U.S. Tsunami Hazard

Tsunamis are infrequent high-impact events that have the potential to cause fatalities and damage on the coast. Since the beginning of the 19th century, tsunamis have caused more than 700 deaths and almost $2 billion in damage to U.S. coastal states and territories.

To better understand the U.S. tsunami hazard and prepare for the impacts of tsunamis on U.S. coasts, the National Tsunami Hazard Mitigation Program assessed the hazard for nine broad coastal regions. While a tsunami can strike any U.S. coast, the hazard level varies. Hazard levels reported here are qualitative and based largely on the historical record (through 2014), geological evidence, and location relative to tsunami sources, all of which provide clues to what might happen in the future.

The hazard is greatest for coastlines near subduction zones, which are particularly active seismic zones, where large earthquakes can produce damaging waves that threaten nearby and distant coasts. Dangerous subduction zones ring the Pacific Ocean and can also be found around the Caribbean.

The West Coast states of Washington, Oregon, and California have experienced tsunamis from as far away as Alaska, South America, Japan, and Russia. The most damaging on record is the tsunami caused by the 1964 Great Alaska earthquake. More recently, harbors in the region were damaged by events in Japan (2011) and Chile (2010). Other tsunamis in the region were produced by local earthquakes and landslides (both underwater and from land). Locally, the greatest threat is from the Cascadia subduction zone, which stretches from northern California to southern Canada. Large Cascadia earthquakes occur every 500 years, on average. According to geological data in the Pacific Northwest, the last great Cascadia earthquake occurred in 1700. It produced a tsunami that crossed the Pacific Ocean and caused damage and deaths in Japan. The next Cascadia event will significantly impact the region and the nation.

Reported tsunamis: Earliest: 1812 | Total events: 94 | Events with runups above one meter: 17 | Total damage: $252 million | Total deaths: 25

Tsunamis with runups over one meter (3.28 feet) are particularly dangerous to people and property, but smaller tsunamis also pose threats. (Runup is the maximum elevation of the tsunami flooding on shore.)

Alaska: High to Very High

Given its location near some of the most dangerous seismic zones in the world, a number of damaging tsunamis have affected the Pacific Coast of Alaska. Historic events include the tsunamis that devastated coastal communities in March 1964, which were produced by the largest recorded earthquake in U.S. history and associated underwater landslides. Due to Alaska’s steep terrain, landslides and icefalls have also caused tsunamis in Alaska. The highest tsunami in recorded history occurred in 1958 when an earthquake-generated landslide produced a tsunami that cleared trees up to 525 meters (1,722 feet) above Lituya Bay. Volcanic activity has also caused tsunamis in Alaska as demonstrated by the Augustine Volcano in 1883.

Reported tsunamis: Earliest: 1737 | Total events: 100 | Events with runups above one meter: 22 | Total damage: $717 million | Total deaths: 222

Hawaii: High to Very High

Hawaii has a long history of damaging tsunamis. Its tsunami record includes events caused by earthquakes both near and far. Significant tsunamis were produced locally in 1868 and 1975, but the majority of Hawaii’s destructive tsunamis were produced by distant subduction zone earthquakes. Notable distant tsunamis came from Chile (1837, 1877, 1960), Russia (1923, 1952), Alaska (1946, 1957), and Japan (2011). Underwater landslides also pose a threat, and volcanic activity was responsible for a tsunami in 1919.

Reported tsunamis: Earliest: 1812 | Total events: 134 | Events with runups above one meter: 30 | Total damage: $668 million | Total deaths: 293

Alaska Arctic Coast: Very Low

There are no tsunamis or significant earthquakes on record for the region, which is not seismically active and is not near a subduction zone.

Approximately 95% of reported U.S. tsunami strikes were to Pacific states and territories.

1 All dollar figures adjusted for inflation (2017)
Understanding the hazard is an important first step in understanding risk. More research remains to be done to better understand the hazard and the potential losses. These hazard levels are based on brief and incomplete historical records. Events may have been unreported or underreported or may have happened in unpopulated areas and gone undetected. The tsunami hazard exists for all coastal U.S. states and territories.

Given the large number of people who live, work, and play on the coast, even where the hazard level is low, the consequences are high. So, it is vital that we understand these consequences as well as how to prepare for and respond to tsunamis, both local and distant and big and small.

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Learn more about tsunamis: www.tsunami.gov

1All dollar figures adjusted for inflation (2017)