Introduction

The Ring of Fire consists of a subduction zone that stretches from the northern coast of South America, through the Aleutian Islands, Alaska, and the western coast of North America. This region is the most active seismic zone in the world, with multiple subduction zones that form the boundary between the Pacific and North American Plates. The subduction process, where one tectonic plate moves beneath another, can cause earthquakes and tsunamis when it descends into the Earth's crust. These events are known to increase the risk of coastal inundation.

Background

The National Oceanic and Atmospheric Administration (NOAA), through the Nature of the Northwest Information Center (NOC) and the Geophysical Institute of Alaska (GIA), is developing an interagency partnership to address the combined effects of erosion, subsidence, and the potential for coastal inundation from tsunami events along the Oregon coast. This approach recognizes the importance of integrated coastal zone management, as well as preparing for the effects of climate change on the Northwest.

Alaska Maximum tsunami scenarios for cities and unincorporated portions of the map. This scenario represents a hypothetical maximum event. This maximum event is the same model used by the U.S. Geological Survey (USGS) in 2011. The two tsunami scenarios involving M9.2 earthquakes are the Alaska-Aleutian Model Specifications. The second event is the same model used by the U.S. Geological Survey (USGS) in 2011.

Historically, about 28 distant tsunamis have been documented by tide gauges along the Oregon coast. The Garibaldi tide gauge has been identifying and mapping the tsunami inundation hazard for the Nehalem River since 1995, which is the area of expected tsunami inundation based on scientific studies. The map legend depicts the respective amounts of deformation higher high tides observed over an 18-year period at the Garibaldi tide gauge. The map shows the cumulative number of buildings inundated within the map of tsunami inundation extent for the two scenarios at the profile locations shown between the wet and dry contour lines is termed the Wet/Dry Zone, where each point is wet or dry. These points are converted to wet and dry areas.

The most recent high tsunami in the Garibaldi area was the 1964 Prince William Sound event, which triggered a tsunami that caused significant damage. More than 200 people died, and the damage estimate was approximately $100 million. About 200 people were killed, and the damage was estimated at $20 million in the 1960 Alaskan earthquake.

The tsunami wave heights reached 10 to 11.5 feet in the Nehalem River, which caused $750,000 to 1 million dollars in damage to bridges, houses, and infrastructure. The 1964 Prince William Sound event generated a tsunami that reached 25 feet at Tillamook South, which caused $10 million in damage. A total of 1,300 fatalities were recorded from this event in Alaska, and 250 people died in Japan. The 1994 Alaska earthquake generated a tsunami that reached 124 feet in Homer, and it caused $1.5 million dollars in damage.

The 1964 Prince William Sound event was the result of a subduction zone event, which can trigger tsunamis due to the movements of tectonic plates. Tsunamis can also be caused by landslides and earthquakes. The Cascadia Subduction Zone is the subduction zone closest to the Oregon coast, and it is considered the most dangerous zone in the region due to its potential for triggering large earthquakes and tsunamis. This subduction zone is located off the coast of Oregon and Washington, and it is where the North American Plate is subducting below the Pacific Plate.

The Cascadia Subduction Zone is considered a high-risk area for tsunamis, and it is estimated that a magnitude 9.0 earthquake could generate a tsunami that reaches 30 to 40 feet in height. This event could cause significant damage and loss of life along the Oregon coast. The Cascadia Subduction Zone is also considered a high-risk area for landslides, and it is estimated that a magnitude 8.5 earthquake could trigger landslides that could cause significant damage and loss of life.

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