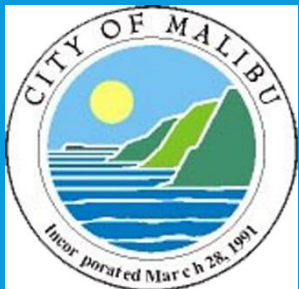


The Tsunami Hazard in Malibu

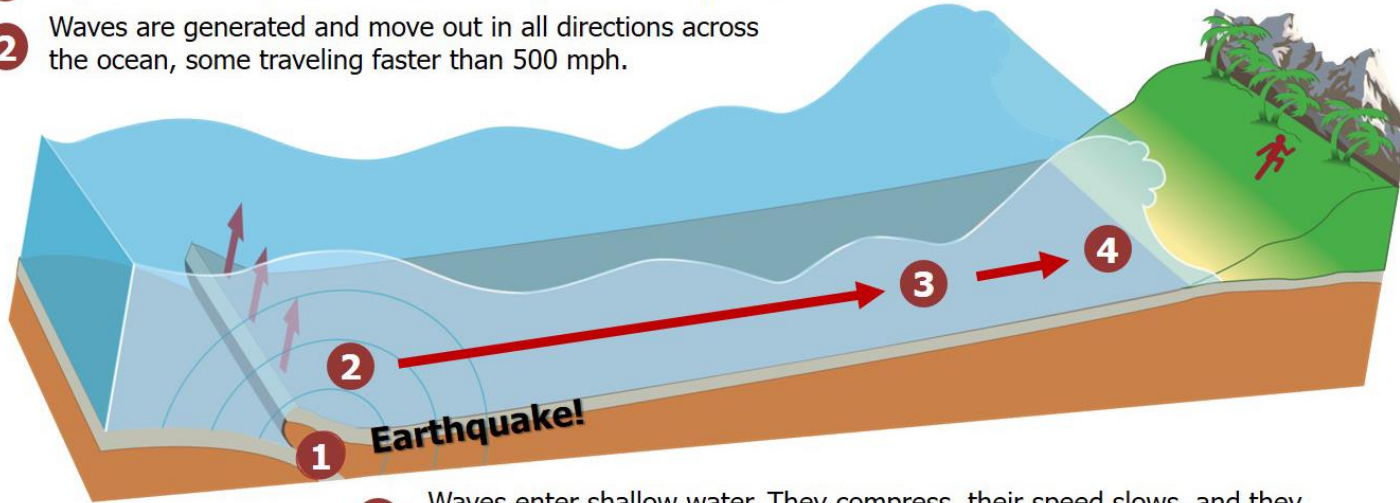


- **Susan Duenas**
- Public Safety Manager
- **Sarah Kaplan**
- Public Safety Specialist

OVERVIEW

- Potential Tsunami Sources
- Tsunami Warning System
- The new Tsunami Inundation Maps
- Potential impact on Malibu
- How to protect yourself

- 1 A plate shifts abruptly, causing an earthquake and displacing water.
- 2 Waves are generated and move out in all directions across the ocean, some traveling faster than 500 mph.



- 3 Waves enter shallow water. They compress, their speed slows, and they build in height.
- 4 Wave height increases and associated currents intensify, becoming threats to life and property.

WHAT CAUSES A TSUNAMI?

WHAT CAUSES A TSUNAMI?

Not all earthquakes generate tsunamis. In general, earthquakes that generate tsunamis:

- ✓ Occur under the ocean
- ✓ Have magnitudes over 7.0
- ✓ Are less than 100 kilometers below Earth's surface

TSUNAMI WARNING SYSTEM & CENTER



- Operated by NOAA
- Staffed 24/7
- Monitors 39 DART system buoys in the Pacific, Atlantic and Caribbean

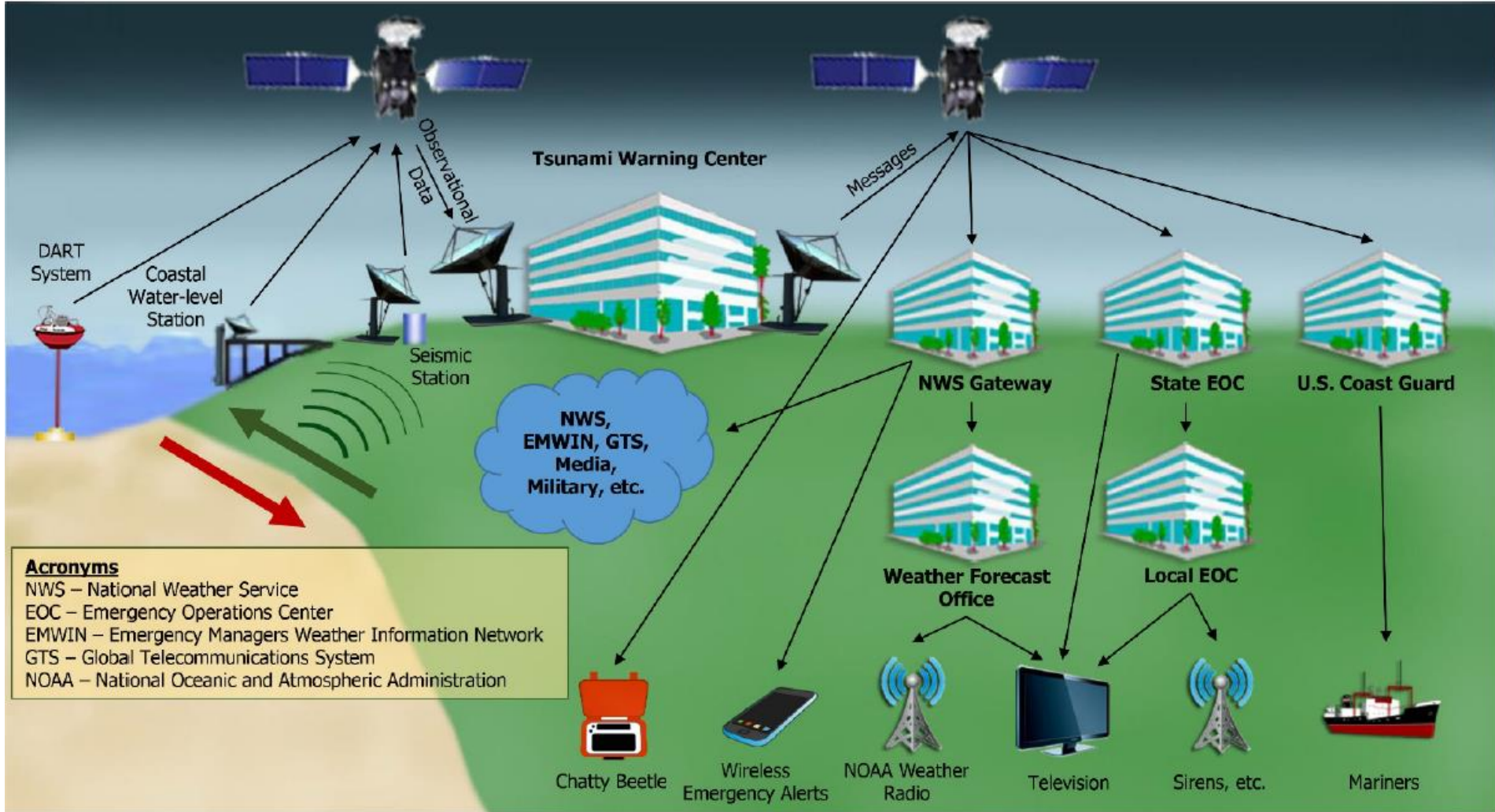


Figure 9. U.S. Tsunami Warning System diagram. Source: NOAA/National Weather Service

Tsunami Alerts

| Alert Name | Actions | Potential Hazards |
|---|--|--|
|  WARNING | Get to high ground or inland IMMEDIATELY Follow tsunami evacuation signage | DANGER! TSUNAMI IMMINENT! Flooding/powerful currents Wave heights > 3 ft. or unknown |
|  ADVISORY | Stay out of the water and away from the shore | STRONG CURRENTS AND DANGEROUS WAVES in or very near coastal water Wave heights of 1 - 3 ft. |
|  WATCH | Be prepared to take action Stay tuned to local radio/TV/ NOAA "alert" weather radios | TSUNAMI IS POSSIBLE Alert level may change once more information is known |
|  INFORMATION STATEMENT | No action needed | NO TSUNAMI IMPACT EXPECTED Alert level may change once more information is known |

THREAT Message: Intended to alert international partners only. Not applicable to U.S. coasts

**THE NATIONAL TSUNAMI WARNING CENTER ISSUES OFFICIAL TSUNAMI ALERTS.
CHECK TSUNAMI.GOV OR WEATHER.GOV WEBSITES FOR TSUNAMI ALERT DETAILS.**



TSUNAMI INUNDATION MAP

| | TSUNAMI SOURCES | Approximate Travel Time | Leo Corrallo State Beach | Malibu Beach/Lagoon | Santa Monica Pier | Marina Del Rey |
|------------------------|---|-------------------------|--------------------------|---------------------|-------------------|----------------|
| Local Sources | M7 Newport-Inglewood Fault | 10-15min | | | | |
| | M7.5 Channel Isl. Thrust Fault | 10-15min | 4 | | 3 | 2 |
| | M7.2 Anacapa Dume Thrust Fault | 10-15min | | 8 | 6 | 3 |
| | Palos Verdes Landslide 1 | 10-15min | | | 7 | 4 |
| | Palos Verdes Landslide 2 | 10-15min | | | | |
| | M7.1 Santa Monica Thrust Fault | 10-15min | | 4 | 5 | 3 |
| | M7.7 Catalina Fault | 15-20min | 4 | 6 | 6 | 5 |
| Distant Sources | M9 Cascadia-full rupture | 2hr | | | 4 | 4 |
| | M9.2 Alaska 1964 EQ | 6hr | 5 | 5 | 7 | 6 |
| | M9.3 Alaska-East Aleutians | 6hr | 7 | 8 | 14 | 14 |
| | M8.9 Central Aleutians I | 6hr | 3 | | 5 | 5 |
| | M8.9 Central Aleutians II | 6hr | | | 3 | 4 |
| | M9.2 Central Aleutians III | 6hr | 6 | 7 | 10 | 10 |
| | M9 Kamchatka 1952 EQ | 9hr | 3 | | | |
| | M8.8 Kuril Islands II | 10hr | | | 3 | 2 |
| | M8.8 Kuril Islands III | 10hr | | | 3 | 3 |
| | M8.8 Kuril Islands IV | 10hr | | | 3 | 3 |
| | M8.8 Japan II | 11hr | | | 3 | 3 |
| | M9.5 Chile 1960 EQ | 13hr | | | 5 | 5 |
| | M9.4 Chile North | 13hr | 5 | 5 | 5 | 6 |
| | Maximum Runup - Local Source | | 4 | 9 | 8 | 5 |
| | Maximum Runup - Distant Source | | 7 | 9 | 11 | 11 |
| | UPDATED Maximum Runup - Distant Source | | 8 | 9 | 15 | 15 |

2011 Tsunami - Santa Cruz Harbor (3 ft wave)

<https://cadoc.maps.arcgis.com/apps/MapSeries/index.html?appid=61bc8d30b53e4fb5927ae199d31f5aef>

IMPACT ON MALIBU

Distant Source Tsunami:

- ✓ Up to 6 hours of warning
- ✓ Some coastal structures will likely have minor to moderate damage
- ✓ PCH could be moderately to significantly damaged and unusable in sections
- ✓ Emergency resources will be stretched for many days
- ✓ Malibu will probably not be a priority

IMPACT ON MALIBU

Near Source Tsunami:

- ✓ Minimal/NO warning before Tsunami arrives
- ✓ Structures will likely have moderate to severe damage
- ✓ PCH could be moderately to significantly damaged and unusable in sections
- ✓ Emergency resources will be stretched in first days
- ✓ Malibu will receive more mutual aid

WHAT IF AN EARTHQUAKE STRIKES WHEN I AM AT THE BEACH?

The ground shaking should be your warning sign.

1. Drop, cover, and hold on until the shaking stops.
2. When you can move around safely, head inland and up.
3. Walk don't drive.
4. Wait for an official all clear before returning.

WHAT SHOULD YOU DO TO PREPARE?

- Eliminate non-structural hazards
- Check your insurance policy
- Make a plan
- Obtain supplies for your home and car
- Attend training
- Talk to your neighbors

WHAT HAS CHANGED ON THE INUNDATION MAPS?

The Inundation maps now include a 500-year event which could increase inundation in

- PCH and adjacent buildings
- Cross Creek and Malibu Creek Drainage
- Las Flores Park
- Other low-lying areas and drainages

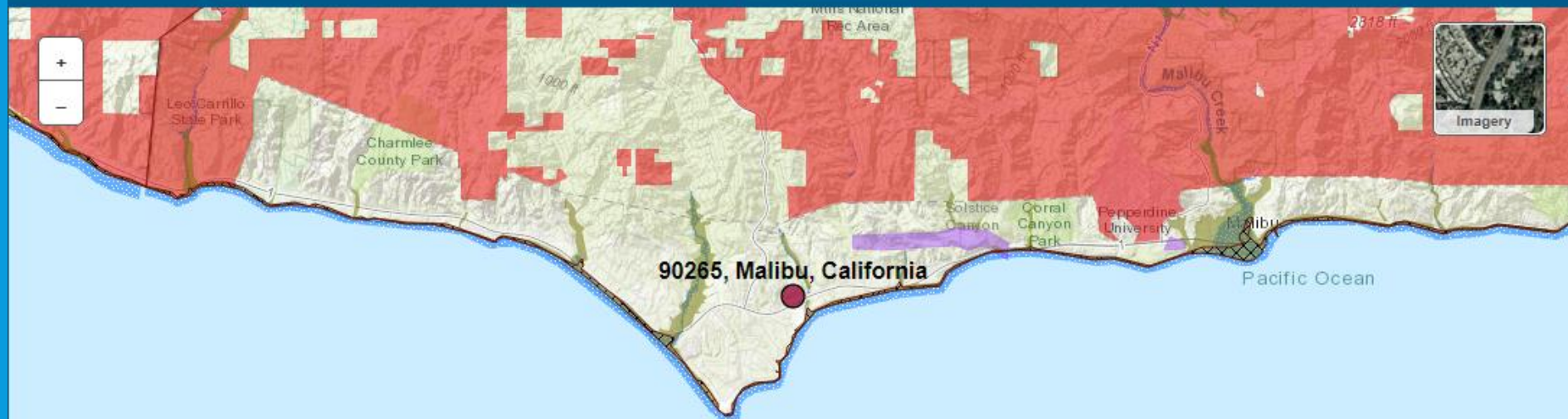
How does MyHazards work?

MyHazards is a tool for the general public to discover hazards in their area (earthquake, flood, fire, and tsunami) and learn steps to reduce personal risk. Using the MyHazards tool, users may enter an address, city, zip code, or may select a location from a map. The map targets the location, and allows users to zoom and scroll to their desired view. The screen then presents information on the risks identified within the search radius, and recommended actions. MyHazards website performs best when using Internet Explorer. Hazard Data is approximate and data layer visibility are subject to the extent of the Map.

Type in your address below to learn how to address natural hazards in your area.

Search

Print



RESOURCES

- <https://www.tsunami.ca.gov/>
- <https://myhazards.caloes.ca.gov/>
- <https://www.tsunami.gov/>
- <https://www.ready.gov/tsunamis>

QUESTIONS?