads that become embedded along stream banks can help stabilize the banks and prevent erosion. In the stream, large woody debris an increase channel complexity and creates a valuable habitat for salmon, trout and other fish, as well as for the many spiders and insects the fish eat.

Large wood also absorbs stream flow energy, thus reducing flow velocities and preventing downstream erosion. In the estuary, logs, trees, and other driftwood function similarly by augmenting structural complexity and providing habitat and refuge areas for fish and other estuarine organisms. Moreover, in this brackish environment, marine wood-boring organisms devour a good bit of the driftwood and, through their waste products, contribute substantial amounts of organic detritus to estuarine food webs. Along the edges of estuaries, the roots and rhizomes of salt marsh plants help to stabilize the shoreline and protect it against erosion. The emergent parts of the plants help prevent excessive siltation of tidal channels by slowing the flow of water through the marshes and

causing fine particles to drop out and settle. Like spongy buffer zones between the estuary and upland areas, salt marshes moderate the effects of winter storms and spring runoff. Throughout the watershed, hydrological, geological, and biological features combine to perform valuable floodplain ecosystem functions. While storing and conveying floodwaters, floodplain wetlands and vegetated riparian areas protect and enhance surface-water quality, recharge groundwater aquifers, and help reduce floodwater volume and velocity while preventing downstream erosion. They also provide habitats for terrestrial, avian, and aquatic wildlife while furnishing scenic and aesthetic value, as well as diverse recreational activities and opportunities for scientific study.

Various features of floodplains interact to play crucial environmental roles, which human disturbance can disrupt, sometimes with devastating results. Development along riverbanks and estuaries degrades floodplain ecosystems, increases the potential for flood damage, and upsets valuable natural functions. Over development of floodplains is the double-edged sword that makes flooding such a threat to human life and property. First, by putting houses, businesses, and industrial structures in the floodplain, people place themselves and their property in harm's way. Moreover, eliminating natural flood-buffering wetlands, open areas, and riparian vegetation to make room for floodplain development increases the threat and effects of flooding. Loss of coastal wetlands and their functions has coincided with pioneer settlement and subsequent development of the floodplains adjacent to estuaries, particularly the larger ones, such as Coos, Umpqua, Siuslaw, Yaquina, and Tillamook bays.

According to the National Wetlands Inventory of the U.S. Fish and Wildlife Service, Oregon has lost 38 percent of its valuable wetlands to development. In the Coos Bay estuary, however, that figure soars to more than 85 percent. Extensive diking, draining, and filling during the late 19th and early 20th centuries eliminated thousands of acres of Coos Bay's valuable salt marshes. Many marshes were diked and drained for agricultural purposes. In early dredging operations, dredge spoils were dumped into salt marshes, because the marshes were nearby and convenient and the spoils served as valuable fill material,

allowing the marsh areas to be claimed for other purposes, such as residential, industrial, and municipal development. In addition to destroying wildlife habitat and removing important salt-marsh functions from the estuarine system, such modifications increase the potential for catastrophic flooding and exacerbate the effects of smaller seasonal floods. Furthermore, extensive development on the filled marshes increases the likelihood of flood damage to residential, business, and industrial structures standing in these areas, including much of downtown Coos Bay. For various reasons, the amount of large woody debris entering our coastal river systems has been greatly diminished from historic levels. Old-growth conifers are the best source of this material, and most of them have been harvested. Clear cutting and stream clearing have also reduced the amount of available large wood. Gone with the fallen trees and driftwood are all their hydrological and biological functions. Costs of repairing damaged levees and revetments after a major flood can soar. Levees can even contribute to the potential for flood damage in several ways. They reduce the floodwater storage capacity by constricting the floodplain.

By increasing stream-flow velocity during high-water periods, they raise the probability of bank erosion. Levees are designed to confine the stream channel, and in so doing they can cause upstream backwater flooding, downstream erosion, and sediment accumulation in the channel. Perhaps worst of all, construction of levees usually encourages new development and major improvements to existing structures in the floodplain. Should the levees then prove incapable of holding back catastrophic flooding, the potential for danger and damage escalates. By design, most flood-control structures are harmful to wildlife. Traditional construction of levees and revetments with bare riprap faces reduces protective vegetation in streams, which often provides forage and refuge areas for juvenile and adult salmon, trout, and other fish species. Absence of vegetation also increases water temperature and decreases biodiversity by reducing or eliminating populations of insects and microorganisms essential in the food web. Because vegetation is more efficient than bare rock in absorbing a stream's energy, lack of vegetation can lead to increased stream flow velocity, as

well as erosion and siltation of downstream spawning beds, resulting in destruction of fish eggs. Reduction or elimination of riparian vegetation diminishes available food and habitat for many species of birds and mammals. It also decreases the amount of organic litter and woody debris that enters the rivers and reaches the estuaries, where such material is essential to estuarine processes. Construction of levees and revetments also cuts off side channels and wetlands from the main channel. These vital areas not only serve as important refuges for various fish species during periods of high main-channel flow, but they also function as rearing habitat and safe havens from predators for juvenile fish, including salmonids. During periods of high flow, these off-channel areas also store floodwaters and slowly release them over time, thus acting like pressure-relief valves when a river is in flood stage.

One clear benefit of structural flood-control projects, such as levees and revetments, is the reduction of flood risks to some houses, businesses, farms, roads, and bridges in the floodplain during moderate flood events. Moreover, reduced flood risk can lead to economic development and prosperity. Such benefits, however, come with certain drawbacks and some possibly unforeseen hazards. Flood-control structures are initially expensive and require costly maintenance. Building new levees, for example, costs from $3 million to $6 million per mile. Costs of repairing damaged levees and revetments after a major flood can soar. Levees can even contribute to the potential for flood damage in several ways. They reduce floodwater storage capacity by constricting the floodplain. By increasing stream flow velocity during high-water periods, they raise the probability of bank erosion.

Anyone who has spent a winter and spring on the Oregon coast knows that flooding is a frequent seasonal occurrence on many coastal rivers and their tributaries. 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 flood into a catastrophic event, however, is the right, or wrong, set of circumstances. As marine air moves on shore along the Oregon 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 rivers 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 tides, extensive coastal flooding can result. When extreme river flows then meet high sea levels, flood-waters cannot discharge into the ocean. With nowhere to go, they back up into the estuary and flood the low-lying areas. Weather extremes also contribute to the potential for catastrophic flooding. During Oregon's 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.

For much of the 20th century, Americans' response to catastrophic flooding was the erection of federally designated and financed dams, levees, and other flood-control structures. By the end of the century, however, in the face of continually rising flood losses and a growing concern for environment well-being, Americans' approach shifted from structural flood control to land-use management, from federal to local decision making. The New York Times aptly described this new concept was "changing the behavior of people instead of rivers. " For decades, we have relied upon technological solutions to problems caused by expanding human population, dwindling natural resources, and technology itself. Some of our technological fixes, however, have created worse problems than they have solved. It's now clear that trying to constrict and

confine the flow and course of a river and restrict it from its natural floodplain might be the most costly and futile of approaches to flood protection. Conversely, recognizing the values of naturally functioning floodplains and restricting human use of these areas may lead us to the most sensible and cost effective solutions to flood control and related problems.

Global warming is causing sea levels to rise worldwide. Also, El Niño events, which may be occurring with greater frequency, raise sea levels temporarily but significantly along the Oregon coast. High sea levels exacerbate the effects of both seasonal and catastrophic floods, increasing the incidence and extent of lowland flooding. Even the classification of areas within flood plains according to their likelihood of flooding over time or in any particular year is a source of confusion and may inculcate a false sense of security in some floodplain property owners, because it's less a matter of prediction than probability. So-called 25-year floods, for example, have a four-percent chance of occurring in any given year; 50-year and 100-year floods have two-percent and one-percent flooding probability, respectively.

Flooding occurs when an excess of precipitation falls, causing rivers, streams, and lakes to rise over their banks. In Coos County, high tides can often add to the problem of heavy rain. Short-term effects on agricultural properties are drowned crops, trapped livestock, and 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 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.

Stranded Livestock, Coquille Valley, Winter 2004

Estuaries

Estuaries are special places where ocean and river mingle to create a dynamic, diverse, and highly productive environment. Plants and animals thrive in this unique environment driven by sunlight and the daily tides. Humans, too, are drawn to the estuary to harvest food, travel on its waters, and claim the flat lands for the purposes of civilization. Twice each day, estuaries are the stage for a slow, stately drama influenced by the moon, the sun, the wind, and the rain. Sinuous channels, branching and winding across the broad mud flats, are filled with incoming ocean waters. As the channels fill, the rising tide spreads slowly across the flat mud. The estuary is full, for a moment, the drama pauses. Then as the earth turns, the ocean's push becomes a pull, and the waters of the estuary recede. Before long, logs at the edge of the salt marsh are grounded on the mud, the eelgrass lies limp and flat, and tiny creatures are stranded in isolated pools of water warming in the sun. Clam diggers move carefully across the muddy flats toward the edge of the winding channel. But in a short time, the cycle will begin again.

An estuary is defined as a semi-enclosed body of water, connected to the ocean, where salt water is measurably diluted with fresh water from the land. It is a zone of transition between the marine-dominated systems of the ocean and the upland river systems, a zone where the mix of the two yields one of the most biologically productive areas on earth.

There are several types of estuaries on the Oregon coast. The majority of them, like Coos Bay, are the drowned river mouth variety, where winter's floods discharge high volumes of sediments through the estuary. In summer, seawater inflow dominates the estuary because the stream flow is low. Estuaries are, in reality, complex systems made up of four major parts or subsystems. These parts blend from one another with no clear demarcation, but each has some distinct characteristics. The Pacific Ocean greatly influences the water and the ecology of the estuary near its mouth. The degree of this influence is a product of two major factors linked to the seasons of the year.

The amount of freshwater outflow pushing against the ocean's waters depends upon the size and shape of the drainage basin; the amount of rainfall or snowmelt; the strength of the tidal surge into the mouth of the estuary, which is influenced by the shape of the channel mouth; and the height of the tide, and in winter, the storm surge.

In this marine-dominated zone there is a steady mix of marine life into and out of the estuary. The main channel serves as the entrance and exit for many fish and larger invertebrates that take advantage of the food-rich estuarine environment during some part of their life cycle. The bay portion of the estuary is characterized by broad mud flats, which are exposed to the air at low tide and flooded by a mist of salt and fresh waters at high tide.

The majority of the larger estuaries have extensive bay components. Coos Bay, for example, has a relatively large bay as part of its estuarine system. Sloughs are the smaller tributaries to the main bay and river channels. They have little freshwater inflow. Tidal flushing may not be as complete as in parts of the estuary that are closer to the ocean or main channel. Generally, sloughs consist of meandering channels that wind through fringing marshes and across mud flats to the main bay. It is these small channels that bring the tide up into the marsh and to the edge of the forest. Coos Bay has a number of sloughs which are relatively large and navigable for several miles, including Isthmus Slough, North Slough, and Catching Slough. In turn, smaller sloughs are tributary to these. South Slough, one of the major tributaries at Coos Bay, does

not fit this general description. Rather, it is a separate, miniature estuarine system, which shares with Coos Bay a common mouth to the ocean. South Slough was designated the first National Estuarine Sanctuary under a program established by Congress in 1972.

Tide is a major limiting factor for many species in aquatic environments. The classification system distinguishes between intertidal and sub tidal habitats, since biological communities often differ significantly according to the degree of tidal influence. Special adaptations are required by intertidal species to resist desiccation and tolerate large variations in temperature and salinity associated with tidal exposure. Sub tidal habitats are below extreme low water, and this has continuously submerged substrates. Intertidal habitats are exposed and flooded by tides as often as twice daily or as seldom as a few times a year. The upper limit of the intertidal zones is defined for regulatory purposes, as the line of non-aquatic vegetation, or as mean higher high water where such a line cannot be determined. 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 properties in flood-prone areas, to local land-use and water-use decisions 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 decision on how valuable floodplain resources should be used and preserved.

Oregon Department of Environmental Quality: Oregon Department of Fish and Wildlife: Oregon Department of Land Conservation and Development: Oregon Water Resources Department: South Slough National Estuarine Research Reserve: United States Army Corps of Engineers: United States Environmental Protection Agency

LOCAL HISTORICAL FLOODS

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. Coos County, with its extensive estuaries and waterways, is particularly vulnerable to coastal storms that can cause widespread flooding.

Because the Coos County economy is highly dependent upon agriculture, storms can have a devastating effect.

Obvious results of storms are regularly seen in flooded grazing pastures and crop fields, in broken trees and downed power lines. Often, however, the impact on farms and ranches goes far beyond the obvious.

Recent Flood History

February 1999, Flooding in Coquille. Crop Damage of $5 million.

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

November 18, 1996 - State of Emergency declared due to flooding and landslides in Coos County. 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. North Bend was one of the locations, with a recorded 6.67" of rain in 24 hours.

Libby Drainage District, Coos Bay

December 21, 1996 – Presidential Disaster Declaration for continued flooding, land and mudslides in Coos County, for period of November 17th to December 11th.

Flooding very widespread in Oregon, with many roads closed due 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 even by four-wheel-drive vehicles.

Stormy conditions, with strong winds and heavy rain. Flash flood warnings and small stream advisories issued for Coos and Curry Counties. Coquille River at flood state. (Hydrologic Information Center)

Mailboxes along roadside near flooded Coos River

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

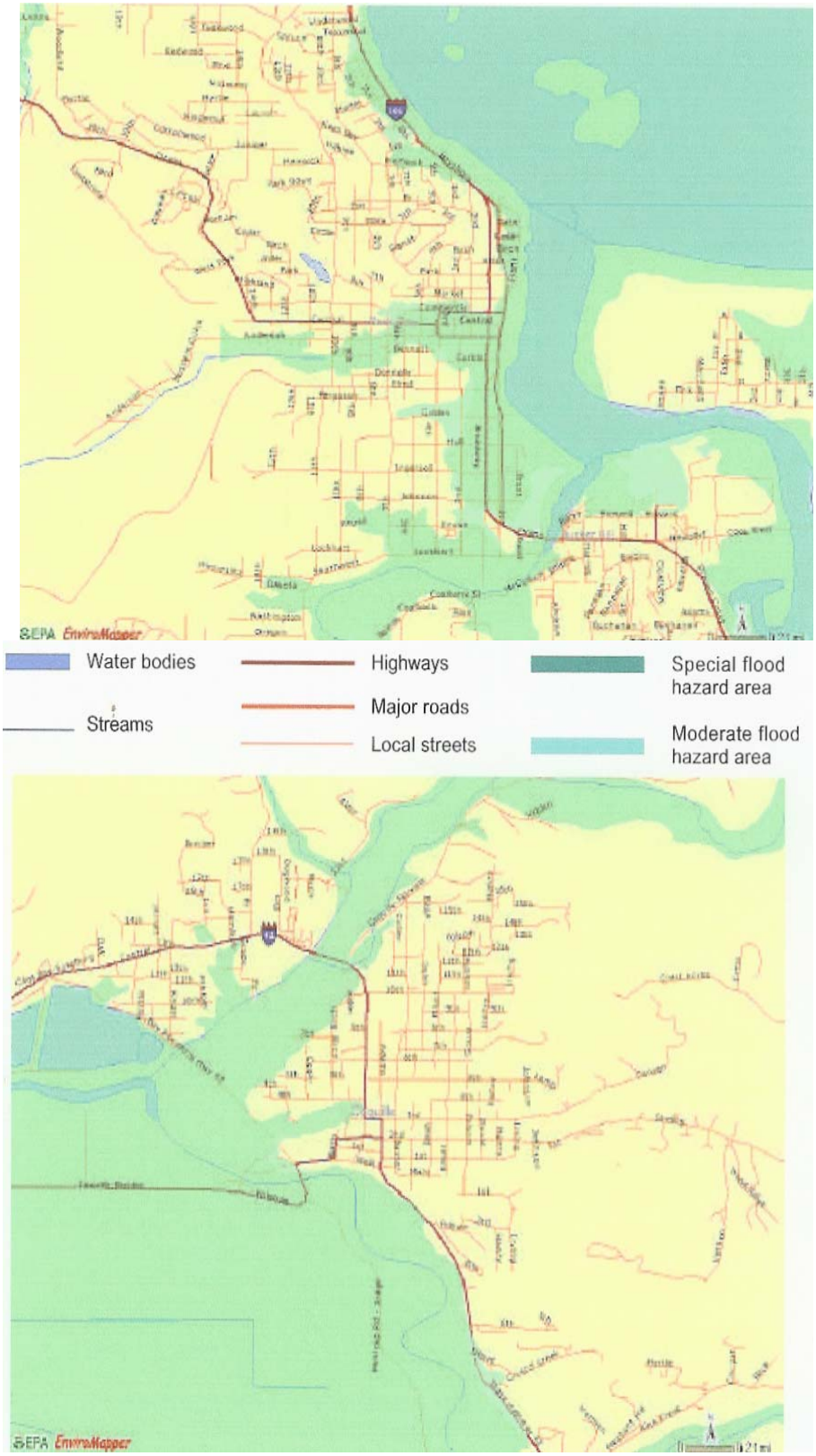
November 30, 1998 – Coquille River flooded, including the North Fork at Myrtle Point.

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

Coos County Flood Damage (1983 – 2002)

Type of Damage	Incorporated Cities	Unincorporated Areas of County
Repetitive Damage / Loss		
Buildings	$15,281.73	$59,493.07
Contents	$ 575.38	$34,047.30
Total Damage / Loss - Non Repetitive		
Buildings	$1,105,645	
Contents	$ 156,399	
Combined Total for Both Types		
Building	$1,180,419.80	
Contents	$ 191,021.68	

POTENTIAL FLOOD AREAS IN AND AROUND COOS BAY



POTENTIAL FLOOD AREAS IN AND AROUND COQUILLE

VULNERABILITY AND RISK - COMMUNITY ISSUES

Infrastructure

The impact on communities and infrastructure from flood events result in the loss of life, property, and the risk of impacting the critical public facilities. The fact that the Coos County communities were located along the water ways to facilitate economic growth and development, local governments were not wise in placing public sanitation facilities in the flood inundation areas of these waterways when they were originally planned, many years ago. In many of the Coos County communities this factor is becoming a large problem in that flood-waters continually damage these facilities on an annual basis. It is of critical note that during the 1996 flood event, 34% of the reported damage was to public buildings. It is important to realize that many of these structures are in a flood prone area.

Flood- waters continually impact these facilities, causing:

- Interruption of critical services.
- Spillage of raw sewage into rivers, creeks and sloughs.
- Impacting fish and wildlife.
- Creating a health hazard.

Heavy winter storms present an ongoing problem for sewage plants.
Recent documented events:

03/23/1998	City of Powers – bypass of raw sewage.
11/06/1999	City of Coquille – sewage spill due to power outage and excess rain.
12/07/1999	Myrtle Point – Sewage spill into Coquille River, caused by heavy rain.
01/11/2000	Myrtle Point – raw sewage overflow, caused by storm.

01/11/2000 Powers – raw sewage overflow into Coquille River, caused by heavy rain.

05/07/2001 Coos Bay – raw sewage spill.

05/15/2001 Myrtle Point – overflow of partially treated sewage into S. Fork Coquille River, caused by heavy rain.

07/24/2001 North Bend – raw sewage overflow into Pony Slough (flows to Coos Bay).

11/21/2001 Myrtle Point – overflow of partially treated sewage due to heavy rain.

12/14/2001 Powers – overflow of raw sewage into South Fork Coquille River.

Fast moving water can wash buildings off of their foundations and sweep cars downstream. Pipelines and bridges can also be impacted when flood debris clogs waterways, leaving the water no place to go but up. Many of these facilities are an essential part of daily life for all citizens in the county. Emergency facilities and residences can be impacted by flooded streets restricting public access. Land slides commonly impact Coos County roads on an annual basis and in some cases can totally isolate a rural community.

Homes

Homes in rural floodplain areas depend on private sewage treatment systems. These homes can also suffer damage to septic systems and drain fields when high water saturates the ground and further absorption becomes impossible. The inundation of these systems can often cause damage to homes and make them unlivable for health reasons. Most flood damage is caused by water saturating typical household materials such as wood, insulation, wall-board, fabrics, furniture, and floor coverings.

Manufactured homes present additional difficulties in that they are more structurally unstable than a stick-built home and must be anchored to provide additional stability during flood events.

Business and Industry

Flood events commonly interrupt businesses by impacting access roads as well as the possibility of water damage to the facility itself causing business closure. A quick response to the needs of business in a flood event can stimulate a community's recovery process. The business community plays a very important role in any community's recovery process. Economic vitality will lessen the impact on local governments to sustain a community.

Roads

Road systems are critical for providing emergency services. Due to the amount of water systems in Coos County, most of the main road networks traverse floodplain and floodway areas. The County Roadmaster is aware of the roads at risk from flooding as well as land slide. Both of these events can and do impact the county on an annual basis.

Bridges

Bridges are of a major concern during flooding events as they are important links in the roadway network. Pilings are often perfect catch structures for floating debris, which often results in major flooding of surrounding areas. Once the water flow is restricted, its impact by tide surges and runoff creates a flash flood which can impact an area for miles.

A state inspector must inspect all state, county, and city bridges every two years. Inspectors are looking for everything from seismic capability to erosion and scour. The rating system enables the inspectors to prioritize the bridges needing repair. On a score from 1 – 100 (1 being the worst) a bridge receiving a rating of 50 or less is placed in the repair list. If the bridge receives a rating over 50 it does not make the repair list. Smaller more economically feasible repairs are the responsibility of the County. Larger projects would require funding

through the Highway Bridge Replacement and Rehabilitation Program (HBRR). For the larger projects HBRR provides 80% funding and the county is responsible for the remaining 20%.

Storm Water Systems

Many of the Coos County and surrounding community's water delivery systems are antiquated and no longer adequate to provide this essential service. Many were constructed in the mid 50's and were built to last for approximately 30 years. Most of the local governments are in the process of assessing their systems and planning replacement. Many times the speed of inundating flood waters into the storm water systems results in additional flooding problems. Some of these systems are no longer capable of delivering adequate drainage in a normal setting and absolutely cannot handle the excessive influx of water during a storm event.

Water Quality

Coos County currently has two water reservoirs, which are restricted from public use to maintain their purity. The water quality is maintained through filtration systems for delivery to the general public. Most rural areas are served by private wells. Most of the well water quality is excellent throughout the county. Those wells that tap into a main water table usually have year around water. There are some that become dry during the late summer months and residents are forced to store water in large tanks to last until the next rainy season, when the water table can be replenished.

CURRENT MITIGATION ACTIVITIES

Currently there are several stream dredging projects on going in Coos County. The projects are the Mettman Creek and Ross Slough (tributaries of Coos Bay). The dredging is to reduce flooding of the pastures through maintenance of the flow capacity of the waterways. There is also annual dredging of the Coquille River in Coquille.

The following **Coos County Zoning and Land Development Ordinances** address property, building, and flood protection in designated flood plain areas.

Section 4.6.200 – **Purpose.**

Section 4.6.201- **Warning and Disclaimer of Liability.**

Section 4.6.202 – **Manufacture home and Manufactured Home Park or**

Subdivision within Designated Flood Areas (restrictions).

Section 4.6.205 – **Designation of Flood Areas** – (as defined by the Federal Insurance Administration).

1. Flood Insurance Study.
2. Designation of Regulatory Floodway.
3. Base Flood Elevation.
4. Flood Insurance Rate Maps.

Section 4.6.210 – **Permitted Uses** – Flood Plain Floating Zone.

Section 4.6.215 – **Conditional Uses.**

Section 4.6.220 – **Identification of Flood Hazard on Verification Letter.** (identification of land prior to issuance of building permit)

Section 4.6.225 – **Flood Elevation Data** (to determine flood insurance, risk, and premium rates).

1. Elevation verification.
2. Necessity to flood-proof a structure.
    a. Maintain records.

Section 4.6.230 – **Procedural Requirements for Development within Special Flood Hazard Areas** (applicable to structures, dependent on compliance with state building codes).

Section 4.6.235 – **Sites Within Special Flood Hazard Areas** (includes placement of prefabricated buildings and mobile homes).

Section 4.6.240 – **Manufactured Homes** (requirement to place on permanent foundations with lowest floor above base flood elevation).

Section 4.6.245 – **Reserved.**

Section 4.6.250 – **Reserved.**

Section 4.6.255 – **Reserved.**

Section 4.6.260 – **Review of Land Subdivision Applications -** (civil engineer assessment of land for subdivision proposal).

Section 4.6.265 – **Evaluation of Variance Applications** (building will not cause undue danger to hazards to others).

Section 4.6.270 – **Floodways** – (prohibition to build in floodways if it can create a hazard).

Section 4.6.275 – **Alteration of Water Courses** – (notification to Department of Land conservation and Development – DLCD and submit evidence of notification to Federal Insurance Administration).

Section 4.6.280 – **Shallow Flooding Areas** – (height requirement of the lowest floor including the basement elevated above the highest adjacent grade of the building site).

Section 4.6.281 – **Coastal High Hazard Area –** (special flood hazards).

1. Structure shall be located landward.
2. Elevated on pilings.
3. Obtain elevation in relation to mean sea level.
4. Space below the lowest floor is free of obstructions.
5. Breakaway walls to be used as parking areas under housing.
6. Prohibition of use of fill for structural support.
7. Prohibition of man-made alteration of any sand dune.

Section 4.6.285 – **Coordination** – (Issuance of permits).

Section 4.6.290 – **Restrictiveness** – (when imposed provision of zoning is more restrictive or contrary to primary zone – provision of flood plain zone shall prevail.

MITIGATION ACTION ITEMS

The mitigation action items identify specific activities that Coos County, individual cities and special districts can undertake to reduce risk and prevent loss from flood events. Each action item has implementation strategies, which can be used by the steering committee and local decision-makers to achieve the plan goals.

Flooding

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

Implementation:

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

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

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

Implementation:

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

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

Flood
Short Term #3: **Explore alternative actions to mitigate flooding in Libby Drainage District and Englewood Diking District**.

Implementation:

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

Coordinating Organization:	Hazard Mitigation Planning Committee Coos County Planning City of Coos Bay Inglewood Diking District Libby Drainage District U.S. Army Corps of Engineers
Timeline:	On Going
Plan Goals Addressed:	Protect Life and Property, Partnerships And Implementation

SECTION 3 SPECIAL NATURAL HAZARDS

Tab 3 - LANDSLIDES

CHARACTERISTICS OF LANDSLIDES

In the broadest sense of the term, a landslide is a gravity-driven process when soil and/or rock moves down a slope. The down-slope 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 a landslide generally multiplies with increased 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, 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:

- **Rock fall –** a relatively free fall of rocks that have become detached from cliffs and steep outcrops. Rock falls are common along Oregon highways where roads are cut through bedrock.
- **Rockslide –** the rapid down slope movement of rock material along a plane of separation within the bedrock. These slides can occur on relatively gentle slopes and cause serious damage.
- **Slump –** the downward slipping 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.

(Photo by Terra Firma Geologic Service)

- **Debris Flow –** is rapidly moving landslides that typically travel long distances, often within confined channels, and often involving significant amounts of water and mud. According to ODF, debris flows can move faster than 35 mph. This type of slide is most common in the Tyee geologic formation in Coos, western Douglas and Lane counties.

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

Landslides and debris flows (rapidly moving landslides that typically move long distances) are natural processes, triggered or accelerated by the following factors:

- Intense or prolonged rainfall, or rapid snow melt that can cause rapid changes in ground water levels
- Undercutting of a slope or cliff by erosion or evacuation

- Shocks or vibrations from earthquakes or construction
- Vegetation removal by fires, timber harvesting, or land clearing
- Placing fill (weight) on steep slopes
- A combination of any of these factors

In most mass movement, water plays a pivotal role by assisting in the decomposition and loosening of rock by lubricating rock and soil surfaces to enhance the beginning of movement. The water also adds weight to an incipient landslide, and imparts buoyancy to the individual particles, which helps overcome the inertia to move. The composition of slides is also very important, proportions of rock, sand, clay, and water will dictate the initiation, speed, and real extent of each slide.

Landslides are frequently the direct consequence of human activity. Seemingly insignificant modifications of surface flow and drainage of water may induce landslides. In an urban setting, improper drainage most often induces disastrous sliding.

Whether in natural or altered slopes, 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 the area'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 steep 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

The storm events of 1996 and 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 southern portion of the state 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.

The toll to human life in the Oregon winter of 1996-97 was costly. Near Roseburg, 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 clear-cut on an 80% slope. Said a survivor, “That home exploded, like a bomb had gone off”. A muddy avalanche impacting Hwy 38 hit three motorists, killing one. 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 clear-cut 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 west 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 1996-1997 events, offers this comment: “While we did our best to gather as much information as possible within the time line of the project, we knew from the onset that we would be unable to collect information on all slides that occurred during this 1996 and 1997 time period. The database contains 9,095 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 from both public and private sources, the contributions are lost entirely from private sources. For a number of reasons, private landowners are reluctant to provide information. In many cases this reluctance is quite understandable, but it is obviously unfortunate for the purposes of the project. However, many individuals and agencies did contribute data and it is noteworthy that such a large number of slides associated with these storms occurred statewide.

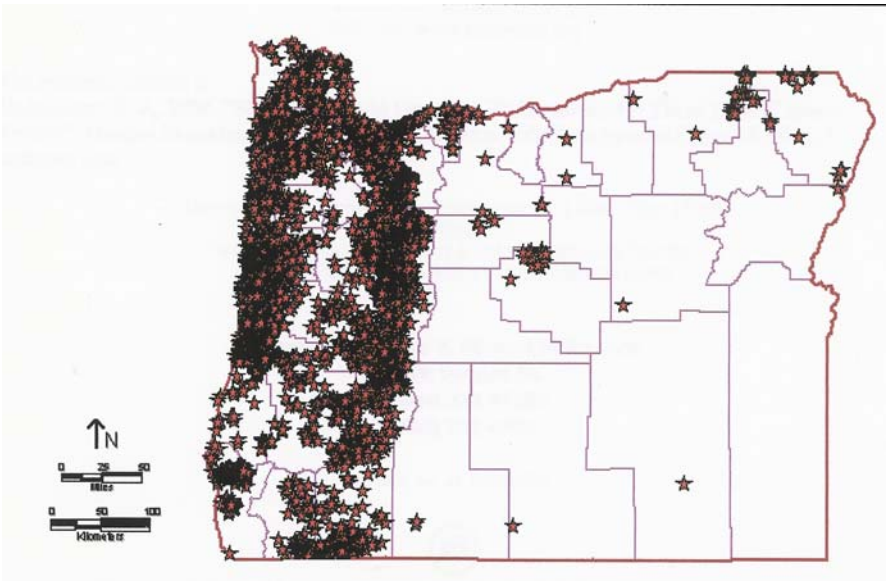
The impetus for developing this database is a desire to better document the magnitude and distribution of landslide occurrences throughout Oregon. Funding for the project was awarded to the Oregon Department of Geology and Minerals Industries (DOGAMI) through a competitive bidding process by the Federal 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, while assisting government and community agencies in devising means to minimize the threat to public health and property that landslides pose.

VULNERABILITY & RISK – 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 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.

Landslide Distribution of the 9,582 database entries throughout the state, DOGAMI, 2000.



ODOT – Costs to date (1999) are the values only for state highways and road right of ways.

	TOTAL COST TO DATE For all Landslides in Regions 1, 2, 3			
	Landslide (Severe Cost of Hazard)	Landslides (Medium to Low Hazard)	Rock falls A Rated	Rock falls B Rated
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
Totals	$90,200	$100,190	$123,330	$210,150

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 Coos County. However, in studying the data it can be determined that the total monies spent in repair after 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. 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 affect 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 Infrastructure

While each community has its own issues specific to slide-prone areas, in general, landslides can affect 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, and 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 tower 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 Coos County have been associated with damage to roads. The Coos 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. There are two major highways, which fall under the authority of Oregon Department of Transportation where repair is concerned. Both Highway 101 and Highway 42 are State Highways and both incur major damage due to slide activity.

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

CURRENT MITIGATION ACTIVITIES

Mitigation activities include current mitigation programs and activities that are being implemented by local or county organizations. **Coos County Zoning and Land Development Ordinance** Article 4.7, 4.7a, 4.7b, 4.7c, regulates development and improvement to land vulnerable to natural hazards.

Section 4.7.100 Purpose – land use regulations for lands situation within resource or hazard areas . . .

Section 4.7.105 Prescribed Regulations – Development in areas identified on Special considerations Map . . .

Section 4.7.110 Priority of Restrictions – Overlay zones pertaining to restrictions imposed on Special Considerations Map.

Section 4.7.115 Relation to Plan Inventory – Identifying Special Considerations Map as an index guide.

Section 4.7.120 Goal #5 Conflict Resolution Process - LCDC Goal #5 resource otherwise protected pursuant to OAR 660-16-005(1); (2); and OAR 660-165-010.

Section 4.7a Special Regulatory Considerations Prescribed by the Coos County Comprehensive Plan.

1. Mineral & Aggregate.
2. Water Resources.
3. Historical / Archeological Sites & Structures.
4. Beaches & Dunes.
5. Non-Estuarine Shore land Boundary.
6. Significant Wildlife Habitat (IORD85-08-011L).
7. Natural Hazards.
   a. Comply with floodplain overlay zone set forth in Ordinance.
   b. Support structural protection measures for bank stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.
   c. Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rock fall, and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comprehensive Plan* (*Requires Administrative Conditional Use).
8. Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Section 4.7b Special Regulatory Considerations Prescribed by the Coos County Comprehensive Plan – Coquille River Estuary.

1. Coquille River Estuary Shore lands Boundary Area.
    a. Prioritize uses.
    b. Requires special findings for some uses and activities in rural areas.
    c. Requires special findings for land divisions in rural shore lands.
    d. Maintain, restore or enhance riparian vegetation as consistent with water-dependent uses. Requires site plan and on-site inspection.
2. Sensitive Beach and Dune Area.
    a. Prohibits residential, commercial or industrial development within areas “Unsuitable for Development”. Permits issued only upon establishment of findings through an Administrative Conditional Use process.
    b. Permit development within “Limited Development. Suitability” areas only upon establishment of findings through an Administrative Conditional Use process.
    c. Cooperation with agencies to regulate destruction of vegetation, erosion, shore structure and other developments. Requires Administrative Conditional Use.
3. Natural Hazards.
    a. Comply with flood plain overlay zone set forth in Article 4.6 (refer to Flooding Chapter of NHMP).
    b. Comply with “Natural Hazard” Strategy #3 & #6, Vol. I, Coos County Comprehensive Plan.
    c. Restricts dwellings in known areas of “Mass Movement”.
4. Agricultural and Forest Lands.
    a. Protect “wet meadows” for agricultural purposes.

b. Specifies permitted uses.

c. Prohibits filling (with exceptions).

d. Subordinates use and activity matrices to Statewide Goals #3 and #17 and ORS 215 requirements. Where this policy applies, ORS 215.203 supercedes use and activities matrix in respective shore land districts.

e. Subordinates use and activities matrix to “Forest Uses” consistent with Statewide Goal #4.

5. Urban Growth Areas.

a. Manage “Especially Suited for Water-Dependent (ESWD)” urban and urbanizable shore lands so as to protect for water-dependent commercial, recreational and industrial uses.

b. Allows New non-water-dependent uses in “Urban Water-Dependent (UW)” districts which are “especially suited for water-dependent uses”, only if findings are made.

6. Shore land Values Requiring Mandatory Protection.

a. Protection of major marshes and significant wildlife habitats. Restricts uses and activities to those consistent with protection of natural values. Such uses may include propagation and selective harvesting of forest products, grazing, harvesting wild crops, and low intensity water-dependent recreation.

b. Protection of historic and archaeological sites.

c. Requires documentation of appropriate protection measures.

d. Only uses consistent with the protection of natural archaeological values are permitted within identified archaeological sites unless an exception has been taken.

7. Selected Mitigation Sites.
    a. Support mitigation /restoration on identified sites.
    b. Prioritize designated mitigation sites.
    c. Protection of mitigation sites from uses which would pre-empt use.
8. Selected Dredged Material Disposal Sites.
    a. Support stockpiling and disposal of dredged materials in identified sites.
    b. Identifies sites to be managed so as to prevent uses and activities which would preempt disposal.
    c. A designated site may be released upon a finding and plan amendment.
    d. Prioritize disposal sites in the bay.

Section 4.7c Special Regulatory Considerations Prescribed By The Coos Bay Estuary Management Plan.

1. Coos Bay Estuary Coastal Shore lands Boundary Area.
    a. Prioritize uses.
    b. Requires special findings for some uses and activities in rural areas.
    c. Requires special findings for land divisions in rural shore lands.
    d. Maintain, restore or enhance riparian vegetation as consistent with water-dependent uses. Requires site plan and on-site inspection.
2. Sensitive Beach and Dune Areas.
    a. Prohibits residential, commercial or industrial development within areas “Unsuitable for Development”. Permits other developments only upon establishment of findings.
    b. Permits development within “Limited Development Suitability” areas only upon establishment of findings.

c. Cooperation with agencies to regulate destruction of vegetation, erosion, shore structures and other developments. Requires Administrative Conditional Use.

3. Floodplain Hazard Areas.
   a. Comply with floodplain overlay zone set forth in Article 4.6.
4. Agricultural and Forest Lands.
   a. Protect “wet meadows” for agricultural purposes.
   b. Specifies permitted uses.
   c. Prohibits filling (with exceptions).
   d. Subordinates use and activity matrix to Statewide Goals #3 and #17 and ORS 215 requirements. Where this policy applies, ORS 215.203 supercedes use and activities matrix in respective shore land districts.
   e. Subordinates use and activities matrix to “Forest Uses”, consistent with Statewide Goal #4.
5. Urban Growth Areas.
   a. Manage “Especially Suited for Water-Dependent (ESWD)” urban and urbanizable shore lands so as to protect for water-dependent commercial, recreational and industrial uses.
   b. Allow New non-water-dependent uses in “Urban Water-Dependent (UW)” districts which are “especially suited for water-dependent uses” Only if findings are made.
6. Shore land Values Requiring Mandatory Protection.
   a. Protection of major marshes and significant wildlife habitats.
   b. Restricts uses and activities to those consistent with protection of natural values. Such uses may include propagation and selective harvesting of forest

products, grazing, harvesting wild crops, and low-intensity water-dependent recreation.

c. Protection of historic and archaeological sites.

d. Requires documentation of appropriate protection measures.

e. Only uses consistent with the protection of natural archaeological values are permitted within identified archaeological sites unless an exception has been taken.

7. Selected Mitigation Sites.

a. Support mitigation / restoration on identified sites.

b. Prioritize designated mitigation sites.

c. Protection of mitigation sites from uses which would pre-empt use.

8. Selected Dredged Material Disposal Sites.

a. Support stockpiling and disposal of dredged materials on identified sites.

b. Identify sites to be managed so as to prevent uses and activities which would pre-empt disposal.

c. A designated site may be released upon a finding and plan amendment.

d. Future dredged material disposal guidelines.

e. Ranks in-bay disposal sites by priority.

CURRENT SLIDE MITIGATION

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

LANDSLIDE MITIGATION ACTION ITEMS

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

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

Coordinating Organization:	Coos County Highway Department Oregon Department of Transportation Private Companies (logging) Hazard Mitigation Advisory Committee
Timeline:	1-2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation, Natural Systems

Landslide

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

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas and areas prone to slide due to flooding for mitigation strategies, specifically:
  - Beach Loop
  - Coos River Highway
  - Ocean Blvd.
  - Bald Hill
  - North Fork Road
  - U.S. Highway 101
  - Lampa Mountain Road
  - State Hwy. #242 – to Powers
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization: Hazard Mitigation Advisory Committee
Coos County Highway Department
Oregon Department of Transportation

Timeline: 1-2 years

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

SECTION 3 SPECIAL NATURAL HAZARDS

Tab 4 - SEVERE WINTER STORMS & WIND

CHARACTERISTICS OF SEVERE WINTER STORMS

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. 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. Coos County falls within Oregon Climate Zone 1, the Coastal Region, and is particularly vulnerable to coastal storms that can cause widespread flooding and damage from high winds.

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

Cold winter storms with attendant 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. 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 Coos County, high tides can often add to the problem of heavy rain. Short-term effects on agricultural properties are drowned crops, trapped livestock, and 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 not 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.

Although Oregon does not have a frequent acquaintance with tornadoes, they do occasionally happen. This picture is from the Collection of the Bandon Historical Society Museum.

Coquille River Light House September 15, 1997; Photo taken by Mary Capps

Tornadoes are often preceded by high winds, thunderstorms, and hail. Wind speeds can reach up 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. Gas and electrical systems may be damaged, causing a risk of fire or explosion. 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. 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:

- 1887 cyclone in Cottage Grove, Lane County, Oregon.
- 1925 tornado that tore up a five-mile path in Polk County, Oregon.
- April 1960 tornado that hit the town of Coquille, Coos County, Oregon.
- October 1967 cyclone near Astoria, Columbia County, Oregon that damaged several homes and commercial buildings.
- 1979 storm which damaged buildings and disrupted power service in the Sandy, Oregon area.
- A tornado that touched down south of Brookings, Curry County, Oregon in 1983.
- In 1993, Newport, Washington County, Oregon saw the most powerful tornado that hit in many years.

HISTORICAL STORM EVENTS

Flooding and Winter Storms

Coos County is particularly vulnerable to coastal storms that can cause widespread flooding and damage from high winds.

February 7, 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. The storm downed a 115 kv transmission line in North Bend and another line was cut off in the Empire area. Widespread property damage and loss of electric power resulted, and numerous electric utilities experienced heavy

damage. Falling trees clogged roads and snarled traffic. A State of Emergency was declared.

February 4, 1999

During an accurately forecasted winter storm, the 639 foot Panamanian registered bulk freighter, N/V New Carissa, ran aground on the shore 2.7 nautical miles north of the entrance to Coos Bay. The grounding was a result of the Master's ill-fated decision to anchor the New Carissa 1.7 nautical miles from shore in a gale with forecasted weather conditions calling for rising seas. These seas eventually caused the vessel to drag anchor on the morning of February 4, 1999. Because of the heavy strain placed on the anchor windlass by the forces of the sea and wind, as well as the maneuvering actions ordered by the Master, the crew struggled for 45 minutes to get the anchor off the sea floor. During this critical period, the New Carissa was restricted by the dragging anchor, pounding sea waves, swells up to 25 feet, and a broadside 22 knot

wind. Under these conditions, the vessel was unable to obtain full power from its propeller and rudder as its stern periodically lifted clear of the water. By the time the anchor was raised off the bottom, the ship had been pushed inescapably close to shore, well within the shore breakers. The New Carissa grounded in the surf line several hundred yards from the beach bluffs at 8:30 in the morning. The vessel was unable to free herself from the beach, and over the next several days, the New Carissa gradually worked her way closer to shore, where, on the night of February 8, she broke into two sections. She carried 359,000 gallons of bunker fuel and 37,400 gallons of diesel, of which approximately 70,000 gallons was estimated as being released into the environment.

The New Carissa, Photo by U.S. Coast Guard, 1999

November 30, 1998	Coquille River flooded, including the North Fork at Myrtle Point.
November 18, 1996	State of Emergency declared due to flooding and landslides in Coos County. Record-breaking precipitation throughout much of Oregon caused local

	flooding, landslides, and power outages over much of the state during November 18-20. One day precipitation records were set at many locations. North Bend was one of the locations, with a recorded 6.67" of rain in 24 hours.
February, 1996	Four days of heavy rain produced a State of Emergency in Coos County, and nearly every county in the state received a disaster declaration. Five Oregon residents died, thousands of people were sheltered, and hundreds of homes were destroyed. The region-wide damage estimates exceeded one billion dollars.
January 9, 1995	Flooding at Coquille. Crop damage of $5 million.
Dec. 64 – Jan 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 state. Mudslides, bridge failures, and inundation closed the state's roads, airports, and railways.
October 12, 1962	The Columbus Day Storm. The standard by which all other statewide disasters are now measured. The storm killed 38 people, injured many more, and did more than $200 million in damage (over $800 million in today's dollars). Newport registered wind gusts of

	138 mph before the instrument was damaged. Cities lost power for 2 to 3 weeks and over 50,000 dwellings were damaged. Agriculture took a devastating blow as entire fruit and nut orchards were destroyed. Scores of livestock were killed as barns collapsed or trees toppled on the animals.
February 24, 1961	Strong cold front delivers sudden heavy wind gusts to southwest Oregon. Along the coast, gusts registered at 80 mph. A four-hour deluge totaled 1.20" of water at Newport, adding to the already heavy 11.31" received for the month. In the area of Yachats, a section of Hwy 101 collapsed and fell into the ocean. Widespread damage and community endangerment was reported along the coast.
November 3, 1958	Sustained wind speeds of 90 mph with gusts up to 112 mph were reported. Many billions of board feet of timber were blown down. At one time, every major highway in western Oregon was blocked at one or more points by fallen treas. Damage to buildings and utility lines was widespread.
December 4, 1951	Winter storm reached its greatest intensity along the coastline, where unofficial observations reported sustained wind speeds between 60 and 100 mph, while inland valley locations reported sustained speeds up to 75 mph. Serious damage to buildings and widespread power losses occurred throughout the state.
Nov. 10-11, 1951	Sustained southerly to southwesterly winds of 40-60 mph occurred over nearly the entire state, with gusts of 75-80 mph recorded at many locations. There was

	extensive damage to power lines, buildings, and standing timber.
January, 1950	January of 1950 was a very cold month for Oregon. There were actually three storms from January 9 to January 18, but very little time separated them. The net effect was one of continuous storm. Snow, sleet, and freezing rain closed roads and stranded motorists, downed power lines had created widespread outages. Bandon recorded 6 inches of snow, North Bend had 2.5 inches, and Powers recorded 18.1 inches.
November 26, 1945	Violent storms and gale-force southerly winds force an Army Air Corps Curtis C-46 off course. The pilot ordered bailout at 1000 feet some fifteen minutes after their final radio contact off the coast of Florence. Most of the crew landed in heavy growth near Gold and Silver Falls. The pilot and co-pilot were killed, found still strapped in their seats. One crewman was never recovered and presumed drowned and lost in the raging waters of Lake Creek.
January 1939	High tides and 60 mph winds wreak havoc along the coast. The Sunset Beach Resort is destroyed.
January 20, 1921	Hurricane-force winds were reported along the entire Oregon and Washington coasts. Astoria unofficially reported gusts up to 130 mph, while the highest officially recorded speed was 113 mph. There was widespread damage to property and timber throughout the state.
March, 1915	Tanker, *J.A. Chansler*, is forced off course by heavy fog and rough weather. Inshore currents drew the tanker to break up on a reef. Twenty-eight men sank

	with the stern. Thirteen men escaped by life raft, seven of those drowned when the raft capsized at Whiskey Run at Randolph. Only three men ultimately survived.
November 2, 1915	*Santa Clara* looses control and rough surf drives the steamer schooner southward toward Tunnel Point. High tide and rough surf grounded the ship, tearing a hole in the hull. Rescue boats capsized, leaving 17 dead.
May 11, 1915	*Claremont* wrecks on the Coos Bay bar. Large rollers drive the wooden steam schooner onto the North Jetty. Heavy surf breaks up the ship within 36 hours of stranding.
January 12, 1910	Steel steamer, *Czarina*, wrecks on the Coos Bay bar. High waves wash over the ship and put out the boilers as it is crossing the bar. Heavy surf pushes the foundering vessel to the North Jetty, then around and northward along the shore of North Spit. Conditions make rescue from shore impossible. Twenty-four are killed.
March 23, 1909	Wooden schooner, *Marconi*, wrecks off the Coos Bay bar. The schooner was under tow by the steam tug Columbia when the hawser parted. The Captain of the Marconi tried to continue out to sea but high winds and strong currents pushed the ship, dragging both anchors, south of the bar and onto the shore.
Winter 1891	Heavy storms wreck the *Gen'l Butler* and disable the *Maggie Ross* off Coos Bay. Other ships also damaged.
January 9, 1880	Heavy weather causes leaks in the ocean-going side-wheel steamer, Alaskan. The Captain gave the order

to abandon ship off Cape Blanco. Four lifeboats were filled, and makeshift rafts designed for the rest of the crew. The escape crafts swamped and capsized. Thirty one are dead. Record cold freezes the Coquille River, stopping all river traffic.

WINDSTORMS

Historical Events

December12, 1995	Record low pressure storm produced high winds. North Bend had gusts to 86 mph; Cape Blanco had gusts of over 100 mph, causing widespread damage and leaving four dead.
Dec 8-10, 1993	Windstorm. Powers records winds at 74 knots and Bandon records winds at 68 knots.
Nov 13-15, 1981	The strongest wind storm since the infamous Columbus Day storm of 1962 struck with an intense low pressure area. North Bend recorded gusts of 92 mph. Three commercial fishermen were believed to have drowned when their fishing boat collided with a barge off Coos Bay. A Coast Guard pilot died when his Sikorsky helicopter crashed in the Pacific as he left North Bend Air Station to help a fishing boat in distress. The search for the missing *Christina J* and her crew was finally called off. Trees were toppled, damage was widespread, and roof damage was common. For example, winds ripped off the 2,500 sq. ft. roof of the Homestead Restaurant in North Bend. In Bandon, a large storage tank toppled over and disgorged a flood of gasoline, forcing evacuation of

	250 residents. Over 1,500 residents of the Coos Bay area were without power of several days.
October 2, 1967	Significant widespread damage to agriculture, timber, utilities, and homes. Unofficial wind speeds of 100 mph to 115 mph were recorded along the coast.
March 27, 1963	Wind gusts in excess of 100 mph were recorded on unofficial instruments along the coast.
October 12, 1962	Columbus Day Storm ("The Big Blow") hits Coos County and western Oregon. The City of North Bend recorded gusts of 81 mph. Newport recorded a peak gust of 138 mph before the wind instrument was damaged. The storm unfolded rapidly, with the average sustained winds from 17 mph to 35 mph in a mere 30 minutes. Thirty eight people were killed and many more were injured. Damage estimates exceeded 200 million dollars. Cities lost power for weeks and over 50,000 dwellings were damaged. Agriculture took a devastating blow as entire fruit and nut orchards were destroyed. Scores of livestock were killed when barns collapsed or trees were blown over onto animals. One hundred million board feet of timber blew down in Elliott State Forest.
November 3, 1955	Sustained wind speeds of 51 mph with gusts up to 90 mph were reported. Many billions of board feet of timber were blown down. At one time, every major highway in western Oregon was blocked at one or more points by fallen trees. Damage to buildings and utility lines was widespread.
Dec 21-23, 1955	High winds were felt across most of the state. North Bend reported sustained wind speeds of 70 mph, with gusts up to 90 mph. Most regular observation

	stations recorded sustained wind speeds of 55 to 65 mph with gusts considerably higher. In addition to extensive damage to buildings, power, and telephone lines, heavy destruction occurred in the Willamette Valley orchards and in standing timber throughout the state.
Dec. 4, 1951	Winter storm reached its greatest intensity along the coastline, where unofficial observations reported sustained wind speeds between 60 and 100 mph, while inland valley locations reported sustained speeds up to 75 mph. Serious damage to buildings and widespread power losses occurred throughout the state.
Nov. 10-11, 1951	Sustained southerly to southwesterly winds of 40-60 mph occurred over nearly the entire state, with gusts of 75-80 mph recorded at many locations. There was extensive damage to power lines, buildings, and standing timber.
April 21-22, 1931	Very strong northeast winds caused widespread damage throughout Oregon. Ships reported dust as far as 600 miles from shore.
January 20, 1921	Hurricane-force winds were reported along the entire Oregon and Washington coasts. Astoria unofficially reported gusts up to 130 mph, while the highest officially recorded speed was 113 mph. There was widespread damage to property and timber throughout the state.
January 9, 1880	A windstorm struck Oregon, spreading sustained winds of 60 mph and gusts ranging to 80 mph throughout the state. A three-masted schooner,

dragging its anchor, was blown up on to the beach at Coos Bay and split in half.

VULNERABILITY AND RISK – COMMUNITY ISSUES

Severe winter storms and high winds pose a significant risk to life and property in Coos County by creating extreme conditions that disrupt essential services such as public utilities, telecommunications, and transportation routes. Often these storms produce hurricane strength winds, torrential rains, and cold temperatures. Severe winter storms are generally prolonged events producing conditions that have destructive impacts especially to trees, power lines, and utility services.

The recent severe winter storm of January 2004 created the necessity for a multi-jurisdictional assessment of emergency resources in Coos County. Torrential rains, flooding rivers, isolated communities, loss of power, and below freezing temperatures brought the necessity for preparedness to the forefront. An assessment team was created from each community as well as Coos County Emergency Management and the Coos County Department of Public Health. The assessment revealed that out of the nine elderly and special needs care centers, only one had a generator and could provide heat and food for their residents. Many of the community government offices did not have generator power and could not conduct business or even receive telephone calls due to the nature of their systems.

The assessment resulted in a widespread preparedness effort to provide essential and emergency services to the residents and special needs community.

Coos County has suffered severe winter wind storms on a yearly basis, which brought economic hardship and affected the life safety of county residents.

COMMUNITY ISSUES

Infrastructure

Winter storms producing high winds and prolonged rain, saturate soil, uproot trees, undermine hill sides, down power lines, and compromise public safety. Swollen rivers covering roadways and landslides inhibiting public access to critical facilities such as hospitals and making it difficult for emergency services to provide essential service to the residents are all common events for Coos County. Trees, power lines, telephone lines, television and radio antennas can be impacted by falling trees and limbs as their stability is weakened by sustained torrential rains and wind.

Roads and Bridges

Flooding and high winds often lead to major traffic accidents. Transportation arteries blocked by fallen trees during a windstorm may have tragic consequences for residents needing to access emergency services. Entire communities isolated by landslides impacting the only roads, into and out-of, rural towns. The City of Powers declared a local emergency in February 2004, due to a major landslide destroying the only paved road into the City. Emergency Medical Services were hampered, as the community has no hospital. Patients requiring emergency medical treatment had to be either air lifted or walked from one ambulance to another through a private property easement, around the slide in order to reach a medical facility.

Power Lines

Winter storms with high winds occur every year. Historically, power outages at times lasting at least a week, are a common occurrence. These types of events, impact coastal residents with increasing severity as weather patterns change and cold storms come in from Alaska.

CURRENT MITIGATION ACTIVITIES

Refer to current mitigation activities of Flooding and Landslide section. All current mitigation activities apply to this section also.

MITIGATION ACTION ITEMS

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

Severe Winter Storm & Wind

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

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

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department Oregon Department of Transportation
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

SECTION 3 SPECIAL NATURAL HAZARDS

Tab 5 - EARTHQUAKE / TSUNAMI

CHARACTERISTICS OF EARTHQUAKES

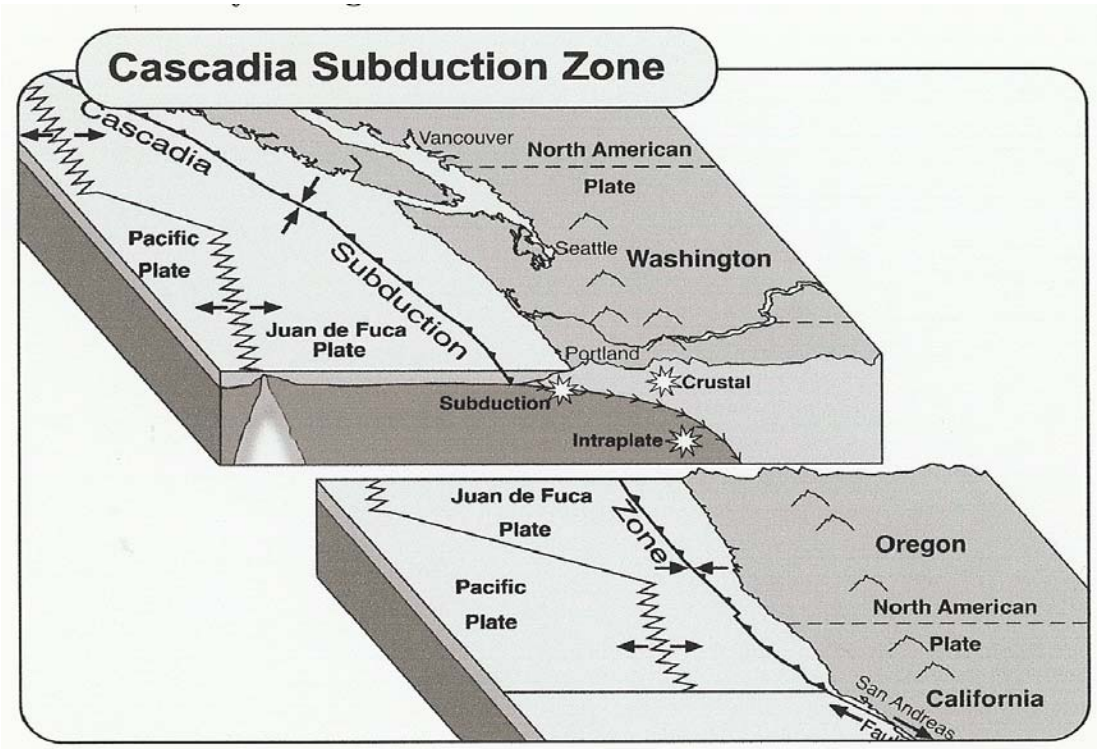
Oregon ranks third nationally for potential earthquake losses which are projected to exceed $12 billion in the case of a major event in the Cascadia Subduction Zone. The February 28, 2001 magnitude 6.8 Nisqually earthquake served as a reminder of Oregon's vulnerability to earthquakes.

Scientists recently discovered strong evidence that great earthquakes, having a magnitude of 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 the Pacific Northwest is threatened by great earthquakes that would release 30 to 1,000 times the energy of a magnitude 7. 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 boundary between the Pacific and Juan de Fuca Plates is marked by a broad submarine chain about 300 miles long, known as the Juan de Fuca Ridge. 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 or "rift" as hot magma from the Earth's interior is injected into the ridge and erupts at its top. 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.



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

In many areas, especially on the coast, liquefaction and landslides would damage buildings and their foundations, destroy bridges, and cause massive loss of life. Shaking from a great subduction zone earthquake could last for as long as 5 minutes. Although the Cascadia subduction zone is located off the Oregon and Washington coast, the amount of energy released in this type of earthquake would be catastrophic to the entire Northwest region, and would likely cause damage in Seattle and Portland. Disaster response would be severely limited in communities throughout Coos County, Western Oregon, and Washington if they were seriously damaged due to an earthquake.

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 statistics below shows that indeed it could. The potential for earthquake damage along Oregon's coastline cannot be overlooked.

Earthquake Related Hazards

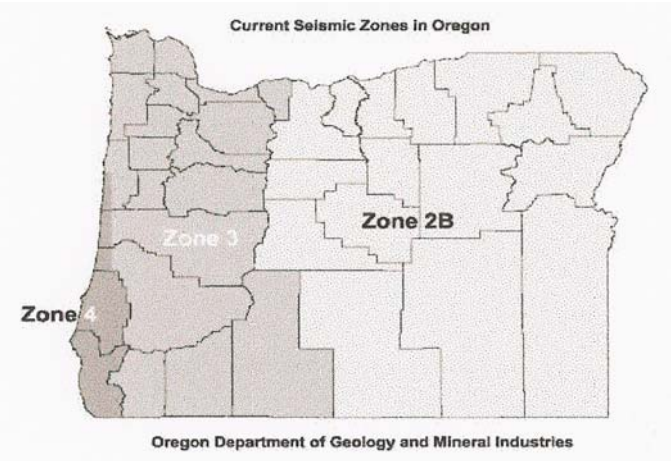
Ground shaking, landslides, liquefaction, amplification and tsunami are the specific secondary hazards associated with earthquakes. The severity of these hazards depends on many factors including soil types, slope conditions, proximity to the fault, magnitude and type of earthquake.

Ground Shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking and duration depends on the magnitude of the earthquake, type of fault, and distance from the epicenter. Buildings on poorly consolidated and thick soils as well as land-fill will typically see more damage than buildings on consolidated soils and bedrock.

Earthquake-Induced Landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake.

Liquifaction occurs when ground-shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight.

Amplification increases the magnitude of the seismic waves generated by the earthquake. Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes.



Until recently, earthquakes were thought to pose little risk to residents of Oregon. This perception has changed dramatically with recent earthquake events and information provided by geological and soil science researchers. In response to this growing awareness, the Oregon Building Codes Division revised construction standards for new buildings to make them more resistant to seismic events. The State Building Codes reflect three seismic zones. An increase in zone number reflects increased seismic activity. All of Coos and Curry Counties and a thin band of Douglas and Lane County to just north of Newport in Lincoln County are in high hazard Zone 4.

Seismic Zones

Zones are based on predicted ground motion and potential risk from large earthquakes within 50 years. New structures must be built to standards capable of resisting the forces caused by ground shaking applicable to the various seismic zones. For example, a structure in Zone 4 must be 33 percent stronger or more seismically resistant than a structure built in Zone 3. Oregon's coastal areas are subject to significant subduction-type seismic activity. The northern coast is currently Zone 3. However, based on new scientific data, consideration is being given to upgrading it to Zone 4.

HISTORICAL EARTHQUAKES OF THE PACIFIC NORTHWEST

DATE	LOCATION	MAG.	DEATHS / DAMAGE / NOTES
11/23/1873	Near Brookings, OR	7.3	Felt as far away as Portland
10/12/1877	Near Portland, OR	6.7	Unknown
2/03/1892	Portland, OR	UNK	A severe shock sent buildings swaying and terrified people. Total area of about 26,000 sq. km)
12/06/1918	Vancouver Island,B.C.	7.0	
1/31/1922	Offshore, Cape Mendocino, CA	7.3	
1/22/1923	Offshore, Cape Mendocino, CA	7.2	
11/10/1938	Shumagin Islands, AK	8.2	
4/13/1949	Olympia, WA	7.1	Widespread damage in Oregon, 8 dead / costs of $150 million
8/20/1952	Offshore Coos Bay, OR	8	
3/09/1957	Andreanof Island, AK	9.1	
11/05/1962	Portland/Vancouver	5.5	Shaking lasted up to 30 seconds
3/28/1964	Prince William sound, AK	9.2	125 dead / $311 million in damage

11/08/1980	Offshore Oregon Coast	7.4	
11/03/1981	Offshore Oregon Coast	6.2	
5/07/1986	Andreanof Island, AK	8.0	
7/12/1991	70 miles off Oregon Coast	6.6	
4/25/1992	Cape Mendocino, CA	7.2	Subduction quake at the Triple Junction
3/25/1993	Portland, OR	5.6	$30 million in damage
9/20/1993	Klamath Falls, OR	6.0	2 dead / $10 million in damage
9/01/1994	Cape Mendocino, CA	7.1	
7/11/2000	Kodiak Island, AK	6.7	
2/28/2001	Olympia, WA	6.8	Estimated $2 billion in damage
11/03/2002	Central Alaska	7.9	****
1/16/2003	Offshore, Oregon	6.2	
6/23/2003	Aleutian Islands, AK	7.0	
11/17/2003	Aleutian Islands, AK	7.8	

The biggest of 2002, the November 3rd earthquake produced a scar on the landscape more than 230 kilometers (145 miles) long. The magnitude 7.9 quake in central Alaska left cracks in the ground that ran the length of the Denali fault system but caused minimal damage to property and, amazingly, few injuries and no deaths. Denali is a so-called strike-slip system, which means the two blocks of rock on either side of the fault grind horizontally past each other. In this case, the northern side moved from the west to the east. The violent earthquake

slammed a remote area of Alaska's interior, shutting down the Trans-Alaska Pipeline, opening 6-foot-wide cracks in highways and making lakes slosh in Louisiana. Nuclear power facilities in various states including Minnesota and Washington reported unusual water movement. On Seattle's urban Lake Union, more than 1,400 miles south of the quake, waves shook houseboats loose from their moorings and some slammed into docks, causing minor damage. Three major highways in Alaska were damaged.

VULNERABILITY AND RISK – COMMUNITY ISSUES

The Cascadia Subduction Zone (CSZ) is the most dangerous fault in Oregon, and one of the most dangerous faults in the United States. Similar 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 could 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 an average of 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.

Tsunami damages are not included in the estimates for this earthquake in the following statistics 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	COOS	CURRY	CLATSOP	LANE
Injuries	854	221	298	1,036
Deaths	16	3	6	19
Displaced Households	2,069	430	788	2,345
Economic Losses For Buildings	$1.4 billion	$328 million	$760 million	$3 billion
Economic Losses To: (in millions)				
Highways	$44	$48	$18	$39
Airports	$20	$11	$5	$11
Communications	$25	$18	$6	$11
Debris Generated (in thousands of tons)	853	267	383	1,314

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 as 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.

Loma Prieta, Northridge, Portland, Klamath Falls and Olympia, all 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.

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.

Coos County is rated 'medium' 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.

TSUNAMI

The Oregon coast has a justly deserved reputation for its spectacular scenery. Because the coast 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 drives 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 from northern California to 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. Does this mean that the two plates are sliding past each other freely 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.

CHARACTERISTICS OF TSUNAMIS

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 from 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 coast, 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 (600 mph) 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 that the velocity of its waves is reduced, and 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 "run-up" 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 wave length is shortened and 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 run-up. 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 the ocean bottom. This phenomenon may be the only warning to residents that a 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 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.

When Does A Tsunami Occur?

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

Where Do Tsunamis Occur?

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 the greatest danger from tsunamis. By these standards, with few exceptions, the coastal communities, ports and rivers bordering on the Pacific run a high risk of tsunami inundation.

Tsunami Facts

Two kinds of tsunamis can affect the Oregon coast:

1. Tsunamis generated by undersea earthquakes just off the coast can strike within five to thirty minutes, possibly disrupting power and communications and leaving little time for an official warning. The actual ground shaking of the preceding 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 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 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 an 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 run-up was on the island of Hawaii, where a 12-meter run-up was recorded. The tsunami arrived at Hilo 4.9 hours after the earthquake originated in the Aleutian Islands, and 96 people lost their lives. A 3-meter run-up was recorded at Coos Bay and Bandon for that event. 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. Sixty people in Hawaii died from the resulting tsunami.

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

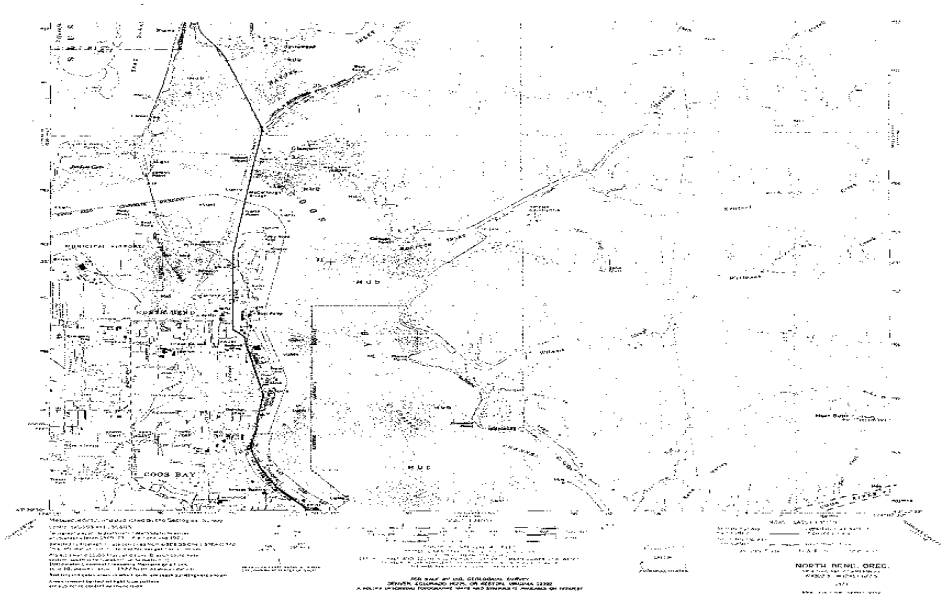
The Alaskan earthquake on March 27, 1964, had a magnitude of 9.2, one of the largest in recorded history. The death toll in Alaska from this event was 115 people, with 106 of the deaths due to tsunamis. The largest wave height for this tsunami was recorded at Shoup Bay, Valdez Inlet, at 67 meters. British Columbia sustained $10 million dollars in damage. It then struck the Oregon coastline, killing four people and causing nearly $1 million 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. Twelve people were killed, and approximately $8 million in damage was done in Crescent City. Coos Bay recorded a run-up of 3.5 meters from this event. The wave continued to travel south, and did significant damage even in a sheltered area of 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.

A “silent earthquake” in Hawaii caused a massive 190 square kilometer slab of the Kilauea Volcano to slip nearly 9 centimeters into the sea in November of 2000. It slid slowly, but a land mass that size suddenly collapsing into the ocean would cause a massive tsunami that would threaten coastal areas in western North America, Chile and Australia.

The 1964 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 coast, but geophysicists warn that another tsunami almost assuredly is in the state's future – a tsunami that also could strike northern California, Washington, or Alaska. Indeed, the series of killer waves that 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.

COOS BAY QUADRANGLE MAP OF POTENTIAL TSUNAMI INUNDATION (DOGAMI Map)



(SOURCES: Portland General Electric Company. Oregon Department of Geology and Mineral Industries in partnership with the Extension Sea Grant Program at Oregon State University, and the Federal Emergency Management Agency, Region X, with help from the National Oceanic and Atmospheric Administration)

CURRENT MITIGATION ACTIVITIES

Goal 7: Areas Subject to Natural Disasters and Hazards

Goal 7 is the Statewide Planning requirement that directs local governments to address natural hazards in their comprehensive plans. Goal 7 states that, "Developments subject to damage, or that could result in loss of life, shall not be planned or located in known areas of natural disasters and hazards without appropriate safeguards. Plans shall be based on an inventory of known areas of natural disasters and hazards…"

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, police and fire stations). These requirements were 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 (ORS455.446), 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 Coos County practice earthquake drills on a monthly basis. The schools in the communities of Bandon, Coos Bay, Charleston, Empire, North Bend, and Lakeside also practice tsunami drills on a monthly basis. On an average of once a year they practice a full-scale exercise having children leave the school building and head for high ground to a predesignated location.

Tsunami Evacuation Routes

Tsunami evacuation routes are marked by road signs in the coastal communities of Bandon, Coos Bay, North Bend, Lakeside, predominantly along the Hwy. 101 corridor.

Non-structural Improvements For Homes And Businesses

The Coos 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.

MITIGATION ACTION ITEMS

The earthquake and tsunami action items provide guidance on suggesting specific activities that agencies, organizations and residents in Coos County can undertake to reduce risk and prevent loss form earthquake and tsunami events. Each action includes implementation strategies which can be used by the steering committee and local decision-makers.

Earthquake & Tsunami

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Hazard Mitigation Plan Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

Earthquake & Tsunami

Short Term #2: **Public Education Program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop and other beach areas. Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

LEGEND

RESOURCE CATEGORIES

POTENTIAL SHELTERS

SCHOOL

OTHER

CHURCH CARE HOME
MUSEUM DAY-CARE
COMM. BLDG.

RESPONSE SERVICES

911 CTR.
POLICE
FIRE
COAST GUARD
HOSPITAL
AMBULANCE

TRANSPORTATION

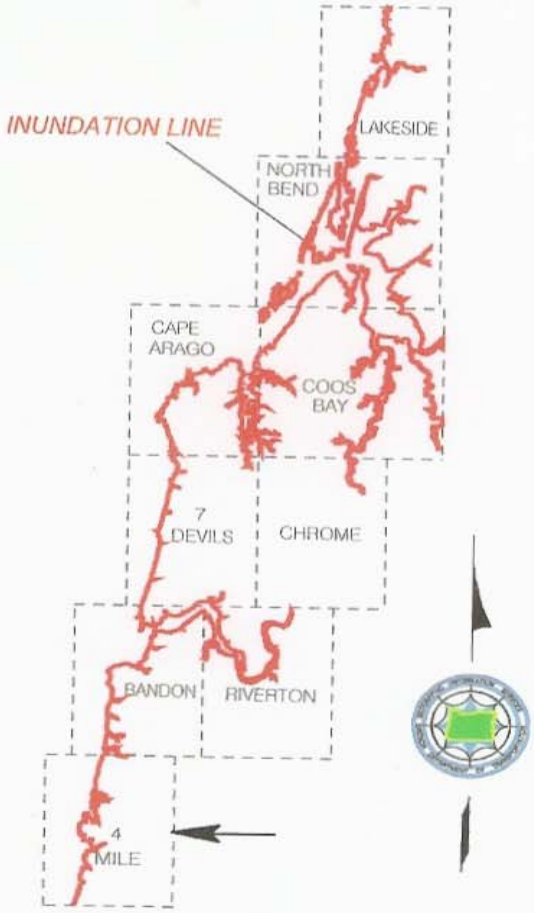
BRIDGE
AIRPORT
LAUNCH
HELIPORT
PORT
NAVLIGHT

MUNICIPAL FACILITIES

HATCHERY
WASTEW
OTHER

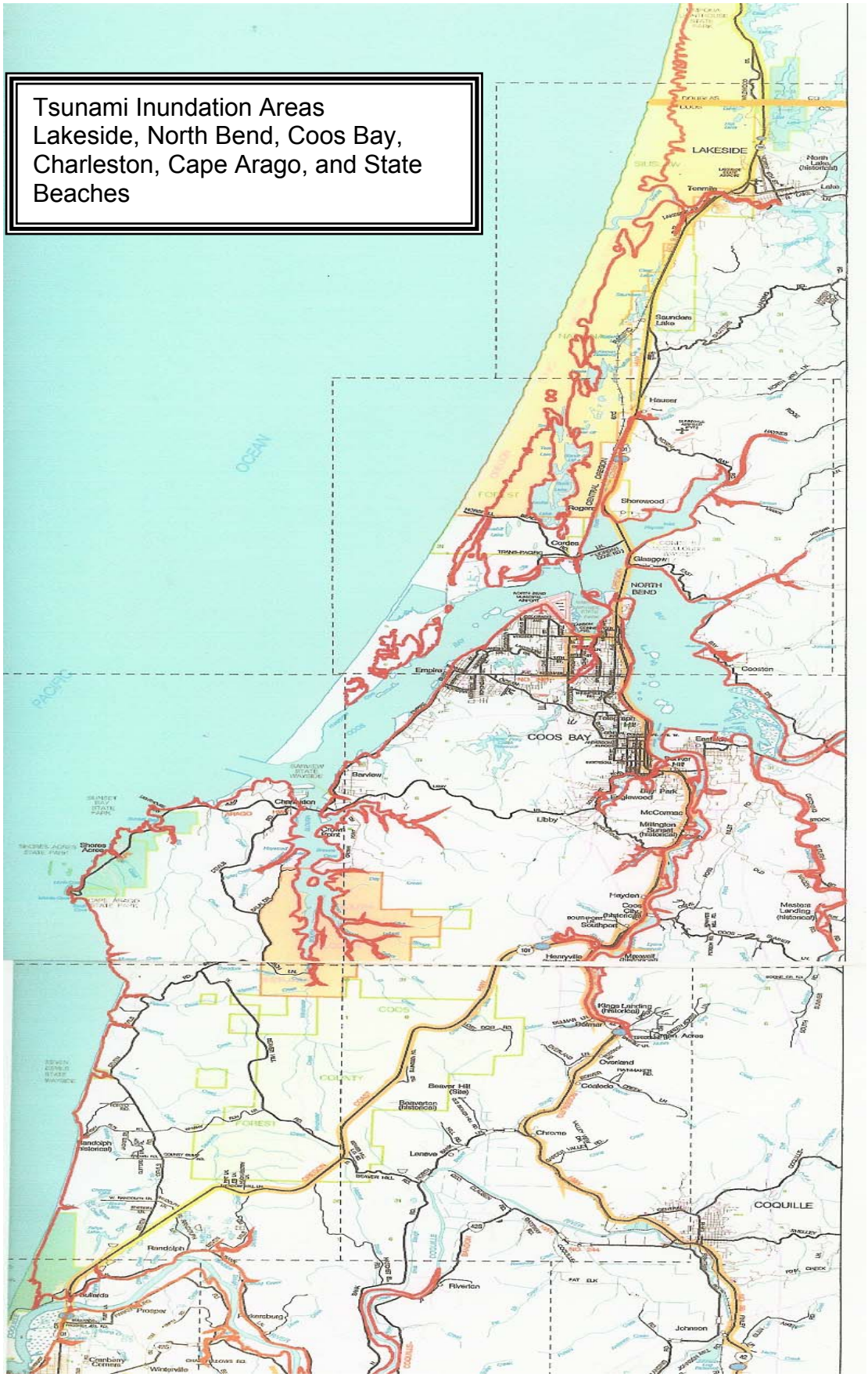
■ = RESOURCE LOCATION
■ = MILEPOINT LOCATION
45.63 = HWY. MILEPOINT

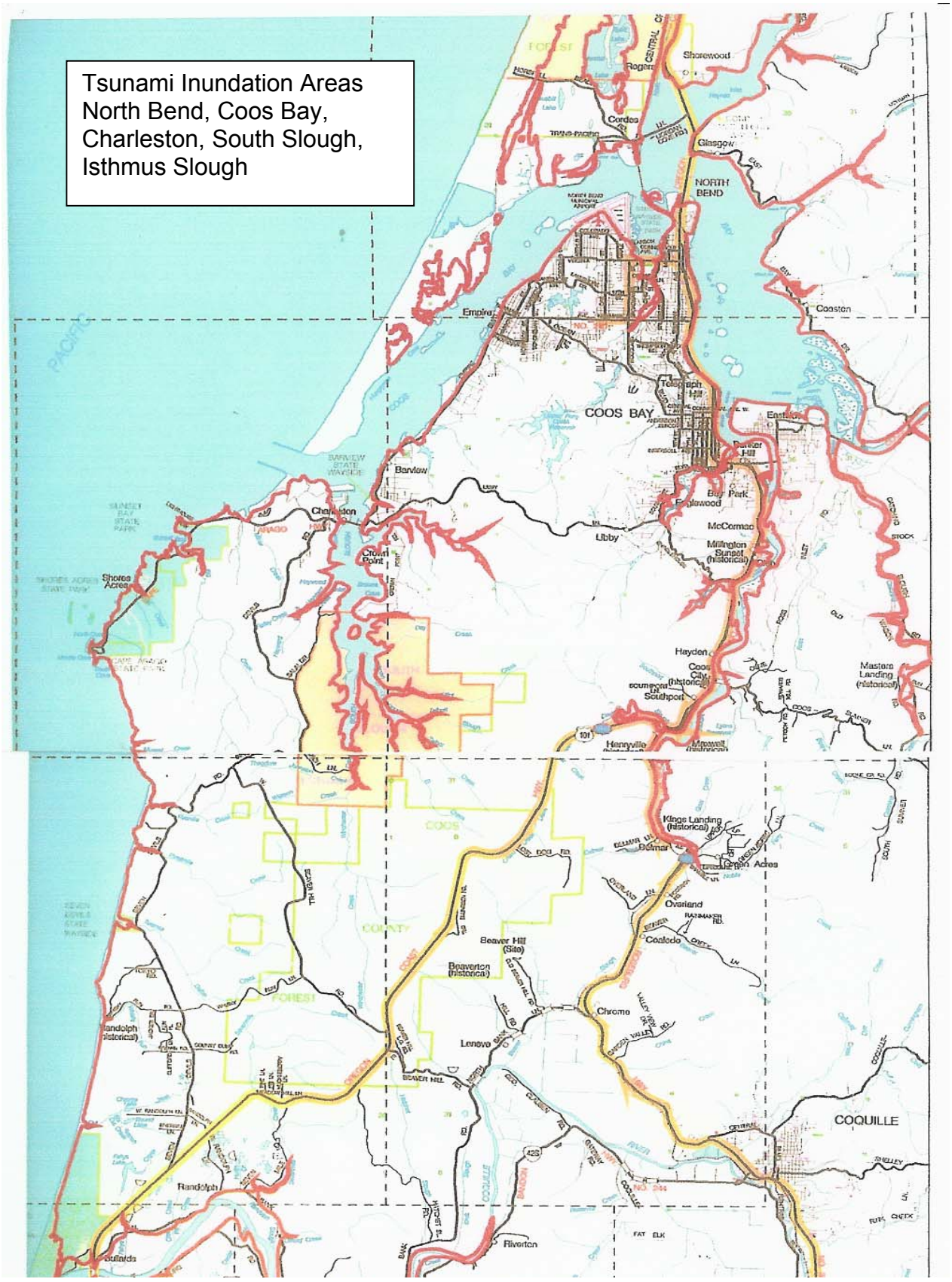
FOCUS AREAS



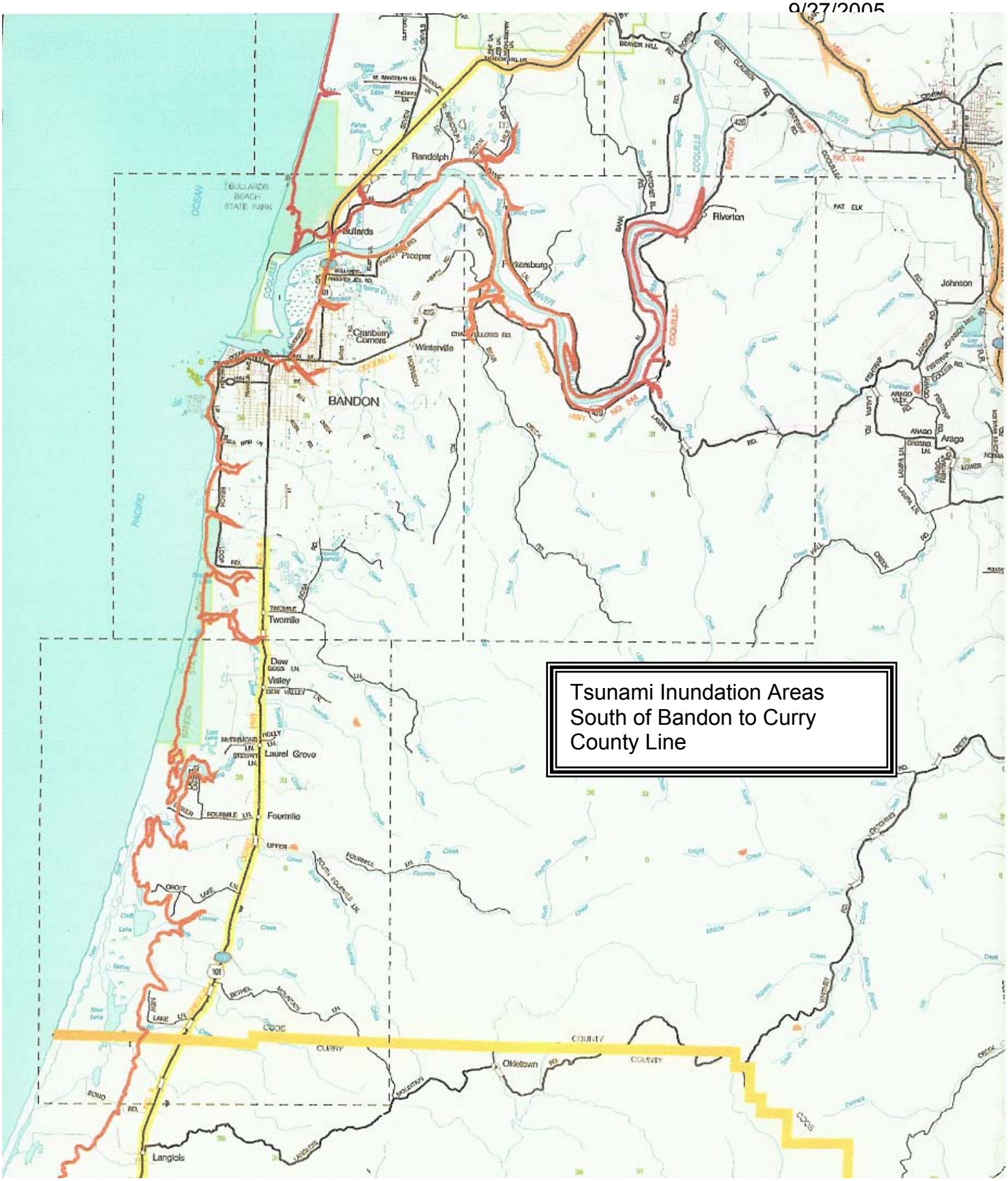
Tsunami Inundation, Lakeside, Tenmile, and National Recreation Area

Tsunami Inundation Areas
Lakeside, North Bend, Coos Bay, Charleston, Cape Arago, and State Beaches




Tsunami Inundation Areas
North Bend, Coos Bay,
Charleston, South Slough,
Isthmus Slough
Shorewood
Cordes
Glasgow
NORTH BEND
Empire
Coaston
COOS BAY
Barview
Charleston
Shores Acres
Crown Point
Libby
McCormac
Millington Sunset (historical)
Hayden
Coos City (historical)
Southport
Hennyville
Mastern Landing (historical)
Kings Landing (historical)
Delmar
Ocean Acres
Overland
Coaledo
Beaver Hill (Site)
Beaverton (historical)
Chrome
Lenova
Randolph (historical)
Randolph
Riverton
COQUILLE

Tsunami Inundation Area
Bandon and Bullards Beach State Park.


Tsunami Inundation Areas
South of Bandon to Curry
County Line
BANDON
Bullards
Randolph
Riverton
Johnson
Arago
Cranberry
Corners
Winterville
Twomile
Dew
Valley
Laurel Grove
Fourmile
Oldetown
Langlois
BULLARDS
BEACH
STATE PARK
COQUILLE
RIVER
COOS
CURRY
COUNTY

SECTION 3 PROBABILITY

Tab 6 - PROBABILITY

PROBABILITY

RISK ASSESSMENT AND HAZARD ANALYSIS

Coos County Emergency Management revised their Hazard Analysis in 1995 and again in 2000. Oregon Emergency Management provided an opportunity to all counties to revise their report the summer of 2002. This assessment involved participation from all local governments in Coos County.

This Hazard Analysis was a planning process that was essential to insure effective mitigation of hazards and efficient recovery from events. A hazard is viewed as a situation or event having the potential for doing damage to life, property, resources, and the environment. The Hazard Analysis provides information, assists in management decisions and is designed to encourage local government to meet previously unmet emergency management procedures. Further, a hazard analysis strives to raise the level of understanding of local officials and citizens in the area of measures to prevent or mitigate hazard events.

The Coos County Hazard Analysis provides current quantitative information for ranking hazards and provides the platform for the Natural Hazard Mitigation Plan action items.

HAZARD ANALYSIS CRITERIA

In analyzing the risk posed by specific hazards, a rating criteria 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 to include in assessing history of a hazard were those events for which the following activities were required:

The EOC (or alternate) was activated;
Activation / implementation of three or more EOP functions;
A multi-jurisdictional response was required;
A unified command structure was necessary to coordinate response;
A “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	=	1-10% could be affected
High	=	> 25% could be affected

PROBABILITY

Probability is based on the likelihood of an 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 ANALYSIS & PROBABILITY

The numeric score is not as important as how it compares with the scores of other hazards we face. By comparing scores, we can determine priorities: Which hazards should we be most concerned about? Which ones less so? By completing this process, planning can first be focused where the risk is greatest.

Based on the hazard analysis criteria, the following hazards were considered to pose the greatest threat to Coos County communities.

SEVERE WEATHER & HIGH WIND PROBABILITY HIGH SCORE 191

Coos County communities are subject to extremely high winds generated by strong Pacific Ocean storm systems that come ashore along the Oregon Coast. Severe storms are frequent with damaging winds. These natural events can and do result in power outages, disruption of services, transportation problems due to trees down and landslides, in addition to property damage.

Dates of occurrence with winds greater than 59 mph:

10/12/62	115 mph	
11/13/81	75 mph	
10/20/84	93 mph	
07/03/68	68 mph	
12/12/95	86 mph	
11/19/96	60 mph	
07/20/00	65 mph	
02/07/02	120 mph	DR1405

FLOOD (excludes Dam Failure) PROBABILITY HIGH SCORE 163

Coos County communities average annual rainfall ranging from 52” to 120”. The floods of 1964 and 1996 caused significant damage to infrastructure and properties within Coos County. These and other less significant flood events are caused by abnormally high water levels. Several days of heavy winter rains, which could be intensified by tidal effects, storm surges, and/or dike failure, are the causes. With approximately 1,418 people in 434 homes living in the flood plain (equates to .02% of the population) are at risk. Significant events:

10/31/24
12/22/64
02/08/96
11/16/96

EARTHQUAKE **PROBABILITY HIGH** **SCORE 149**

Past history of earthquakes in Oregon is relatively new. Recent quakes in Oregon were in March of 1993 Mw5.6, Scotts Mills quake and the September 1993 Mw6.9 and Mw5.9 quake in Klamath Falls. Despite their relatively small size the rural epicenters, both caused property damage. The greatest risk from earthquake in Coos County would be from an offshore Subduction Zone earthquake, with the maximum credible event ranging from Mw8.0 to Mw9.5 depending on how much of the zone ruptures at once. Other reports estimate earthquake recurrence intervals ranging from 340 to 590 years, the last large quake was about 1700 (300 years ago), placing the probability of another event in the next 50 years at 10 to 20 percent. Coos County has very few multi-story buildings, which would be damaged in a significant event. Only the newer buildings have been built to the seismic 4 standard for Oregon.

The highway systems for both the State and the County would suffer as Coos County has 43 bridges on priority one routes identified by ODOT as Highway 101, 42, and 242, which are on the 20 year plan to be retrofitted.

WILDLAND FIRE **PROBABILITY HIGH** **SCORE 146**

The major threat of fire in Coos County comes from the wildland/urban interface fires. With continued building in the interface zone, combined with the popularity of the rural lifestyle, the threat of wildland interface fire will increase. The other threat comes from the vast amount of forestland in the County. Coos County has had 68 big fires since 1917. Of those 68 fires, 7 have been over 1,000 acres and those 7 fires, 1 has been over 6,000 acres, and 2 have been 30,000 acres and over.

Major Coos County Fires since 1917:

Tioga	1919	6,080 acres
Tioga	1932	41,435 acres
Bandon	1936	30,000 acres including 90% of the City

TSUNAMI **PROBABILITY HIGH** **SCORE 124**

Tsunami is an event that has resulted in serious impact in 1957 in the Aleutian Islands of Alaska, 1946 in the Aleutian Islands of Alaska, and 1964 in Prince William Sound of Alaska. With the recent completion of the Coos County Tsunami inundation maps by DOGAMI, the impact from a generated tsunami is not as severe as previously believed. Those maps have brought greater awareness and preparedness by the citizens of Coos County especially those living along the coastline for the Cities of Bandon, Charleston, Coos Bay, and North Bend.
Tsunami Warnings for Coos County:

April 1, 1946
March 28, 1964
May 7, 1986
June 10, 1996

LANDSLIDE **PROBABILITY HIGH** **SCORE 115**

Landslides in Coos County usually occur due to the following: intense or prolonged rainfalls that cause sharp changes in groundwater levels; undercutting of a slope or cliff by erosion; vegetation removal by fires, timber harvesting, or land clearing; rockfall, rockslide, slump, and debris flows are all relative to landslides. The type of slides most common in the Tyee geologic formation in Coos County is debris flows. Within the last 10 years the following roadways have experienced slides due to fill failure, rockfall or landslide causing closure in some degree: Highway 42 – 28; Highway 42S – 2; Coos River Highway – 14; Powers 242 – 6; Highway 101 – Coast Highway –5; Cape Arago Highway 240 – 1; Empire to Coos Bay Highway –1; and Coos County Highways 22 (too numerous to name).

INFESTATION **PROBABILITY MEDIUM** **SCORE 61**

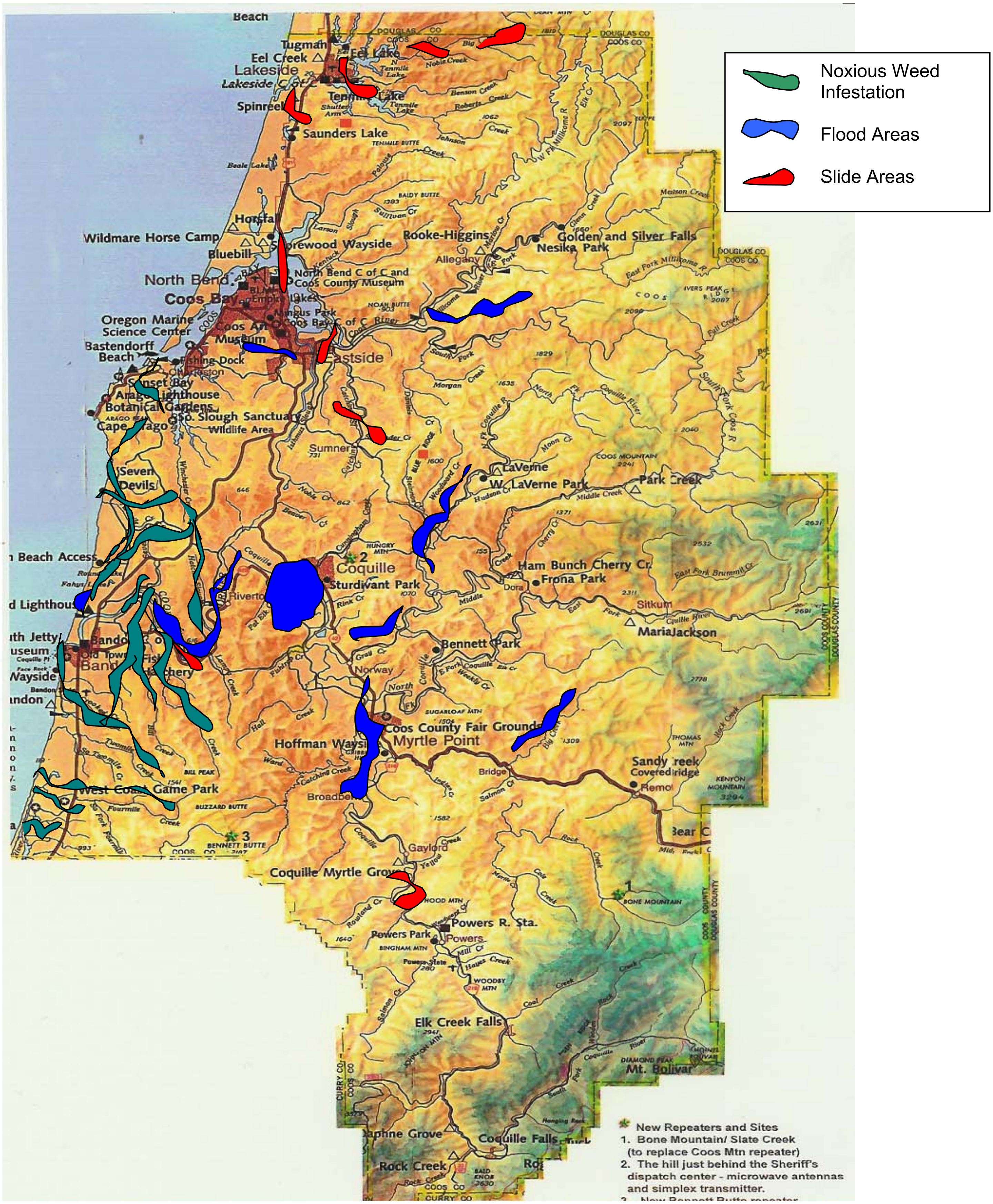
The major disease infestation is the Swiss Needle Cast epidemic. It is more evident in Douglas fir of the Coast Range. Nearly one million acres of forest in Oregon are affected with losses in tree volume growth approaching 100 million board feet per year. Sudden Oak Death, a newly detected disease is a threat to Oregon's oak. Root diseases and dwarf mistletoe continue to cause tree mortality and growth loss throughout Oregon's forests.

Coos County has approximately 900,000 acres of forest, which is 87% of the total land area and touches every community. The acreage is equally divided among public, small private, and forest industry ownership. The majority of the standing saw timber in the county (55%) is located on the public lands as opposed to 29% on forest industry lands and 16% on small private plots.

HAZARD ANALYSIS MATRIX

HAZARD	HISTORY WF=2	VULNERABILITY WF=5	MAXIMUM WF=10	PROBABILITY WF=7	TOTAL =
Severe Weather High Wind	2X9 =18	5X8 = 40	10X7 =70	7X9 =63	**191**
Flood	2X10 =20	5X6 =30	10X5 =50	7X9 =63	**163**
Earthquake	2X2 =4	5X6 =30	10X8 =80	7X5 =35	**149**
Wildland Fire	2X6 =12	5X7 =35	10X5 =50	7X7 =49	**146**
Tsunami	2X2 =4	5X5 =25	10X6 =60	7X5 =35	**124**
Landslide	2X8 =16	5X2 =10	10X4 =40	7X7 =49	**115**
Infestation	2X1 =2	5X1 =5	10X4 =40	7X2 =14	**61**

APPENDIX A MAPS


Noxious Weed Infestation
Flood Areas
Slide Areas
New Repeaters and Sites
1. Bone Mountain/ Slate Creek (to replace Coos Mtn repeater)
2. The hill just behind the Sheriff's dispatch center - microwave antennas and simplex transmitter.
North Bend
Coos Bay
Coquille
Myrtle Point
Powers
Lakeside
Eastside
Sumner
Bandon
Coos County Fair Grounds
Golden and Silver Falls
Elk Creek Falls
Mt. Bolivar
Saunders Lake
Tenmile Lake
Oregon Marine Science Center
Bastendorff Beach
Seven Devils
West Coast Game Park
Hoffman Wayside
Coquille Myrtle Grove
Powers Park
Bennett Park
LaVerne
W. LaVerne Park
Frona Park
Sitkum
Dora
Norway
Daphne Grove
Rock Creek
Coquille Falls

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

Bandon

The City of Bandon is located near Highway 101, on the coastline at the south end of Coos County, at the mouth of the Coquille River, an elevation of only 20 feet above sea level. The city was incorporated in 1891 and has a population of 2,833 as of the 2000 Census. The median age group is 49.3 years. Of the total population, 29.4% is over the age of 65. Several factors, both natural and man-made, contribute to the tourism that plays a large part in the economy of Bandon. Natural attractions include the obvious proximity of the Pacific Ocean and spectacular scenery and accessibility to fishing, hiking, beach combing and wildlife watching, as well as Coquille Point, Face Rock Viewpoint State Park, Oregon Dunes National Recreation Area, Bullards Beach State Park, Bandon Marsh and Bandon State Park. Man-made amenities include Old Towne Bandon, the lighthouse at Bullards Beach, Bandon Dunes Golf Course, West Coast Game Park, cranberry bog tours, Bandon Cheese Factory, Port of Bandon, Bandon Museum, art galleries, specialty shops and several fine restaurants. The harbor at Bandon provides boating opportunities and berthing for fishing vessels. The Coquille River Lighthouse was the last lighthouse to be built on the Oregon coast and was completed in 1896. It can be viewed from the waterfront in Bandon.

COMMUNITY ISSUES

The City of Bandon has experienced devastating fires on two occasions, which resulted in the City burning to the ground. One of the main issues since the last rebuild of Bandon is the antiquated water delivery system. The deterioration of this system has left significant portions of the older sections of the city without the capability to deliver enough water and pressure to a fire hydrant to extinguish a house fire much less any kind of fire. This issue is of major concern. Due to the fact that major portion of the outlying areas of the City are inundated with Gorse, a noxious weed, with high oil content which once burning is very difficult to extinguish and was the major cause of the city burning to the ground, on both occasions.

Several other issues facing Bandon include the impact of severe winter Pacific storms. Being located directly on the rugged Oregon coast at the mouth of the Coquille River, winter storms and high winds continually pound the jetty and marina areas of the City, as well as compromise the infrastructure and the capability of the City to provide electrical services to the residents. High winds are recorded all year long with hurricane force winds being recorded during winter storms. With heavily forested areas surrounding down town, electrical wires are continually damaged due to downed trees weakened by saturated soil. Bandon is looking to replace the very vulnerable overhead electrical delivery system with underground cable.

Critical facilities are outdated and unable to deliver the quality and quantity of service needed to keep up with this growing community, which is the fastest growing area in Southwest Oregon. A tremendous influx if retired residents are flocking to this area for its beautiful rugged coast line and proximity to world class golfing, fishing, hunting, and hiking.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Coos County, and participating Cities will gain eligibility for Hazard Mitigation Grant Program funds.

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

CITY OF BANDON

MITIGATION ACTION ITEMS

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 Strategy:

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

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Partnered with Coos County Road Department,
Industrial Partners
BLM

Timeline: 5 years

Plan Goals Addressed: Emergency Services, Protection of Life & Property

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WILDFIRE #2

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

Implementation Strategy:

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

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry
U.S. Forest Service
Rural Fire Districts
Coos Forest Protection Association

Timeline: On Going

Plan Goals Addressed: Protect Life and Property, Public Awareness

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WILDFIRE #3

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Work with fire jurisdictions regarding issuing open burn permits in late summer.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies: Natural Hazard Mitigation Committee
Coos County Sheriff
Oregon Department of Forestry
U.S. Forest Service
Coos Forest Protective Association
Coos County Roads Department
The City of Bandon

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property

FLOODING #1

Short Term: **Review current County and City Codes to assess applicability and feasibility, and identify mitigation options.**

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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
City of Coos Bay Engineer
Representatives from Diking Districts

Timeline: 1 – 2 Years

Goals Addressed: Protect Life and Property, Partnerships and Implementation

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FLOODING #2

Short Term: **Review current, storm water facility capabilities to determine the necessity for new or additional mitigation actions.**

Implementation:

- Identify and map critical areas of flooding.
- Necessity for an engineering study for storm water mitigation in the mapped areas.
- Explore funding options for replacing required flood fight equipment that is no longer serviceable.
- Explore funding options for replacing or rehabilitating essential facilities.

Coordinating Organization: Natural Hazard Mitigation Committee
City of Bandon
City of Coquille
City of Myrtle Point
Coos County Planning Department
Coos County Road Department
Oregon Department of Transportation

Timeline: On going

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

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LANDSLIDES #1

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

Implementation:

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

Coordinating Organization: Natural Hazard Mitigation Committee
Coos County Highway Department
Oregon Department of Transportation
Private Industry (logging)
BLM

Timeline: 1-2 Years

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

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LANDSLIDES #2

Short Term: **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, specifically:
  - Beach Loop
  - Anderson / Blossom Gulch
  - Bald Hill
  - North Fork Hill
  - U.S. Hwy. 101
  - Lampa Mountain Road
  - County Hwy. #242
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for mitigation of slide damage.
- Assess the feasibility of placing electrical utilities underground.

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

Timeline: 1-2 years

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

SEVERE WINTER STORM & WIND #1

Short Term: **Enhance strategies for debris management for severe winter storm events.**

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws for mitigation activity.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2 : **Public Education Program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach and dune areas, and coastal urban areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop area.
- Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies:	Hazard Mitigation Advisory Committee Coos County Planning City of Bandon City of Coos Bay City of Lakeside
Timeline:	On Going
Plan Goals Addressed:	Protect Life and Property, Public Awareness

EARTHQUAKE & TSUNAMI

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Natural Hazard Mitigation Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

LETTER OF PROMULGATION

As the governing body for the City of Bandon, 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 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule, 44 CFR, Part 201.

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

_____ _____

_____ _____

_____ _____

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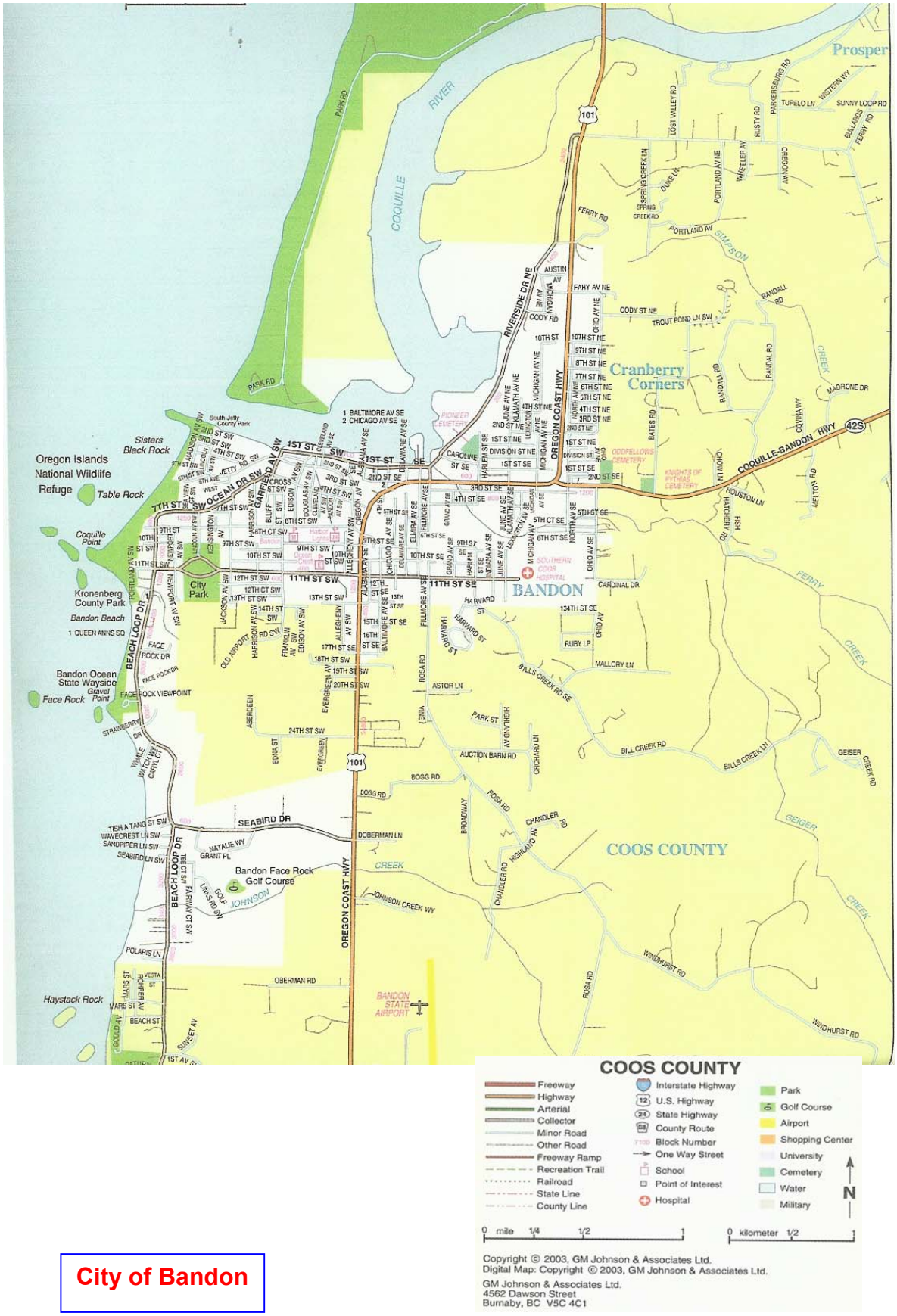

City of Bandon

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

Coos Bay, Oregon is a beautiful coastal town located on Highway 101 in the southern part of the State. The total population numbers 15,700. The city is Oregon's second busiest maritime commerce center. The busy port of Coos Bay was founded in 1854 by J.C. Tolman of the Coos Bay Co. The International Port of Coos Bay transports a wide variety of items, but the vast majority of the tonnage consists of wood products. The city is one of the world's largest ports for forest products. Inbound cargoes are wood stocks in different varieties and also petroleum products. Most of the outbound cargoes carry wood products which are exported all over the world. The ships reach the city by entering the harbor passing through the Charleston Jetty and are guided safely into the channel by the Cape Arago Lighthouse. The ships then make their way through the channel passing under one of Oregon's most famous coastal bridges, the Conde D. McCullough Memorial Bridge. The port of Coos Bay offers one of the safest entrances on the Pacific Northwest coast. The 15-mile channel helps assure that cargoes move rapidly and quickly through the harbor's marine terminals to domestic and international markets. The channel offers both the visitor and the residents the ability to enjoy many recreational activities – these include fishing, Dungeness crabbing, and claming. Coos Bay charter boats offer deep-sea fishing where the recreational fisherman can catch salmon, tuna, halibut, ling cod, yellow eye, cabezone, black rock fish and many others. Charter boat trips provide the opportunity to get close to wildlife. Seals, whales, porpoises, sea lions, as well as sea birds such as puffins, murres, shearwaters, and petrels are easily seen from charter boats and shore viewing areas. Whale watching is a favorite seasonal pastime. Myrtlewood is found primarily in a small area on the Pacific Coast. Several myrtlewood factories turn this rare wood into unique creations. Immediately north of the Bay Area is the 32,000 acre Oregon Dunes National Recreation Area. This is a unique setting of sand, lakes, timber,

and ocean beaches. Towering sand dunes and miles of flat, sandy beaches characterize the Oregon Dunes National Recreation Area. Although this area contains some of the largest coastal sand dunes in the world, an ecosystem that results from the meeting of two extremely diverse life zones – the coastal ocean and mountain forest, may be found. The Cape Arago Lighthouse is located just south of Coos Bay, and can be viewed from a trail off Sunset Beach State Park.

COMMUNITY ISSUES

The natural hazard mitigation issues facing Coos Bay center around flooding and landslide issues. The Libby Drainage District and the Englewood Diking District, as well as several drainage basins within the City limits impact residents each year. These areas are Blossom Gulch, Dakota Avenue, Colorado Avenue, South Seventh Street, and Golden Avenue. Because the drainage and diking districts affect both Coos Bay and Coos County residents, the action items addressed will be coordinated between both entities.

Statistics show that certain areas of the Diking and Drainage Districts are inundated with flood waters on a yearly basis. The last assessment and evaluation for mitigation of the flooding problems of the Englewood Diking District and Libby Drainage District is seventeen years old. The action items indicated address this problem as well as the need for storm-water pumping stations at various areas throughout the City, which are also threatened by flood waters annually.

The concerns of flooding in certain areas of the City, the Drainage and Diking Districts and collaborative action items involving fire, earthquake, flooding, winter storm, and tsunami are addressed in the action items for review and approval.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Coos County and participating Cities will gain eligibility for Hazard Mitigation Grant Program funds.

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

CITY OF COOS BAY

MITIGATION ACTION ITEMS

WILDFIRE #1

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

Implementation:

- Explore fire agencies using GPS for response planning and mapping.
- Seek funding for a countywide GPS for mapping purposes.
- Partner with private and public agencies, as well as 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: Hazard Mitigation Planning Committee
Oregon Department of Forestry
Coos Forest Protection Association
U.S. Forest Service
Industrial Partners

Timeline: 5 Years

Plan Goals Addressed: Emergency Services,
Protection of Life and Property
Partnerships in Implementation

WILDFIRE #2

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

Implementation Strategy:

- 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 Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Industrial Partners
Coos County Citizens Corps

Timeline: On Going

Plan Goals Addressed: Protection of Life and Property
Partnerships in Implementation
Emergency Services,

WILDFIRE #3

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace equipment that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies: Hazard Mitigation Planning Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Coos County Roads Department
The City of Bandon

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property

FLOOD #1

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

Implementation:

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

Coordinating Organization:	Hazard Mitigation Planning Committee Coos County Planning Department City of Coos Bay Representatives from Diking and Drainage Districts
Timeline:	1 – 2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships In Implementation

FLOOD

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

Implementation:

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

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

FLOOD

Short Term #3: **Explore alternative actions to mitigate flooding in Libby Drainage and Englewood Diking Districts.**

Implementation:

- Review current tide-gate maintenance programs for applicability to current mitigation problems.
- Explore feasibility of dredging and uplifting the dikes and other methods of repairing dikes.
- Review existing (20 year old) mitigation study of diking districts to determine current applicability.
- Study mitigation actions for transportation arteries in diking district, which lie in the flood plain.
- Implement feasibility study of the possibility of raising homes in 100-year flood plane.
- Explore funding options for feasibility studies and determined mitigation actions.
- Explore feasibility of new tide gates to protect Southwest Boulevard, pump stations, and other infrastructure.

Coordinating Organization:	Natural Hazard Mitigation Committee Coos County Planning City of Coos Bay Planning Englewood Diking District Libby Drainage District U.S. Army Corps of Engineers
Timeline:	On Going
Plan Goals Addressed:	Protect Life and Property, Partnerships In 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 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
Coos County Highway Department
City of Coos Bay
Oregon Department of Transportation
Private Companies (logging)
Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

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

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LANDSLIDE

Short Term #2: Evaluate current, and high hazard slide areas for mitigation 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, specifically:
  Beach Loop
  Coos River Highway
  Ocean Boulevard
  Bald Hill
  North Fork Hill
  U.S. Hwy. 101
  Lampa Mountain Road
  Hwy. #242
  East Bay Road
- Explore funding sources for geo studies and assessments
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization: Hazard Mitigation Advisory Committee,
Coos County Highway Department
City of Coos Bay
City of North Bend
Oregon Department of Transportation

Timeline: 1-2 years

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

SEVERE WINTER STORM & WIND

Short Term #1: Enhance strategies for debris management relating to severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of associated equipment, such as cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee City of Coos Bay Coos County Road Department Oregon Department of Transportation
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE / TSUNAMI

Long Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Hazard Mitigation Planning Committee
City and County Planners

Timeline: 2-5 Years

Plan Goals Addressed: Protect Life and Property
Partnerships in Implementation

EARTHQUAKE & TSUNAMI

Short Term #2: **Public Education Program to enhance existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach front areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop and other high risk areas. Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee
City and County Planners

Timeline: 1-2 years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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LETTER OF PROMULGATION

As the governing body for the City of Coos Bay, 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 of prioritizing our objectives in order to mitigate those areas of great concern.

As part of a county wide collaborative 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44 CFR, Part 201.

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

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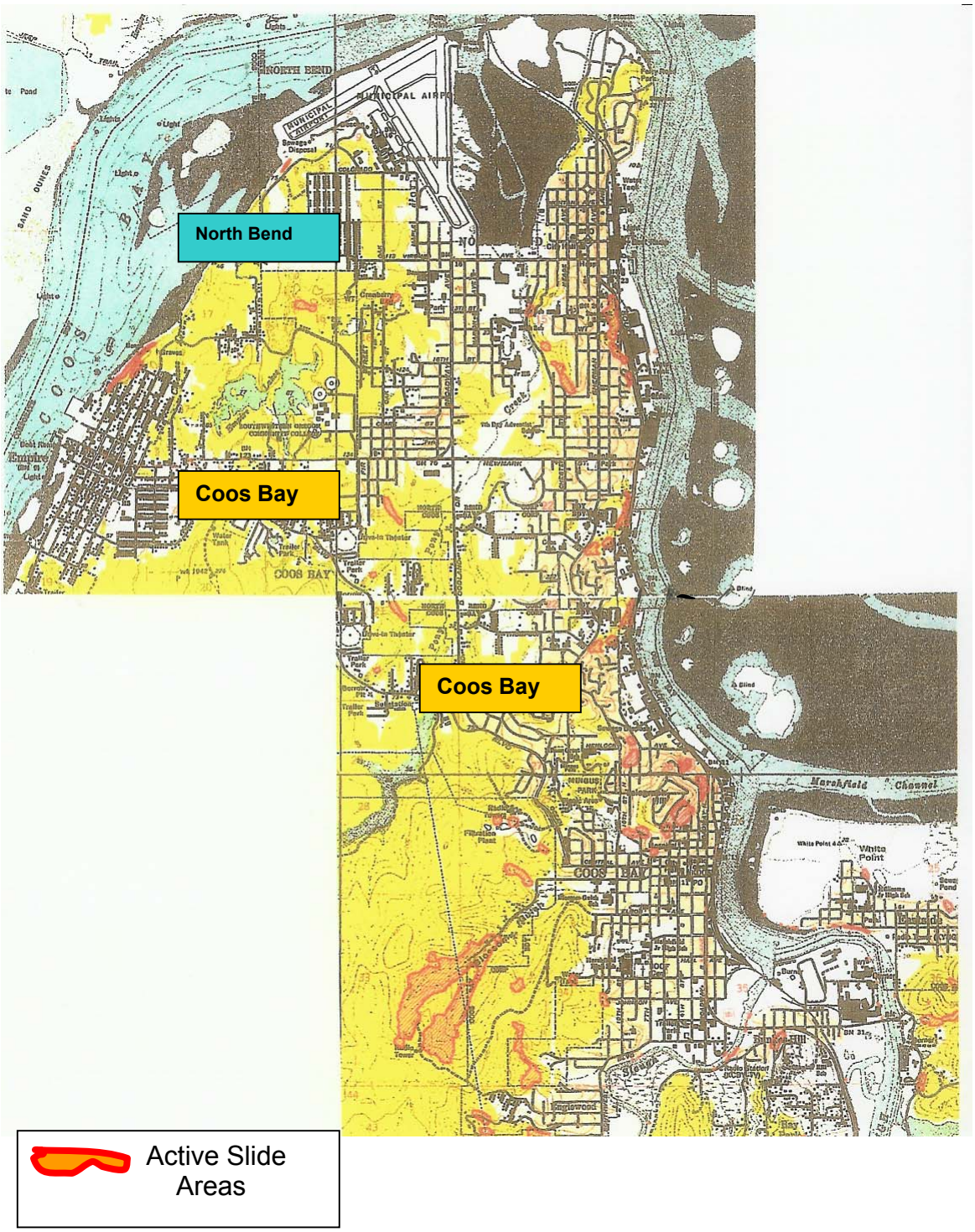
North Bend
Coos Bay
Coos Bay
Active Slide Areas

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

COQUILLE

Ranked one of the 10 best small towns in the U.S. by Holiday and Leisure Magazine (2001) the City of Coquille is the Coos County seat and is nestled in a beautiful valley, set between the I-5 corridor and the Pacific Ocean along the beautiful Coquille River. Coquille's elevation is a mere 40 feet above sea level. Founded in the early 1850's and incorporated in 1885, Coquille is the geographical center and county seat of Coos County. With a population of 4,295, and a median age group of 41.5, Coquille retains its small town atmosphere and values. Turn of the twentieth century historic homes and business locations populate the down town area. The Sawdust Theatre is one of the area's main attractions with performances running from Memorial Day to Labor Day.

Recreation abounds around Coquille, with numerous camping, fishing, and hunting opportunities. The Coquille River, on whose banks the city was founded, is one of the foremost steelhead fisheries in the world. In addition to steelhead fishing, Chinook and Coho Salmon abound during the fall run which takes place starting about mid July. In addition to salmon and steelhead, there are several different types of fresh water sport fisheries, including bass, and salt water fish too numerous to mention. The Coquille Valley is a veritable paradise for wildlife. There are local herds of elk and deer, and the wet-land surrounding the winter lake contains many species of wildlife, including beaver, river otters, mink, raccoon, bald eagles, hawks, and kingfishers. The town offers many quaint shops and an annual Gay 90's celebration. Area attractions include Myrtlewood groves, Coquille[MSOffice1] Myrtle Grove State Park, the Carriage Museum, and several boat launches.

COMMUNITY ISSUES

The predominant natural hazard mitigation issues facing the City of Coquille center around the current water resources and waste water treatment facilities which are continually impacted by flooding issues. For many of the action items addressed collaboration between other county agencies and industry will be necessary to mitigation activities.

Statistics show that the primary action items regarding flooding and waste water inundation due to the incapability of current facilities to handle both are a primary concern. Wildfire, landslide, earthquake, flooding, winter storm, and tsunami are included for review and approval.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Coos County and participating, Cities will gain eligibility for Hazard Mitigation Grant Program funds.

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

CITY OF COQUILLE

MITIGATION ACTION ITEMS

WILDFIRE

Long Term #1: **Identify and map all roads, private drives, logging trails, to increase the ability of firefighters and emergency responders 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 a countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- Create current road and trail maps of region.
- Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responders.

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Coos County Road Department,
Industrial Partners (logging)
BLM

Timeline: 5 years

Plan Goals Addressed: Emergency Services

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

Coordinating Agencies:	Hazard Mitigation Planning Committee Oregon Department of Forestry U.S. Forest Service Rural Fire Protection Districts Coos Forest Protection District
Timeline:	On Going
Plan Goals Addressed:	Protect Life and Property, Public Awareness

WILDFIRE

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies:	Hazard Mitigation Planning Committee Oregon Department of Forestry, Coos Forest Protective Association Coos County Roads Department The City of Bandon
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Partnership in Implementation

FLOODING

Short Term #1: Review current County and City Codes to assess current applicability and feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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, City of Coos Bay Engineer Representatives from Diking / Drainage Districts
Timeline:	1 – 2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation

FLOODING

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

Implementation:

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

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

FLOODING

Short Term #3: **Explore alternative actions to mitigate inundation of sewage treatment facility and alleviate raw sewage spills.**

Implementation:

- Solicit continued public input in waste treatment plant project.
- Explore funding options for mitigation strategies.

Coordinating Organization:	Natural Hazard Mitigation Committee Coquille Planning Department Department of Environmental Quality Coos County Health Department
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships In Implementation

LANDSLIDES

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

Timeline: 1-2 Years

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

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LANDSLIDES

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, specifically:
  - Beach Loop
  - Anderson / Blossom Gulch
  - Bald Hill
  - North Fork Hill
  - U.S. Hwy. 101
  - Lampa Mountain Road
  - County Hwy. #242
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

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

Timeline: 1-2 years

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

SEVERE WINTER STORM & WIND

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department Oregon Department of Transportation
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

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EARTHQUAKE & TSUNAMI

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization :	Hazard Mitigation Planning Committee City and County Planners
Timeline:	1-2 Years
Plan Goals Addressed:	Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: Public Education Program enhancing existing programs.

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop area.
- Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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LETTER OF PROMULGATION

As the governing body for the City of Coquille, 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 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule, 44 CFR, Part 201.

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

_____ _____

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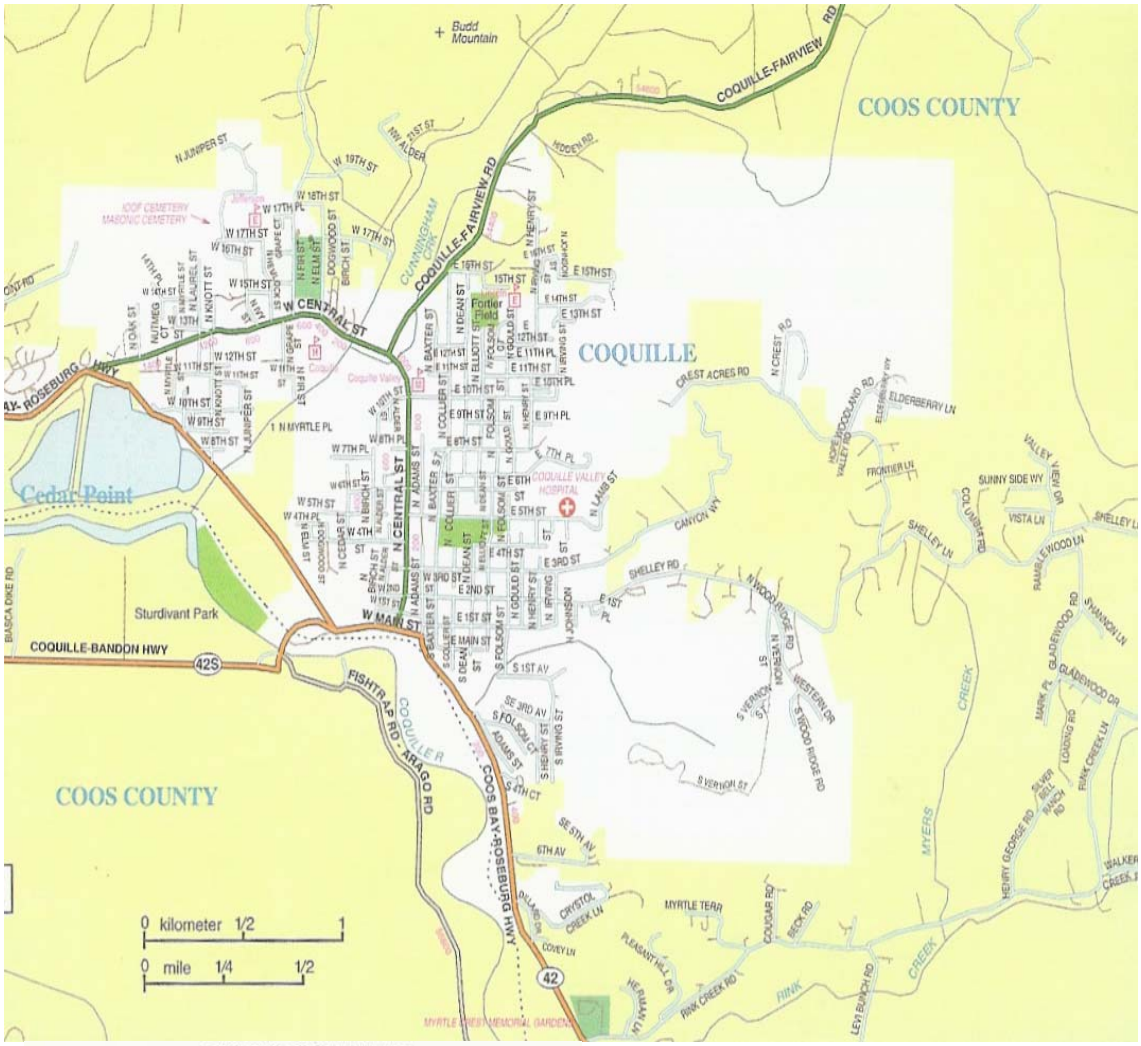
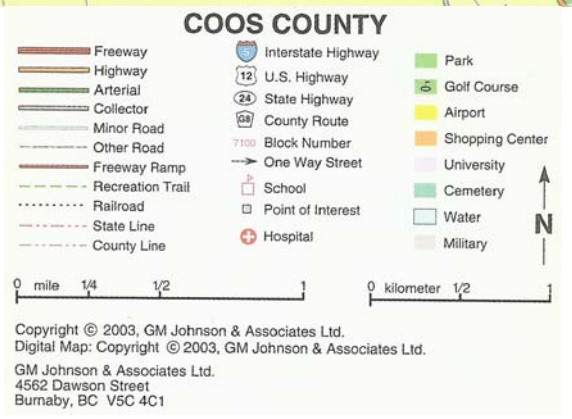
_____


Budd Mountain
COQUILLE-FAIRVIEW RD
COOS COUNTY
COQUILLE
W CENTRAL ST
N CENTRAL ST
Cedar Point
Sturdivant Park
COQUILLE-BANDON HWY
42S
W MAIN ST
FISHTRAP RD
ARAGO RD
COOS BAY-ROSEBURG HWY
42
COOS COUNTY
0 kilometer 1/2 1
0 mile 1/4 1/2


COOS COUNTY
Freeway
Highway
Arterial
Collector
Minor Road
Other Road
Freeway Ramp
Recreation Trail
Railroad
State Line
County Line
Interstate Highway
U.S. Highway
State Highway
County Route
Block Number
One Way Street
School
Point of Interest
Hospital
Park
Golf Course
Airport
Shopping Center
University
Cemetery
Water
Military
N
0 mile 1/4 1/2 1
0 kilometer 1/2 1
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Digital Map: Copyright © 2003, GM Johnson & Associates Ltd.
GM Johnson & Associates Ltd.
4562 Dawson Street
Burnaby, BC V5C 4C1

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

LAKESIDE

Lakeside is located on scenic Highway 101 strategically located between Coos Bay/North Bend and Winchester Bay/Reedsport, one mile inland from the Pacific Ocean, between Tenmile Lakes and the Oregon Dunes National Recreation Area. Lakeside was incorporated in 1974. The population, as of the 2000 Census, is 1,371, encompassing 649 households. The median age is 53.3 years, putting it considerably above both the state and national median. The per capita income for the city is $16,702. Over fifteen percent (15.2%) of the population is below the poverty line.

Boating and recreation provide a major source of revenue in the area. Tenmile Lakes is one of Oregon's largest and most popular recreation lakes, with superb fishing year round. Claming, crabbing, and ocean fishing are only minutes away. Several RV resorts and marinas are available for vacationers.

Lakeside lies nestled between Tenmile Lakes and the Oregon Dunes National Recreation area. Tenmile Lakes is one of Oregon's largest and most popular recreation lakes. Fishing is superb year round and species include large mouth bass, trout, crappie, bluegill, and catfish. Tenmile Creek, which feeds into the ocean, provides great steelhead fishing in the spring and fall. There are large open areas on the lake, which are perfect for all types of watercraft and sports. Sand Dune access is easily accessible only minutes from downtown Lakeside.

COMMUNITY ISSUES

Lakeside lies in the proximity to the Pacific Ocean, and Oregon Dunes National Recreation Area tsunami inundation zone. Due to the influx of tourists during the summer months for the boat races as well as year around fishing and boating, primary concerns are for a tsunami warning system.

PLAN ADOPTION

The Coos County Commissioners and City councils of the cooperative cities will be responsible for adopting the Coos County Natural Hazard Mitigation Plan. The 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlines in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Coos County, and participating cities will gain eligibility for Hazard Mitigation Grand Program funds.

Once signed by individual Cities and County government, a copy of the signed Letter of Promulgation will need to be sent to the County Emergency Manager for inclusion in the master plan to be sent to Oregon emergency Management and the Federal Emergency Management Agency, for approval.

CITY OF LAKESIDE

MITIGATION ACTION ITEMS

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

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

Timeline: 5 years

Plan Goals Addressed: Emergency Services, Partnerships in Implementation

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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 Strategy:

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

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

WILDFIRE

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Coos County Roads Department
The City of Bandon

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property

FLOOD

Short Term #1: Review current County and City Codes to assess current applicability and feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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 City of Coos Bay Engineer, and Representatives from Diking Districts
Timeline:	1 – 2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation

FLOOD

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

Implementation:

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

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

LAND SLIDES

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 with specific knowledge of extreme rural areas, to study high-risk areas.
- Develop a regional map of high-risk areas.

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

Timeline: 1-2 Years

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

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LAND SLIDES

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

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies, specifically:
  - Beach Loop
  - Anderson / Blossom Gulch
  - Bald Hill
  - North Fork Hill
  - U.S. Hwy. 101
  - Lampa Mountain Road
  - State Hwy. #242
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Highway Department Private Companies Oregon Department of Transportation
Timeline:	1-2 years
Plan Goals Addressed:	Protect Life and Property, Emergency Services, Partnerships and Implementation

SEVERE WINTER STORM & WIND

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Natural Hazard Mitigation Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: **Public Education Program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop area.
- Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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LETTER OF PROMULGATION

As the governing body for the City of Lakeside, having recognized the need for sufficient planning, has engaged in risk assessment, and considered pre-disaster remedies to potential loss. 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.

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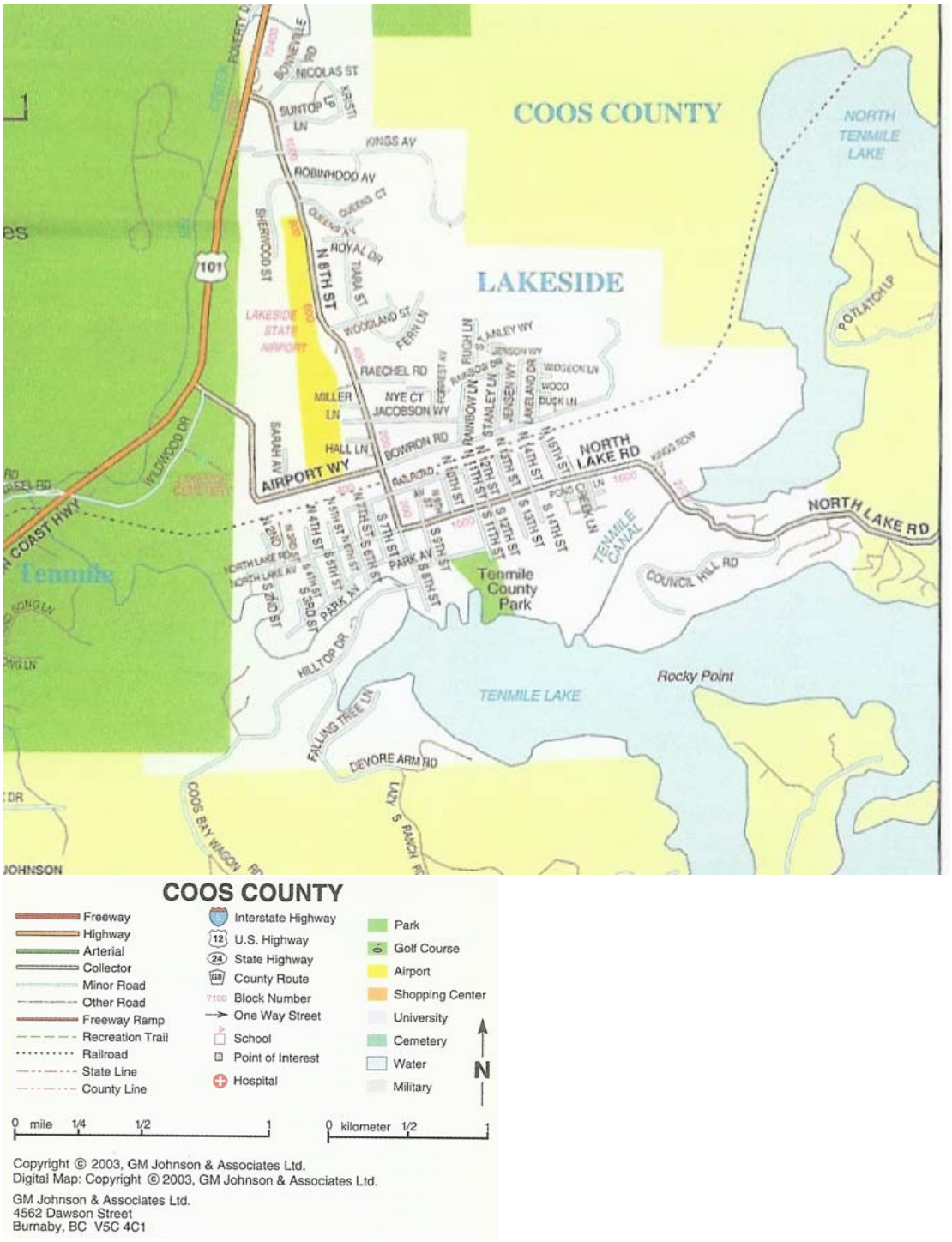
COOS COUNTY
LAKESIDE
NORTH TENMILE LAKE
POTLATCH LP
NICOLAS ST
SUNTOP LN
KINGS AV
ROBINHOOD AV
QUEENS CT
QUEENS AV
ROYAL DR
TIARA ST
SHERWOOD ST
N 8TH ST
101
LAKESIDE STATE AIRPORT
WOODLAND ST
FERN LN
RAECHEL RD
MILLER LN
NYE CT
JACOBSON WY
HALL LN
BOWRON RD
AIRPORT WY
SARAH AV
WILDWOOD DR
COAST HWY
Tenmile
NORTH LAKE RD
RAILROAD
N 10TH ST
N 11TH ST
N 12TH ST
N 13TH ST
N 14TH ST
N 15TH ST
POND CREEK LN
TENMILE CANAL
S 14TH ST
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S 9TH ST
S 8TH ST
S 7TH ST
S 6TH ST
PARK AV
Tenmile County Park
COUNCIL HILL RD
HILL TOP DR
TENMILE LAKE
Rocky Point
FALLING TREE LN
DEVORE ARM RD
COOS BAY WAGON RD
JOHNSON

COOS COUNTY
Freeway
Highway
Arterial
Collector
Minor Road
Other Road
Freeway Ramp
Recreation Trail
Railroad
State Line
County Line
Interstate Highway
U.S. Highway
State Highway
County Route
Block Number
One Way Street
School
Point of Interest
Hospital
Park
Golf Course
Airport
Shopping Center
University
Cemetery
Water
Military
N
0 mile 1/4 1/2 1
0 kilometer 1/2 1
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4562 Dawson Street
Burnaby, BC V5C 4C1

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

MYRTLE POINT

Myrtle Point is said to be one of the best-preserved small towns in Southern Oregon. Located at the southern end of the Coquille River Valley, about 25 miles inland from the Oregon coast, Myrtle Point is a community of 2,451 and was incorporated in 1893. Primarily a farming community, it was named for the abundant groves of Oregon Myrtlewood trees and its geographical location above the Coquille River. The average age of residents here is 40. The historic downtown districts ringed by many vintage homes, some well kept and others in the process of restoration.

The town sits along Highway 42, a major east-west route, between U.S. Highway 101, and Interstate 5. The town is home to the Coos County Logging Museum, open in summertime. The museum is located in a domed, pioneer-era building originally built as a Mormon Church, with unusual acoustics. The town's main event is the Harvest Festival, usually the last weekend in September. There are several other quaint festivals in spring and summer. Myrtle Point's boom years came in the late 1890's, when speculation ran high about a railroad connection to Roseburg. The railroad eventually chose another route, but the region's rich timberlands and farmlands sustained the community. The town is adjacent to the Coquille River, which rises into the nearby Coast Range and finds its way down to the sea at Bandon. Once an important waterway for frontier-era commerce and transportation, the river is a popular fishery for salmon and steelhead. The Coquille River Valley remains a productive cattle and dairy region, and there are sawmills and other small industry. Pride in a hard-working pioneer heritage runs high, and the town strives to maintain its downtown district and small town character. Myrtle Point is the home of the Coos County Fair and Rodeo and the Coos County Logging Museum. Local area attractions include myrtlewood groves, Coquille Myrtle Grove State Park, and the Siskiyou National Forest. Myrtle Point Lehnherr Skateboard Park located within the city limits, boasts the deepest bowl in the Pacific Northwest.

COMMUNITY ISSUES

Myrtle Point shares many of the same concerns that it's neighbor, Coquille does. Having concerns about critical waste facilities being located in the flood plane and recent instances of raw sewage being spilled into the Coquille River during annual flooding of the river. Flood levels have been marked on the side of the waste facility building up to 16 feet, the second story. With the facility being inundated with flood-waters on a regular basis, the city has begun studies to evaluate the necessity of either moving the facility to higher ground or rehabilitating the facility at it's current location.

As part of this planning process, these issues are of primary concern for Myrtle Point and have become an action item.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlines in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Coos County and participating Cities will gain eligibility for Hazard Mitigation Grant Program Funds.

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

CITY OF MYRTLE POINT

MITIGATION ACTION ITEMS

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 Strategy:

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

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

Timeline: 5 years

Plan Goals Addressed: Emergency Services

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 Strategy:

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

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

FLOOD

Short Term #1: Review current County and City Codes to assess current applicability and feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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 Cooperative Planning Departments Representatives from Diking Districts
Timeline:	1 – 2 Years
Goals Addressed:	Protect Life and Property, Partnerships And Implementation

FLOOD

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

Implementation:

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

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

FLOOD

Short Term #3: **Explore alternative actions to mitigate flood damage to critical facilities.**

Implementation:

- Initiate studies into rehabilitation of current facilities.
- Explore feasibility of moving current facility to higher ground.
- Investigate feasibility of building new facility on higher ground.
- Explore funding for mitigation studies and construction.

Coordinating Organization:	Hazard Mitigation Planning Committee City of Myrtle Point
Timeline:	1 – 2 Years
Plan Goals Addressed:	Protect Life and Property, Emergency Services

LANDSLIDES

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 with specific knowledge of extreme rural areas, to study high-risk areas.
- Develop a regional map of high-risk areas.

Coordinating Organization:	Coos County Highway Department Oregon Department of Transportation Private Companies (logging) Hazard Mitigation Advisory Committee
Timeline:	1-2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation, Natural Systems

SEVERE WINTER STORM

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department Oregon Department of Transportation
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Natural Hazard Mitigation Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

LETTER OF PROMULGATION

As the governing body for the City of Myrtle Point, 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 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44 CFR, Part 201.

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

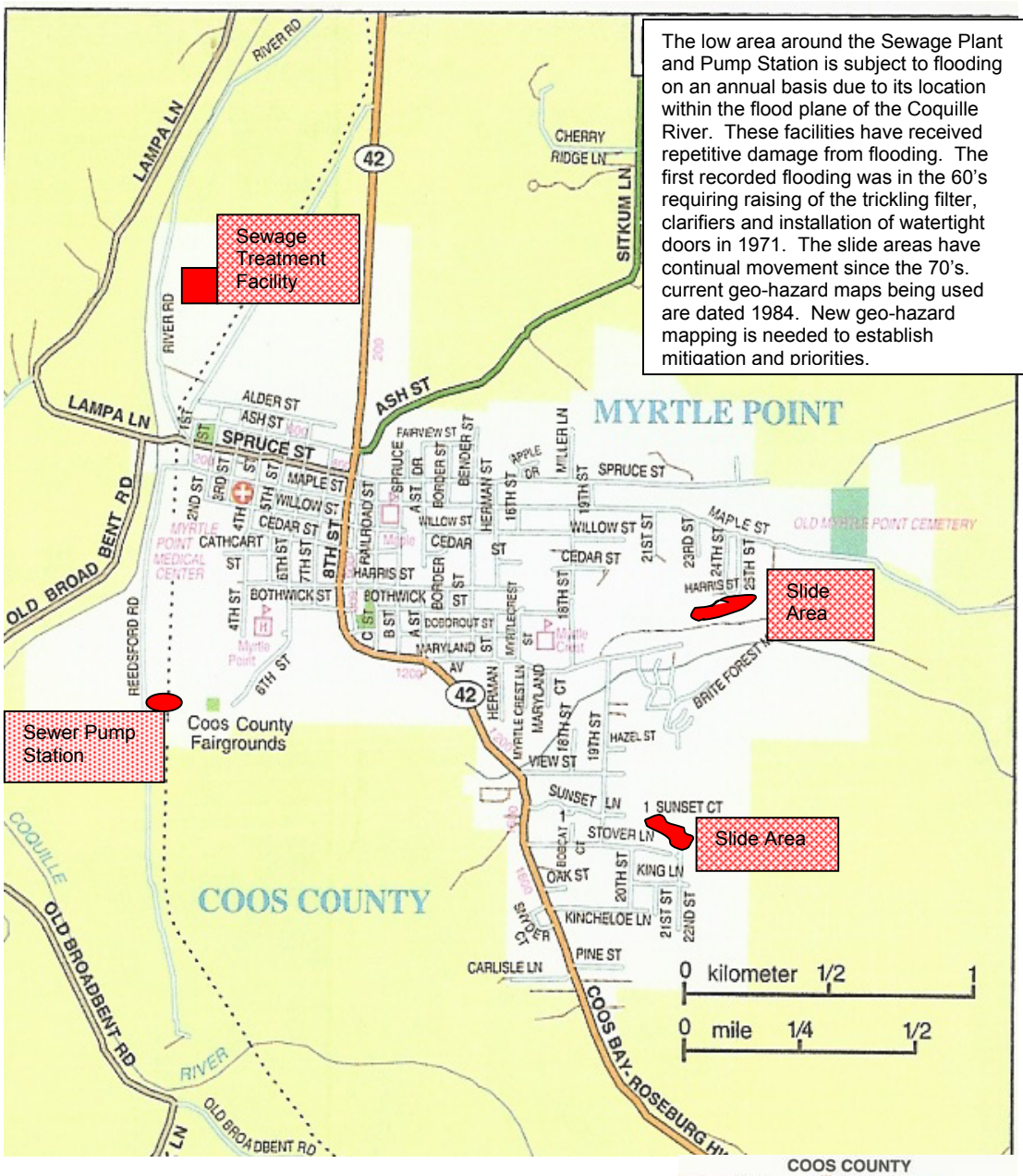
_____ _____
Ed Cook, Mayor Joe Bouska, Councilor

_____ _____
Mike Johnson, Councilor Bob Thomas, Councilor

_____ _____
Denise Dewald, Councilor Joanne Miller, Councilor

_____
Barbara Carter, Councilor

Attest: _____
Randy Whobrey
City Manager


The low area around the Sewage Plant and Pump Station is subject to flooding on an annual basis due to its location within the flood plane of the Coquille River. These facilities have received repetitive damage from flooding. The first recorded flooding was in the 60's requiring raising of the trickling filter, clarifiers and installation of watertight doors in 1971. The slide areas have continual movement since the 70's. current geo-hazard maps being used are dated 1984. New geo-hazard mapping is needed to establish mitigation and priorities.
Sewage Treatment Facility
Sewer Pump Station
Slide Area
Slide Area
Coos County Fairgrounds
MYRTLE POINT
COOS COUNTY
RIVER RD
LAMPA LN
OLD BROAD BENT RD
ASH ST
SPRUCE ST
MAPLE ST
WILLOW ST
CEDAR ST
HARRIS ST
BOTHWICK ST
MARYLAND ST
VIEW ST
SUNSET LN
STOVER LN
KING LN
KINCHELOE LN
PINE ST
CARLISLE LN
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CHERRY RIDGE LN
BRITE FOREST
COOS BAY-ROSEBURG
COQUILLE
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COOS COUNTY
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4562 Dawson Street
Burnaby, BC V5C 4C1

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

NORTH BEND

Situated on a north bend of the Coos Bay estuary, the town's history dates back to the 1850's, when there were sawmills and a handful of houses. Many of North Bend's existing structures were constructed during the 1920's and were made of concrete, rather than fire-prone wood. This era was highlighted by a commercial boom. It took the vision of an early 20th Century lumberman named Louis Simpson to make the settlement into a proper city, with the proper name North Bend. North Bend was incorporated in 1903. Simpson's father had started the town's original sawmill, and the businesses expanded to include mills that turned out a variety of wood products, from fruit boxes to fancy doors. There were machine shops and a foundry, a woolen mill, a furniture factory, milk condenser, brewery and two shipyards which turned out a steady stream of wooden schooners that took Simpson lumber to San Francisco and other distant markets.

North Bend had the region's first hospital, three churches, and claims a place in aviation history. In1913 Vern Gorst brought a hydroplane to North Bend. In 1925 Pacific Air Lines, an air mail carrier (with an occasional passenger riding atop the mail sacks) was founded by Gorst in the North Bend Hotel. Pacific Air Lines later merged with other companies to become United Airlines.
During World War II, Kruse and Banks Shipyards built minesweepers and rescue tugs for the United States Navy. In 1960, Pony Village Shopping Center, the first covered mall on the Oregon Coast, was established. Industrial activity of the 1950's through 1970's centered on forest products, but the town's main sawmills closed in the 1980's. Recreational activities increased, tourism grew, and service industries added workers, including many at the Mill Casino and Hotel, built on the site of a former Weyerhauser Co. sawmill. The downtown, consisting of many fireproof masonry buildings dating to the early years of the 20th Century, are slowly being restored, and still house a number of lively businesses.

COMMUNITY ISSUES

The City of North Bend suffers the same flooding issues as the rest of the communities in Coos County. Specific low lying, areas are inundated by floods each year. Many of these flooding issues can be mitigated with rehabilitated or new tide gates along the Pony Creek corridor. Non functional tide gates may contribute to bank deterioration along this creek. Dredging and clearing smaller creek beds and ditches of debris is an important mitigation action item. Tsunami Areas are North Bend Municipal Airport down Virginia Ave. including all of the shopping mall.

Slide issues are of a major concern. The winter storms of 2004 brought this to the forefront as a slide blocked the southbound lanes of U.S. Highway 101. Mitigation is a must for this particular area as the impact to the City of North Bend and peripheral entities would be devastating.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. This final review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Coos County, and participating cities will gain eligibility for Hazard Mitigation Grant Program funds.

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

CITY OF NORTH BEND

MITIGATION ACTION ITEMS

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

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
Coos County Road Department,
Industrial Partners (logging)
BLM

Timeline: 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 Strategy:

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

Coordinating Agencies:	Natural Hazard Mitigation Committee Oregon Department of Forestry U.S. Forest Service Coos Forest Protection District Coos County Citizens Corps
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Public Awareness, Partnerships in Implementation

WILDFIRE

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail trustees for abatement work.

Coordinating Agencies:	Natural Hazard Mitigation Committee Oregon Department of Forestry, Coos Forest Protective Association Coos County Roads Department
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships In Implementation

FLOOD

Short Term #1: Review current County and City Codes to assess current applicability and feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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

Timeline: 1 – 2 Years

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

FLOOD

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

Implementation:

- Identify and map critical areas of flooding.
- Investigate the necessity for an engineering study for storm water mitigation in the mapped areas.
- Explore funding options for replacing required flood fight equipment that is no longer serviceable.
- Assess tide gates for their effectiveness and determine the necessity for repair or replacement.

Coordinating Organization:	Natural Hazard Mitigation Committee City of North Bend City of Coos Bay U.S. Army Corps of Engineers
Time Line:	On going
Plan Goals Addressed:	Protect Life and Property, Partnerships And Implementation

LANDSLIDES

Short Term #1: Encourage ODOT to develop mitigation alternatives for current slide activity along, Hwy. 101 corridor.

Implementation:

- Facilitate geo-hazard survey of slump fractures in hillside threatening homes, businesses, highways and railroad.
- Explore funding options for survey and repair.

Coordinating Organization:	Hazard Mitigation Planning Committee City of North Bend U.S. Army Corps of Engineers ODOT
Timeline:	1-2 years
Plan Goals Addressed:	Protect Life and Property, Partnerships In Implementation

LANDSLIDE

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

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies, specifically:
  Bald Hill
  North Fork Hill
  U.S. Hwy. 101, down town North Bend
  Lampa Mountain Road
  County Hwy. #242
  East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization:	Hazard Mitigation Advisory Committee City of North Bend Coos County Highway Department Private Industry Oregon Department of Transportation
Timeline:	1-2 years
Plan Goals Addressed:	Protect Life and Property, Emergency Services, Partnerships and Implementation

SEVERE WINTER STORM & WIND

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #1: Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.

Implementation:

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

Coordinating Organization : Hazard Mitigation Planning Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: **Public Education Program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach areas.
- Explore the feasibility of tsunami warning signs in the waterfront area.
- Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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LETTER OF PROMULGATION

As the governing body for the City of North Bend, 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 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 Coos County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44 CFR, Part 201.

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

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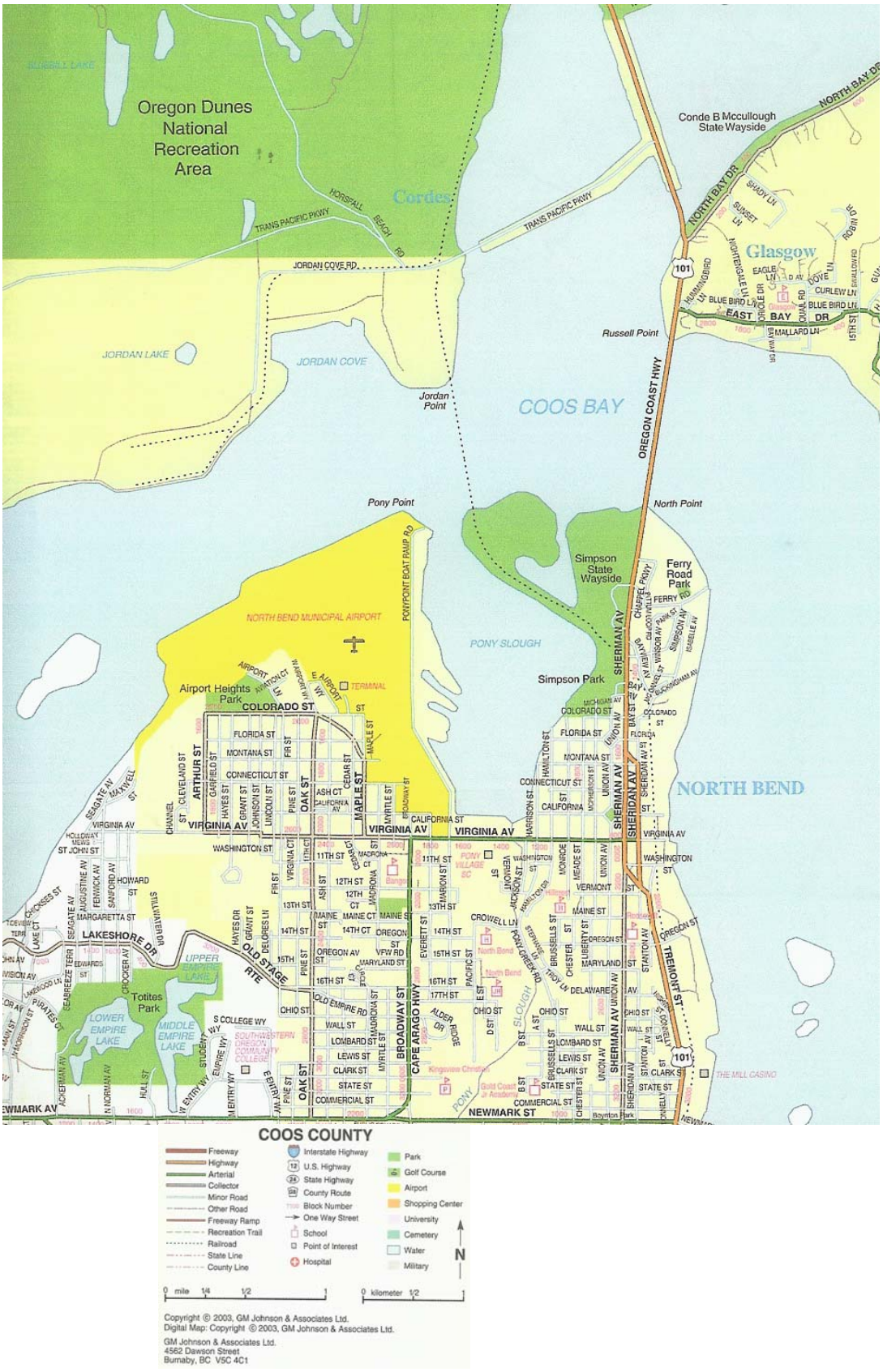
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Glasgow
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JORDAN COVE
Jordan Point
COOS BAY
Russell Point
OREGON COAST HWY
Pony Point
North Point
Simpson State Wayside
Ferry Road Park
NORTH BEND MUNICIPAL AIRPORT
PONY SLOUGH
Simpson Park
Airport Heights Park
NORTH BEND
LAKESHORE DR
Totites Park
LOWER EMPIRE LAKE
MIDDLE EMPIRE LAKE
UPPER EMPIRE LAKE
SOUTHWESTERN OREGON COMMUNITY COLLEGE
CAPE ARAGO HWY
BROADWAY ST
SHERMAN AV
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NEWMARK ST
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Point of Interest
Hospital
Park
Golf Course
Airport
Shopping Center
University
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4562 Dawson Street
Burnaby, BC V5C 4C1

APPENDIX B

INDIVIDUAL COMMUNITY ACTION ITEMS

The City of Powers is located south of Myrtle Point, on the bank of the South Fork of the Coquille River. The city consists of 334 households, with a total of 734 people as of the 2000 Census. The median age is 45.

The original settlers of Powers hailed from North Carolina, and the town took its name from the early 20th century lumberman, Albert Powers, who brought in men and machines (including a railroad) to log the surrounding forest. The town was incorporated in 1945. The historic Wagner House is said to be the oldest pioneer home in the region.

Powers is home to the popular Powers County Park and pond, Powers Pioneer House, the Railroad Museum and Powers Orchard Park. It is also along the scenic drive leading through Siskiyou National Forest, land to Agness and the Rogue River, and to Gold Beach in Curry County. The 82 mile drive wanders past old-growth Douglas fir, stands of Port Orford cedar, and water falls in the Coquille River canyon.

COMMUNITY ISSUES

Nestled at the base of the Siskiyou's in pristine forests and along the south fork of the Coquille River, Powers faces many challenges being approximately 25 miles from any other community in the county. Winter 2004 forced Powers to declare a local emergency when a section of Hwy #33 became victim to a massive landslide and fell into the Coquille River, and Powers became isolated from the rest of the county. Medical emergencies had to be air lifted from the city to a hospital in Coos Bay. The acquisition of a section of private property enabled the Oregon Department of Transportation to fashion a by-pass around the slide. The roadway is now passable by vehicles. Roads and bicycle path also go to Glendale, Interstate Highway 5.

Powers being extremely remote faces isolation from several hazards, landslides being one and fire, being the other.

PLAN ADOPTION

The Coos County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Coos 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 Manager will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for final review. The final review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA Coos County, and participating Cities will gain eligibility for Hazard Mitigation Grant Program funds.

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

CITY OF POWERS

MITIGATION ACTION ITEMS

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 Strategy:

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

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry,
Coos Forest Protective Association
U.S. Forest Service
Coos County Road Department,
Industrial Partners
BLM

Timeline: 5 years

Plan Goals Addressed: Emergency Services, Partnerships in Implementation

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

Coordinating Agencies: Hazard Mitigation Planning Committee
Oregon Department of Forestry
U.S. Forest Service
Coos Forest Protection Association
Industrial Partners (Logging)
BLM

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

WILDFIRE

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

Implementation Strategy:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.
- Explore funding options to purchase adequate water truck.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies: Hazard Mitigation Planning Committee
Oregon Department of Forestry,
U.S. Forest Service
Coos Forest Protective Association
Coos County Roads Department
The City of Bandon

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property

FLOOD

Short Term #1: Review current County and City Codes to assess current applicability and feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact 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

Timeline: 1 – 2 Years

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

FLOOD

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

Implementation:

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

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

LANDSLIDES

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 with specific knowledge of extreme rural areas, to study high-risk areas.
- Develop a regional map of high-risk areas.

Coordinating Organization:	Hazard Mitigation Advisory Committee U.S. Forest Service Coos County Highway Department Oregon Department of Transportation Private Companies (logging)
Time Line:	1-2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation, Natural Systems

LANDSLIDES

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

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies, specifically:
  - Beach Loop
  - Anderson / Blossom Gulch
  - Bald Hill
  - North Fork Hill
  - U.S. Hwy. 101
  - Lampa Mountain Road
  - County Hwy. #242
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

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

Time Line: 1-2 years

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

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SEVERE WINTER STORM & WIND

Short Term #1: Enhance strategies for debris management for severe winter storm events.

Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of cutters and saws.

Coordinating Organization:	Hazard Mitigation Advisory Committee Coos County Road Department
Timeline:	On Going
Plan Goals Addressed:	Emergency Services, Partnerships and Implementation, Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #1: **Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community**.

Implementation:

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

Coordinating Organization : Hazard Mitigation Planning Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: **Public Education Program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach areas.
- Explore the feasibility of tsunami warning signs in the Bandon Beach Loop area.
- Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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LETTER OF PROMULGATION

As the governing body for the City of Powers, 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.

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

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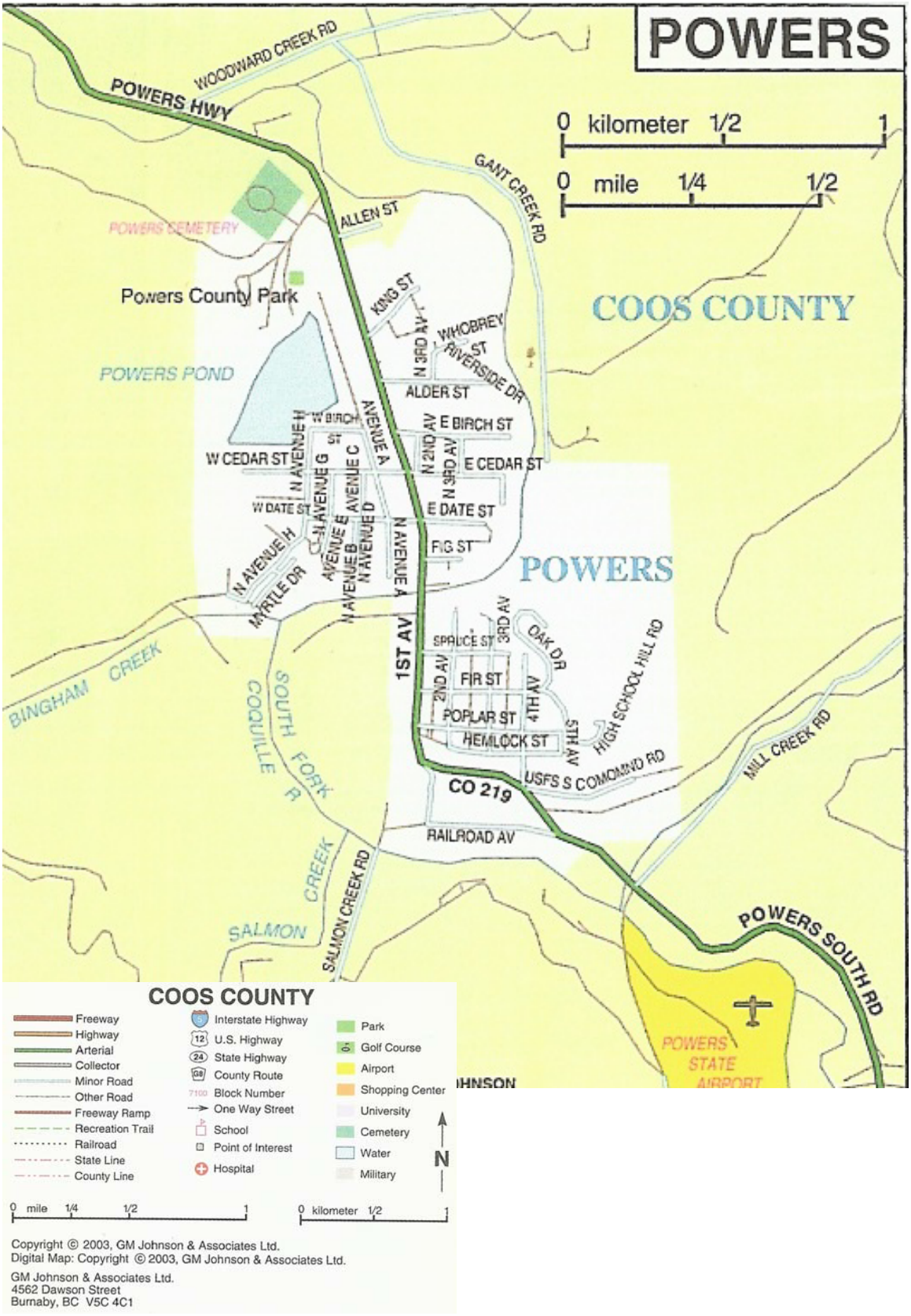
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SALMON CREEK RD
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Railroad
State Line
County Line
Interstate Highway
U.S. Highway
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Point of Interest
Hospital
Park
Golf Course
Airport
Shopping Center
University
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APPENDIX C BIBLIOGRAPHY

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