Tsunami Inundation Map of the Port Townsend, Washington, Area
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Introduction

Evacuation from the occurrence of great earthquakes off the Washington, Oregon, and Southern California coasts and boundaries is generally of concern. These events may occur anytime and may cause significant damage. The Washington coastal region is located approximately 150 miles west of the Cascadia subduction zone, which is a right-lateral plate boundary where two tectonic plates are moving past each other. The Cascadia subduction zone is a region of potential seismic activity that could cause tsunamis in the vicinity of Port Townsend.

The phenomenon we call “tsunami” ( soo-NAH-mee) is a series of traveling waves generated by submarine earthquakes, volcanic eruptions, or landslides. Tsunami waves travel great distances over the open ocean. In deep water, the waves may reach speeds exceeding 500 miles per hour and travel hundreds of miles before reaching the coast. As the waves approach the shore, they can become very destructive and cause great damage.

The average range of tide is approximately 5 feet in Discovery Bay and 6 feet in Port Townsend. The landward limit of expected inundation is based on a computer model of waves generated by two different scenario earthquakes, both moment magnitude 9.1, on the Cascadia subduction zone. The model used is a finite element model called ADCIRC, which was modified by Myers and others (1999) to take into account the bathymetric and topographic data used. This can be up to 50 m horizontally.

Map Design

The landward limit of current inundation is based on a computer model of waves generated by two different future earthquake scenarios, both moment magnitude 9.1, on the Cascadia subduction zone. The model used is a finite element model called ADCIRC, which was modified by Myers and others (1999) to take into account the bathymetric and topographic data used. The time histories of tsunami waves in open water near Port Townsend, as well as the associated wave heights and velocities, are shown.

Acknowledgments

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References Used


Figure 1. Initial deformation model for scenario 1A. Warmer colors are areas of uplift and colder areas are subsidence.

Figure 2. Initial deformation model for scenario 1B. Warmer colors are areas of uplift and colder areas are subsidence.

Figure 3. Elevation time history of tsunami waves in open water near Port Townsend.

Figure 4. Current velocity time history off Port Townsend, in feet per second, which is about half a knot.

Figure 5. Landward limit of expected inundation.