



Map Explanation

The "Ring of Fire" also called the Circum-Pacific Belt, is the zone of earthquake activity surrounding the Pacific Ocean. It is an arc stretching from New Zealand in the south, across the western Pacific, to the Aleutian Islands of Alaska, and south along the coast of North and South America (Figure 2). The Ring of Fire is located at the borders of the Pacific Plate and other major tectonic plates. The Pacific Plate is colliding with and sliding underneath other plates creating volcanic arcs and occasionally release energy in the form of an earthquake rupture. This rupture causes a vertical displacement of water that creates a tsunami. The tsunami waves are sent in all directions. The energy of the tsunami, once it reaches the open ocean, takes more time to travel the Pacific Ocean and arrive offshore on Oregon (Figure 2). Distinct earthquake/tsunami events have affected the Oregon coast, for example, offshore Alaska in 1964 and offshore Japan in March 2011.

Alaska-Aleutian Model Specifications: DOGAMI modeled two distant earthquake and tsunami scenarios involving M6.2 earthquakes originating near the Gulf of Alaska. The first scenario attempts to replicate the 1964 Prince William Sound event, and the second scenario represents a hypothetical maximum event. This maximum event is the same model used by the U.S. Geological Survey (USGS) in their 2006 tsunami hazard assessment of Seaside (TSOW-06). This model uses extreme fault model parameters that result in maximum seafloor uplift, nearly twice as large as in the 1964 earthquake. The selected source location on the Aleutian chain of islands also shows higher energy directed toward the Oregon coast than other Aleutian source locations. For these reasons the hypothetical "Alaska Maximum" scenario is selected as the worst case distant tsunami scenario for Oregon. Detailed information on fault geometries, subseafloor, computer models, and the methodology used to create the tsunami scenarios presented on this map can be found in DOGAMI Special Paper 42 (Witter and others, 2011).

Figure 1: The 'Ring of Fire' is a zone of active earthquakes and volcanoes that rings much of the Pacific Ocean, including the Oregon coast. Volcanoes and earthquakes on this ring are caused by the movements of tectonic plates. One type of movement is called subduction — when thin, oceanic plates, such as those that compose the rock beneath the Pacific Ocean, sink beneath thicker, lighter plates that make up continental plates. Earthquakes that occur as a result of subduction can trigger tsunamis.

Figure 2: This image depicts the actual initial tsunami arrival times, in hours, around the Pacific Rim from the 1964 Prince William Sound earthquake. This magnitude 9.2 earthquake and resulting tsunami caused 125 deaths and \$311 million in property loss, \$84 million and 106 deaths in Alaska (NGSC/WDC). The tsunami devastated many areas along the Gulf of Alaska. Left serious damage in British Columbia, Hawaii, and along the west coast of the United States and was recorded on tide gauges in Cuba and Puerto Rico.

	Entire Map Area	Unincorporated Areas
Total Buildings	744	744
Buildings within Tsunami Zones*		
Alaska N9.2 (1964)	151	151
Alaska Maximum	152	152
Percent of Buildings within Tsunami Zones		
Alaska N9.2 (1964)	20.3%	20.3%
Alaska Maximum	20.4%	20.4%

*Building counts shown are based on polygon centroids and are cumulative within the map area.

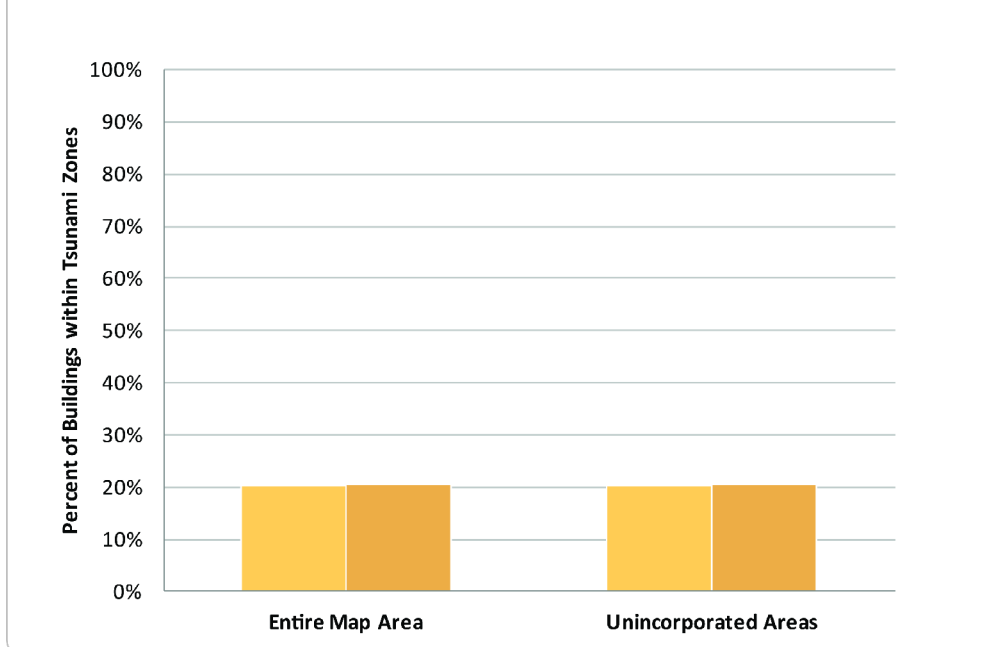


Figure 3: The table and chart show the number of buildings inundated for the Alaska M9.2 (1964) and Alaska Maximum tsunami scenarios for cities and unincorporated portions of the map.

Change in water level for two tsunami scenarios at the simulated gauge station shown on the map

Legend:

- Alaska M9.2 (1964)
- Alaska Maximum

Station: B40 Riskey Creek (Station B40)

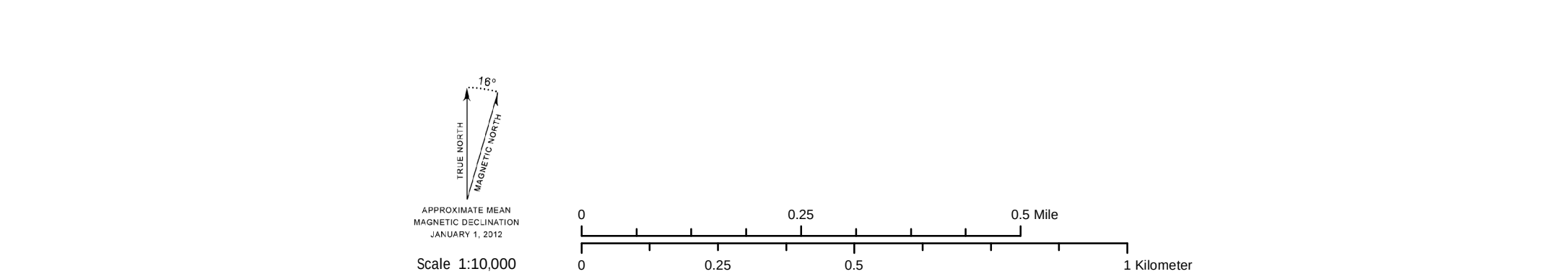
Y-axis: Elevation, feet (NAVD83)

X-axis: Time since Earthquake (hours)

Time since Earthquake (hours)	Alaska M9.2 (1964) Elevation (feet)	Alaska Maximum Elevation (feet)
0.0	8.0	8.0
1.0	8.0	8.0
2.0	8.0	8.0
3.0	8.0	8.0
4.0	8.0	8.0
4.5	8.0	8.0
5.0	9.0	11.0
5.5	9.0	10.0
6.0	8.0	14.0
6.5	11.0	12.0
7.0	10.0	10.0
7.5	10.0	10.0
8.0	10.0	10.0

Figure 4: This chart depicts the tsunami waves as they arrive at the selected reference point (simulated gauge station). It shows the change in wave heights for the two Alaska tsunami scenarios over an 8-hour period. Wave heights vary through time, and the first wave will not necessarily be the largest as waves interfere and reflect off local topography and bathymetry. Any absence of data indicates periods for which tsunami inundation has not yet reached or has receded from the station location and dry land is exposed.

Figure 5: These profiles depict the expected maximum tsunami wave elevation for the two Alaska tsunami scenarios along lines A-A' and B-B'. The tsunami scenarios are modeled to occur at a static (no flow) tide and equal to the Mean Higher High Water (MHHW) high tide.



Earthquake Size	Slip / Deformation	Earthquake Magnitude	
	Alaska M8.2 (1964)	Vertical seafloor deformation estimate	-9.2
	Alaska Maximum	Uniform slip on 12 subfaults with each assigned values ranging from 49 to 98 feet.	-9.2
	Alaska Maximum Wet/Dry Zone		
	Urban Growth Boundary		Fire Station
	Building Footprint		Police Station
	Simulated Gauge Station		School
	Profile Location		Hospital/Urgent Care Clinic
	Senate Bill 379 Line		U.S. Highway
	State Park		State Highway
	Elevation Contour (25 ft intervals up to 200 ft)		Improved Road

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14
15

Lincoln City
Lincoln Lane
Polk Remittin
OREGON
Benton Lane

Lincoln City North
Lincoln City South
Olden Beach - 5th/6th River
Olden Beach - 7th/8th River
Olden Beach - 9th/10th River
Olden Beach - 11th/12th River
Olden Beach - 13th/14th River
Olden Beach - 15th/16th River
Olden Beach - 17th/18th River
Olden Beach - 19th/20th River
Olden Beach - 21st/22nd River
Olden Beach - 23rd/24th River
Olden Beach - 25th/26th River
Olden Beach - 27th/28th River
Olden Beach - 29th/30th River

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