



Map Explanation

This tsunami inundation map displays the output of computer models representing the two selected tsunami scenarios: Alaska M9.2 (1964) and the Alaska Maximum. All tsunami simulations were run assuming that prevailing tide was static (no flow) and equal to Mean Higher High Water (MHHW) tide; MHHW is defined as the average height of the higher high tides observed over an 18-year period at the Port of Oxford tide gauge. The map legend depicts the respective amounts of deformation and the earthquake magnitude for these two scenarios. Figure 3 shows the cumulative number of buildings inundated within the map area.

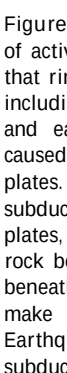
The computer simulation model output is provided to DOGAMI as millions of points with values that indicate whether the location of each point is wet or dry. These points are converted to wet and dry contour lines that form the extent of inundation. The transition area between the wet and dry contour lines is termed the Wet/Dry Zone, which equates to the amount of error in the model when determining the maximum inundation for each scenario. Only the Alaska Maximum Wet/Dry Zone is shown on this map.

The "Ring of Fire" also called the Circum-Pacific belt, is the zone of the earthquake activity surrounding the Pacific Ocean. It is an area stretching from New Zealand, along the eastern edge of Asia, north across the Aleutian Islands of Alaska, and south along the coast of North and South America (Figure 1). 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 subduction zones that eventually release energy in the form of an earthquake rupture. This rupture causes a vertical displacement of the water that creates a tsunami. When these events occur around the Ring of Fire but not directly off the Oregon coast, they take more time to travel the Pacific Ocean and arrive offshore in Oregon (Figure 2). Distant earthquake/tsunami events have affected the Oregon coast, for example, offshore Alaska in 1964 and offshore Japan in March 2011.

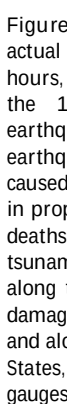
Historically about 28 distinct tsunamis have been documented by Oregon tide gauges since 1854. The most severe was generated by the 1964 M9.2 Prince William Sound earthquake in Alaska. Oregon was hit hard by the tsunami, which killed four people and caused an estimated 750,000 to 1 million dollars in damage to bridges, houses, cars, boats, and sea walls. The greatest tsunami damage in Oregon did not occur along the ocean front as one might expect, but in the estuary channels located further inland. Of the communities affected, Seaside was inundated by a 10 foot tsunami wave and was the hardest hit. Tsunami wave heights reached 10 to 11.5 feet in the Nehalem River, 10 to 11.5 feet at Depoe Bay, 11.5 feet at Newport, 10 to 11 feet at Florence, 11 feet at Reedsport, 11 feet at Brookings, and 14 feet at Coos Bay (Witter and others, 2011).

Aleka-Aleutian Model Specifications: DOGAMI modeled two distant tsunami scenarios involving M8.2 earthquakes originating near the Gulf of Alaska. The first scenario attempts to replicate the 1914 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 Seattle (TPSW 2006). This model uses extreme fault model parameters that result in maximum seafloor uplift, nearly twice as large as in the 1954 earthquake. The resulting tsunami wave heights along the Aleka Peninsula are shown in Figure 10, directed toward the Oregon coast from other Aleka Peninsula source locations. For these reasons, the hypothetical “Aleka-Aleutian Maximum” scenario is selected as the worst case distant tsunami scenario for Oregon. Detailed information on fault geometries, subsidence, computer models, and the methodology used to create the tsunami scenarios presented on this map can be found in USGS Special Paper 43 (Witter and others, 2011).

Ring of Fire



Prince William Sound 1964 M9.2 Earthquake and Tsunami Travel Time Map



Buildings within Tsunami Inundation Zones

	Entire Map Area	City of Brookings	Unincorporated Areas
Total Buildings	7,525	7,093	472
Buildings within Tsunami Zones*			
Alaska M2-2 (1964)		6	6
Alaska Maximum		126	126
		0	0
Percent of Buildings within Tsunami Zones			
Alaska M2-2 (1964)		0.1%	0.1%
Alaska Maximum		1.7%	1.8%
		0.0%	0.0%

*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 the Alaska M8.8 (1964) Maximum tsunami scenarios for cities and unincorporated portions of the map.

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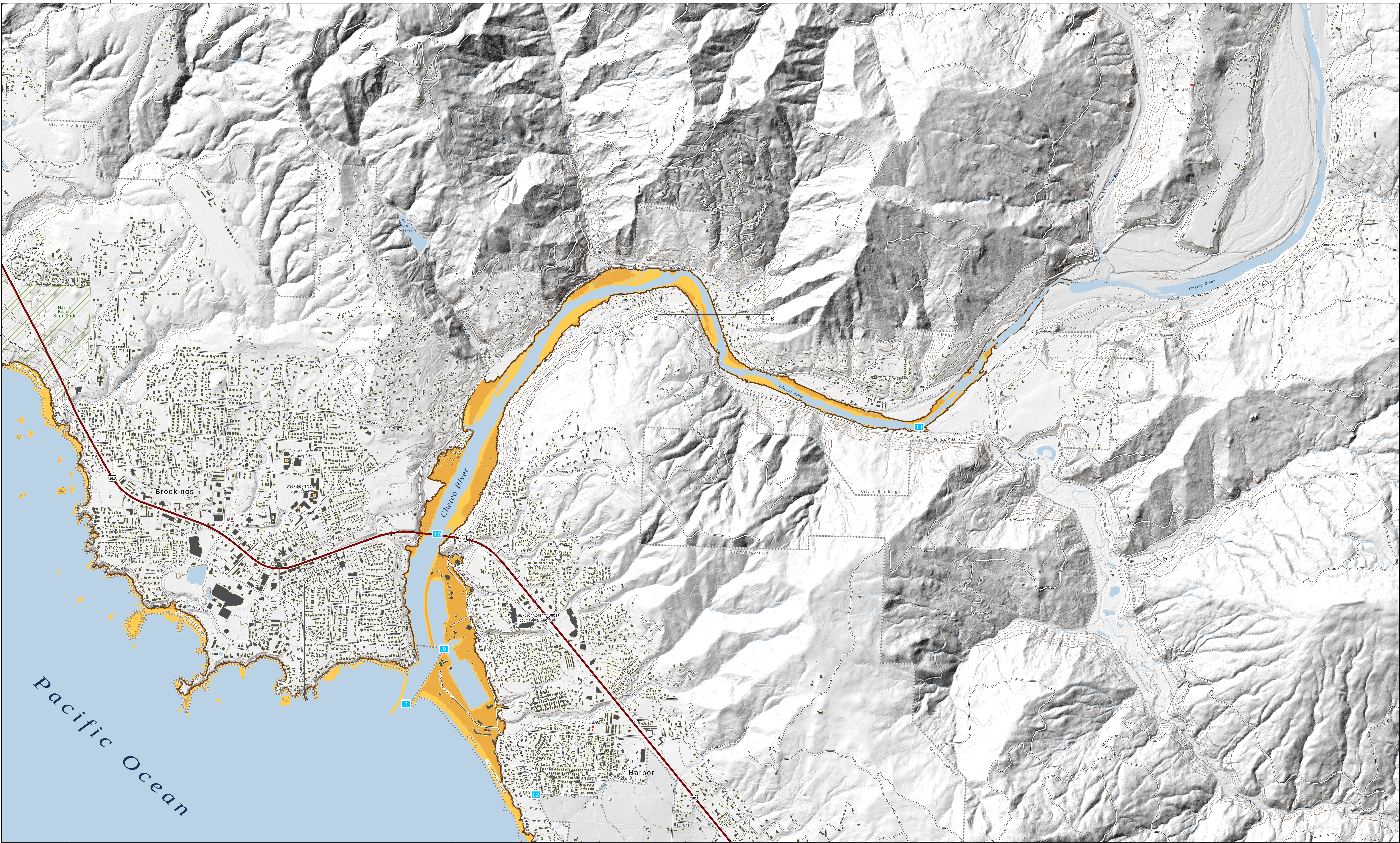
The computer simulation model output is provided to DOGAMI as millions of points with values that indicate whether the location of each point is wet or dry. These points are converted to wet and dry contour lines that form the extent of inundation. The transition area between the wet and dry contour lines is termed the Wet/Dry Zone, which equates to the amount of error in the model when determining the maximum inundation for each scenario. Only the Alaska Maximum Wet/Dry Zone is shown on this map.

This map also shows the regulatory tsunami inundation line (Oregon Revised Statutes 455.446 and 455.447), commonly known as the Senate Bill 379 line. Senate Bill 379 (1995) instructed DOGAMI to establish the area of expected tsunami inundation based on scientific evidence and tsunami modeling in order to prohibit the construction of new essential and special occupancy structures in this tsunami inundation zone (Priest, 1995).

Time Series Graphs and Wave Elevation Profiles: In addition to the tsunami scenarios, the computer model produces time series data for "gauge" locations in the area. These points are simulated gauge stations that record the time, in seconds, of the tsunami wave arrival and the wave height observed. It is especially noteworthy that the greatest wave height and velocity observed are not necessarily associated with the first tsunami wave to arrive onshore. Therefore, evacuees should not assume that the tsunami event is over until the proper authorities have sounded the all-clear at the end of the evacuation. Figure 4 depicts the tsunami waves as they arrive at a simulated gauge station. Figure 5 depicts the overall wave height and inundation extent for the two scenarios at the profile locations shown on this map.

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2012



Estimated Tsunami Wave Height through Time for Simulated Gauge Station

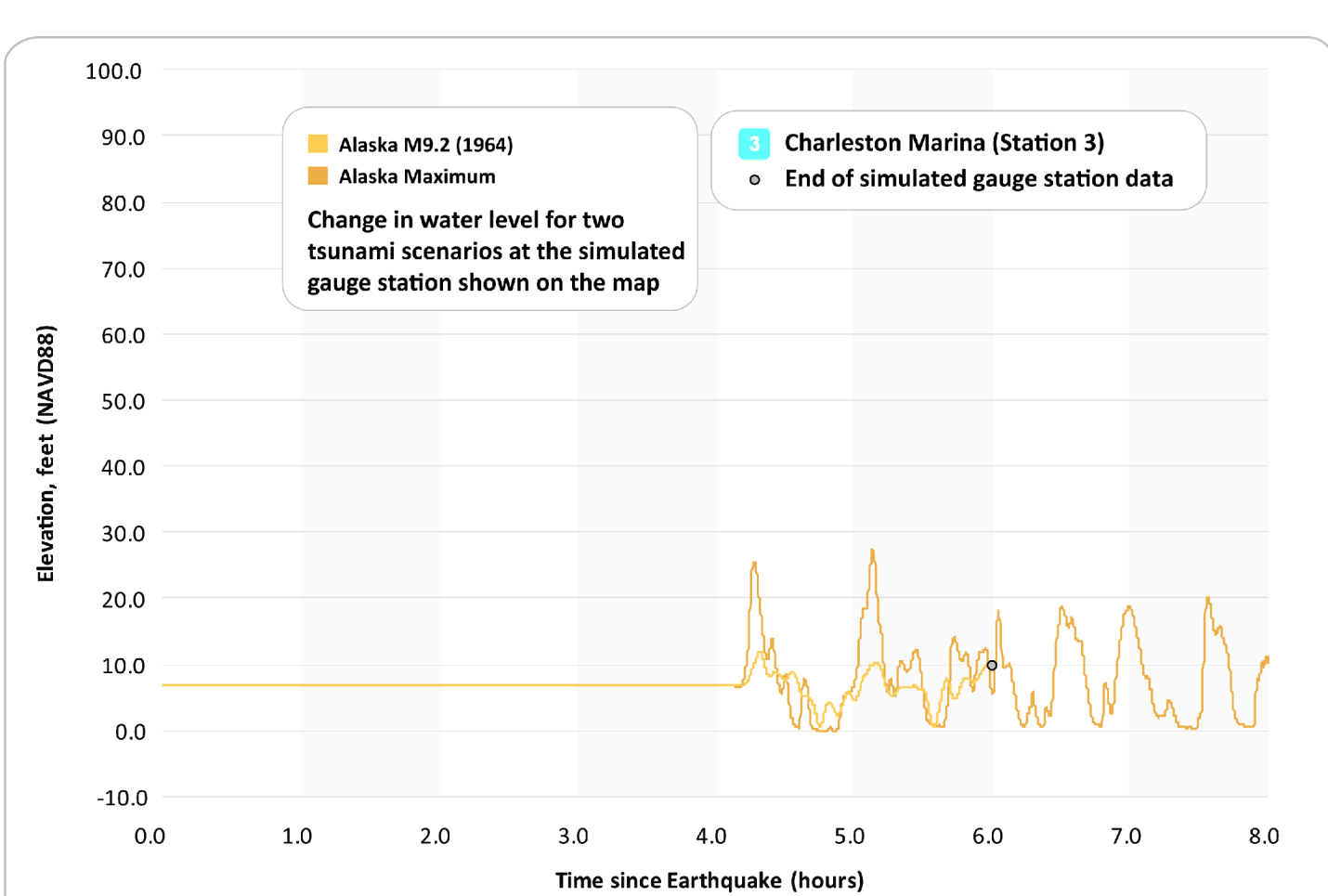


Figure 4: This chart depicts the tsunami waves as they arrive at the selected reference point (simulated gauge station). It shows the change in wave heights for the two Alaska tsunami scenarios over an 8-hour period. Wave heights vary through time, and the first wave will not necessarily be the largest as waves interfere and reflect off local topography and bathymetry.

Maximum Wave Elevation Profiles

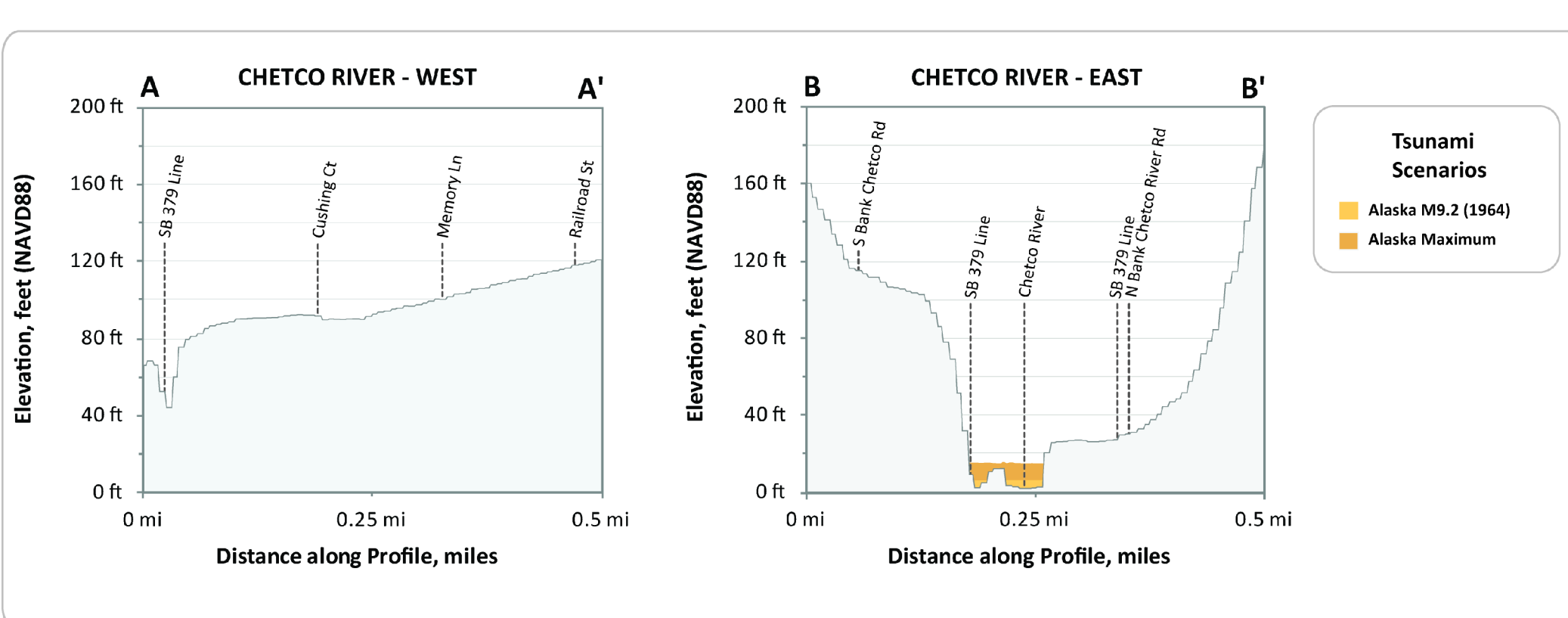
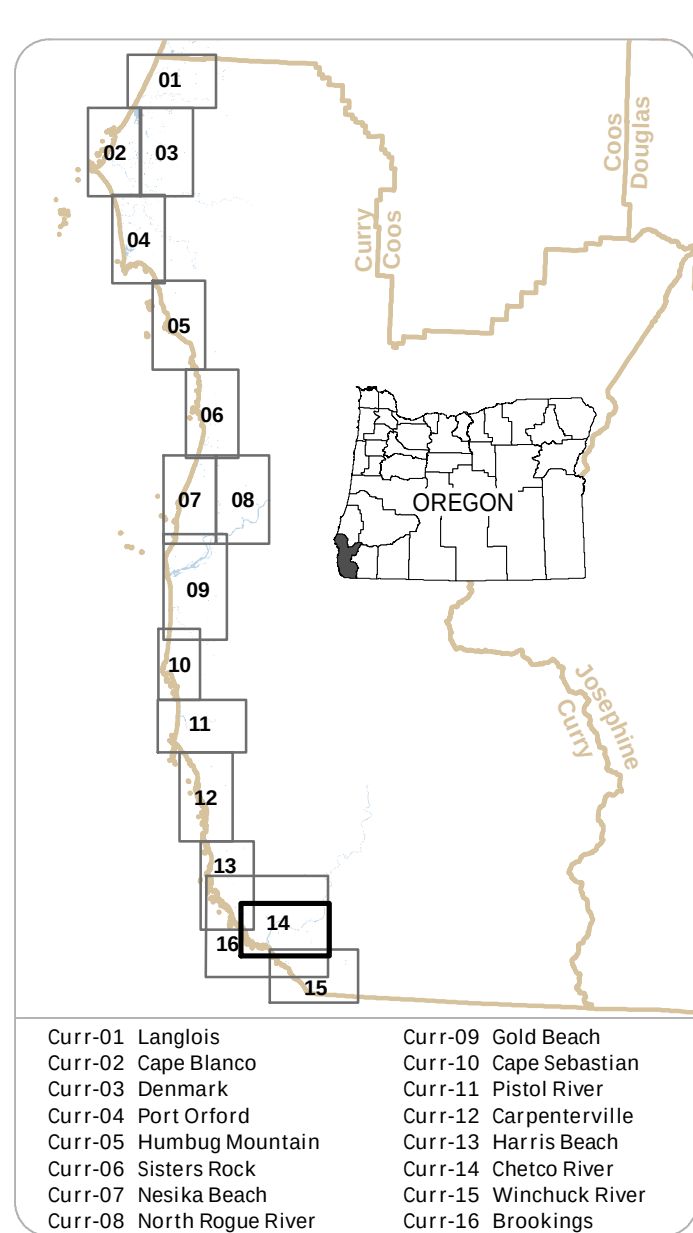


Figure 5: These profiles depict the expected maximum tsunami wave elevation for the two Alaska tsunami scenarios along lines A-A' and B-B'. The tsunami scenarios are modeled to occur at static (no flow) tide and equal to the

Tsunami Inundation Map Index



Legend

Earthquake Size	Slip / Deformation	Earthquake Magnitude
	Alaska M9.2 (1964)	Vertical seafloor deformation estimate
	Alaska Maximum	Uniform slip on 12 subfaults with each assigned values ranging from 49 to 98 feet
	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	
	State Park	 U.S. Highway
	Elevation Contour (25 ft intervals up to 200 ft)	 State Highway
	 Improved Road	

Data References

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