

2016

Earthquake - Tsunami Room



*What you need to
know to protect
yourself and your
family **BEFORE** the
next Earthquake or Tsunami strikes*

- *Make an earthquake*
- *See what's shaking right now*
.....and much more

Sponsored by the **Redwood Coast
Tsunami Work Group**
a member of the
Earthquake Country Alliance
"We're all in this together"



Living on
SHAKY GROUND
HOW TO SURVIVE EARTHQUAKES AND TSUNAMIS IN NORTHERN CALIFORNIA

Inside and to the right





The Most Important Take-Away Message



Protecting yourself from injury during the earthquake is where it all begins. You can't evacuate if you are injured during the shaking!



As soon as it is safe to move, get your "grab and go" kit and walk to high ground or inland away from the coast. Take the time to put on shoes as debris may make walking hazardous. Practice the evacuation route before hand so you know where to go.



Tsunamis are TRICKY! Just when you think the waves are done, another damaging surge may arrive. The largest waves may arrive many hours after the first. Stay away from the coast until officials say it is safe to return.

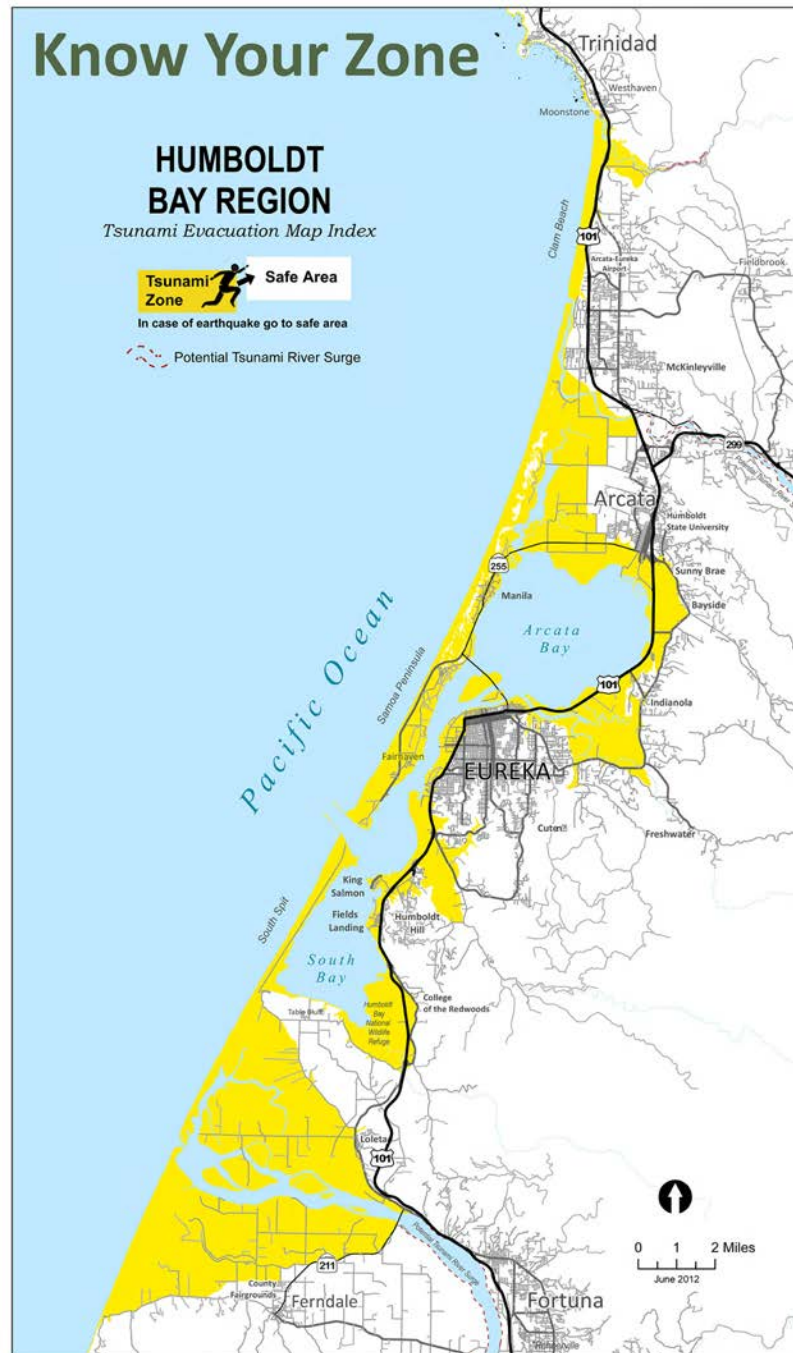
Know Your Zone

HUMBOLDT BAY REGION

Tsunami Evacuation Map Index



In case of earthquake go to safe area



Put a pin in the map where you live or work. If it is in the white area, you are safe. You do not need to evacuate. If it is in the yellow area, plan an evacuation route. Remember, the earthquake shaking is your warning. Head to high ground or inland as soon as the shaking subsides enough for you to safely move. Go on foot - the ground shaking is likely to have disrupted roads.



This map is designed to help you protect yourself from the biggest tsunami likely to hit our area - a magnitude 9 earthquake on the Cascadia subduction zone. It is based on the best currently available information about tsunamis in our region. The map does not show where the water is likely to flow. It shows safe areas (in white) and areas that may be at risk (in yellow). The map may be change as more information becomes available.

Beach safety

for Northern California



TSUNAMI: If you feel an earthquake on the coast, no matter how small, think tsunami. Immediately move to high ground or inland and stay there. The longer the earthquake the more likely a tsunami will follow within 10 minutes.



SNEAKER WAVES: Large sneaker waves can strike without warning -- Stay back. Don't be fooled by an ocean that looks calm. There can be 30 minutes of small waves right before a set of sneaker waves strike.



RISING TIDES: Rising tides expose you to more ocean hazards by causing sneaker waves to wash further up the beach, and can cut off access to trails or safe passage around headlands. Use a tide book to plan your trips to the beach.



RIP CURRENTS: Rip currents are strong outgoing currents that can pull you into cold deep water. Northern California beaches are not good for swimming or wading -- almost all have rip currents and cold water.



ROCKS AND JETTIES: Being on top of high rocks can give you a false sense of safety. Waves can overtop rocks without warning and knock you into the ocean and rocks below. Avoid climbing on exposed coastal rocks and jetties.



STEEP CLIFFS: High steep cliffs can collapse under your feet sending you crashing down the cliff. Stay back from cliff edges.



Beach Safety Tips

Choose your beach well. Steep beaches are dangerous. Flatter wider beaches are a better choice. Select beaches with easy access to high ground in case of a tsunami.

Plan your way to safety. When on the beach always look for a route to safety from rising tides, sets of large waves or a tsunami that forces you to go to high ground quickly.

Cold Water. North coast beaches are not swimming beaches. The extremely cold ocean water can paralyze your arms and legs within minutes making it impossible to keep your head above water.

Don't go in after dogs. Dogs pulled into the turbulent surf almost always get out on their own while human rescuers do not. Stay on dry land and wait for them to swim back to shore.

Call 911. Don't go into the water to rescue a person who gets pulled into the surf. Remember, you will likely get into trouble requiring rescuers to divide their time between multiple victims. Call 911 and keep track of the person's location in the water so you can guide rescuers to the person in trouble.

Check the weather (for sneaker waves and high surf advisories) and tides before you head to the beach

Tsunami Safety

Two Ways to Know if a Tsunami is Coming

Natural Warnings

Ground shaking, a loud ocean roar, or the water receding unusually far exposing the sea floor are Nature's warnings that a tsunami may be coming. If you observe any of these signs, immediately move to higher ground or inland – as far as you can safely go. A tsunami may arrive within minutes. Stay away from low coastal areas until told by officials that the danger has passed.

Official Warnings

You may learn about **Tsunami Warnings** on local TV and radio stations, alerts from NOAA weather radios, or in some cases by announcements from emergency officials, airplanes, or outdoor sirens. Move away from beaches or harbor areas and seek more information. Tune into local radio or television stations for more information.

**Both Natural and Official Warnings are equally important.
Respond to whatever you hear or observe first!**

Tsunamis are Tricky

The first wave or surge will not be the largest.

Tsunami surges can last up to 12 hours and in some cases much longer.

Just when you think it is all over, another very large surge may come.



Sneaker Wave Safety

Don't be fooled by an ocean that looks calm. There can be 30 minutes of small waves right before a set of sneaker waves strike.

Stay back and stay alert. Stay farther away from the surf than you might think is necessary. Sneaker waves can surge over 100 yards high up onto the dry sand with enough force to knock you down and drag you into the ocean. Rising tides also cause waves to wash farther up the beach and can cut off access around headlands, rocks, and trails.

Never turn your back on the ocean. It is dangerous to be near the surf with your attention diverted. If beach activities like surf fishing or agate hunting require you to do this, consider wearing a life vest so you have a chance of surviving if you get pulled into the surf.



Steep versus flat. Steep beaches are particularly dangerous because the force of the ocean waves can reach much farther up the beach and pull you into the surf. These beaches have steep drop offs and coarse sand that washes out from under your feet making it hard to resist being pulled into the water. Beaches that separate lagoons from the ocean are especially steep (Big Lagoon, Dry Lagoon, and Freshwater Spit). Flatter, wider beaches are better choices.

Access to high ground. Look for beaches with high ground that you can reach on foot within 10 minutes. Escaping to high ground or inland generally takes longer from beaches that separate lagoons or bays from the ocean.

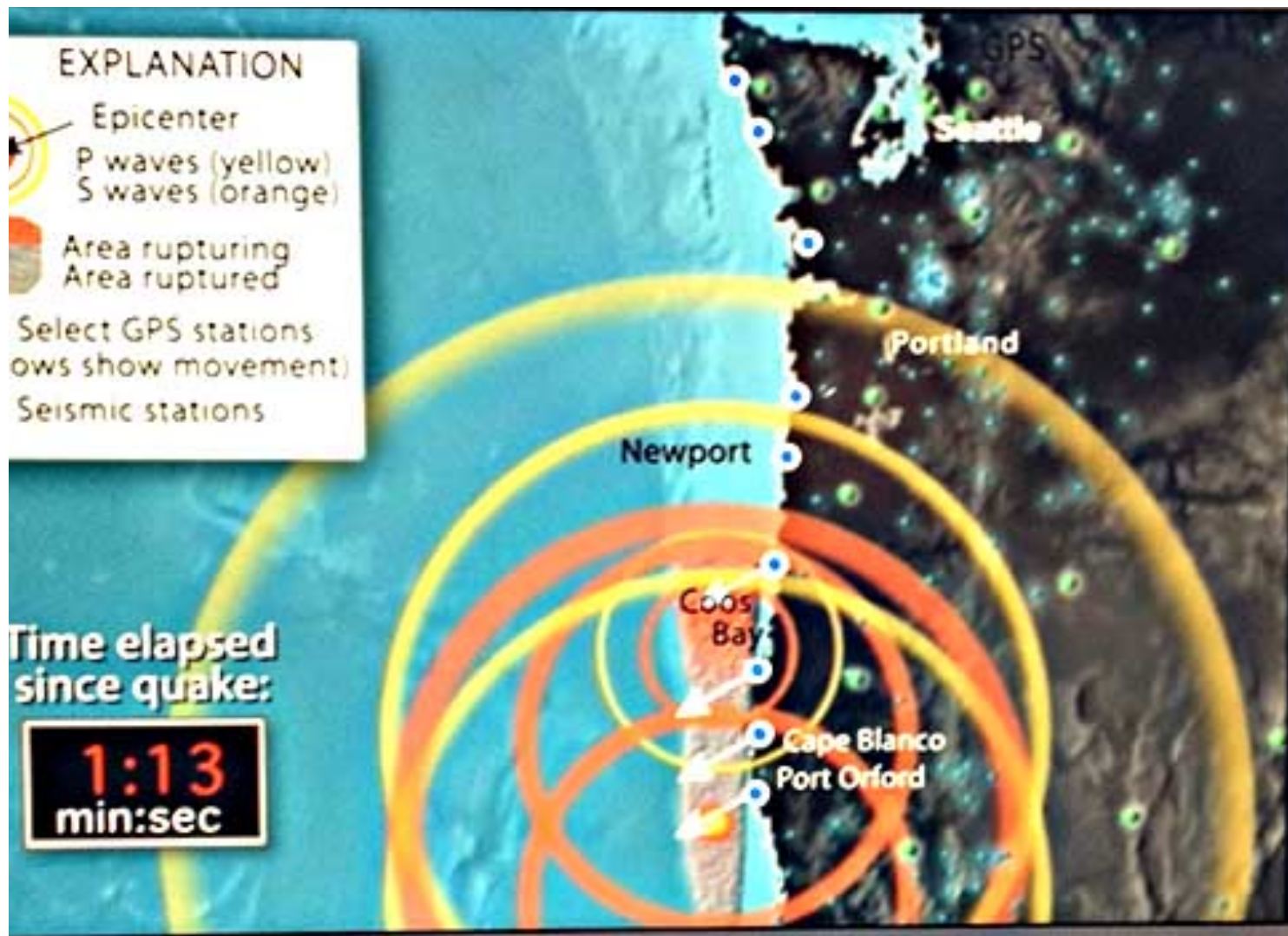
Cell phone coverage. Look for beaches with cell phone coverage. This allows you to quickly call for help in an emergency. It also provides you with a way to receive official Tsunami Warnings through the Wireless Emergency Alerts system (make sure your phone and carrier participates in this program).

Children. Choose a safe beach for children. Flatter beaches are better. Children are more vulnerable to sneaker waves and other beach hazards, and will need more time to evacuate from a fast arriving tsunami. Remember to have children play far from the water's edge so they are not exposed to sneaker waves. Always keep children under close supervision.

Choose Your Beach Well

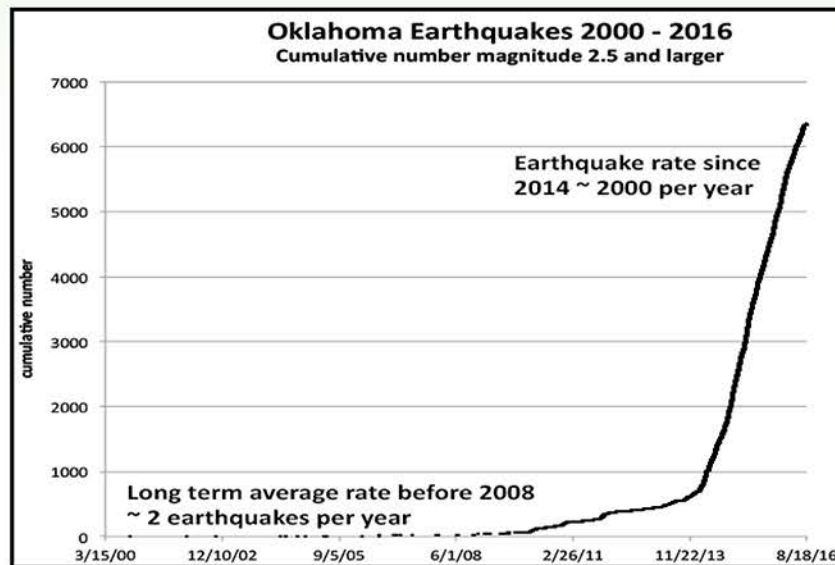
for tsunami and other beach hazards

Introducing Earthquake Early Warning



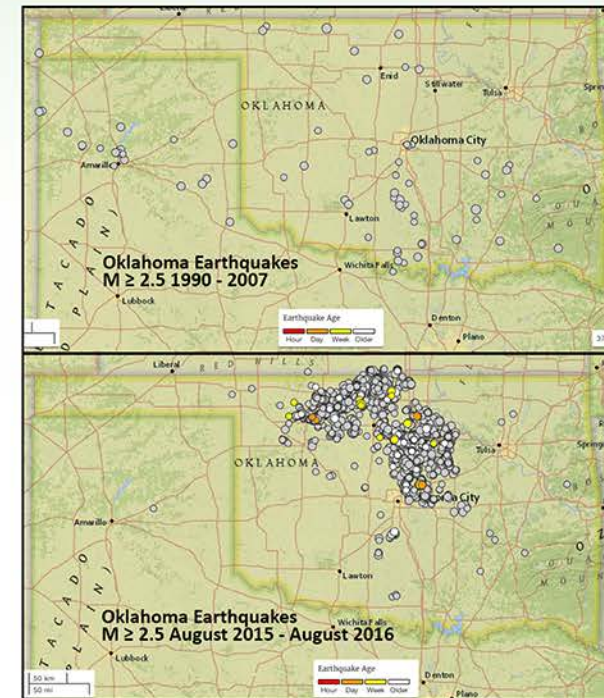
What is happening in Oklahoma?

What Lower-48 state had the most felt earthquakes in the past year? Move over California. Since August of 2015, 34 earthquakes in the magnitude 4 range have been detected in Oklahoma compared to only 30 in California in California in the same time period.



This graph shows the cumulative number of earthquakes from 2000 to the present. What changed around 2009? The requirement that fluid wastes from oil and gas drilling be disposed in deep waste water wells. More waste water has been injected as hydraulic fracturing (fracking) has increased.

Last year Oklahoma finally recognized the increased seismicity as human-caused and is requiring a reduction of the rate and volume of fluid injection.



The rate of earthquakes in Oklahoma increased 1000-fold since 2014 compared to the long term pre-2008 rate.

Notable quakes of 2016 (to date):

- **Deadliest quake:** April 16 M 7.8 Ecuador, 661 deaths

Impacts exacerbated by dense population and earthen structures with no resistance to earthquake shaking and numerous aftershocks.

- **Largest quake:** March 2 M 7.8 Indonesia & April 16 M 7.8 Ecuador.

The March 2 earthquake was centered 500 miles off the coast of Sumatra and unlike the Ecuador earthquake of the same size, did no damage.

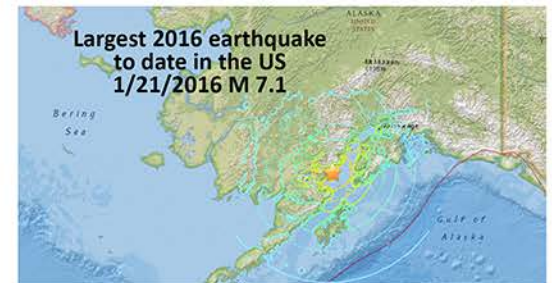
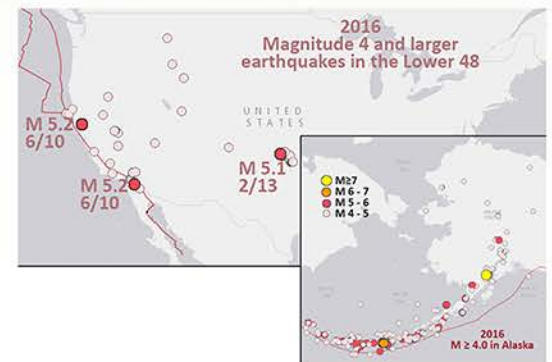
- **Largest US quake:** Jan. 21 M 7.1 Alaska Peninsula, no damage.

- **Largest US quakes in the lower 48:** Three earthquakes in the M 5 range to date: M 5.2 on June 10 near Borrego Springs, CA; M 5.1 on Feb. 13 in Oklahoma; 5.1 near Clear Lake, CA on Aug. 10.

- **State with the most reported felt earthquakes:**

OKLAHOMA! Since January 1, 443 earthquakes of magnitude 3 or larger were reported in Oklahoma. California was way behind with only 131 in the same period.

- **Tsunamis:** 2016 has been a quiet year so far - four tsunamis detected and the largest only 8 inches high. The most recent tsunami to cause damage was Chile's M 8.3 in September of 2015.



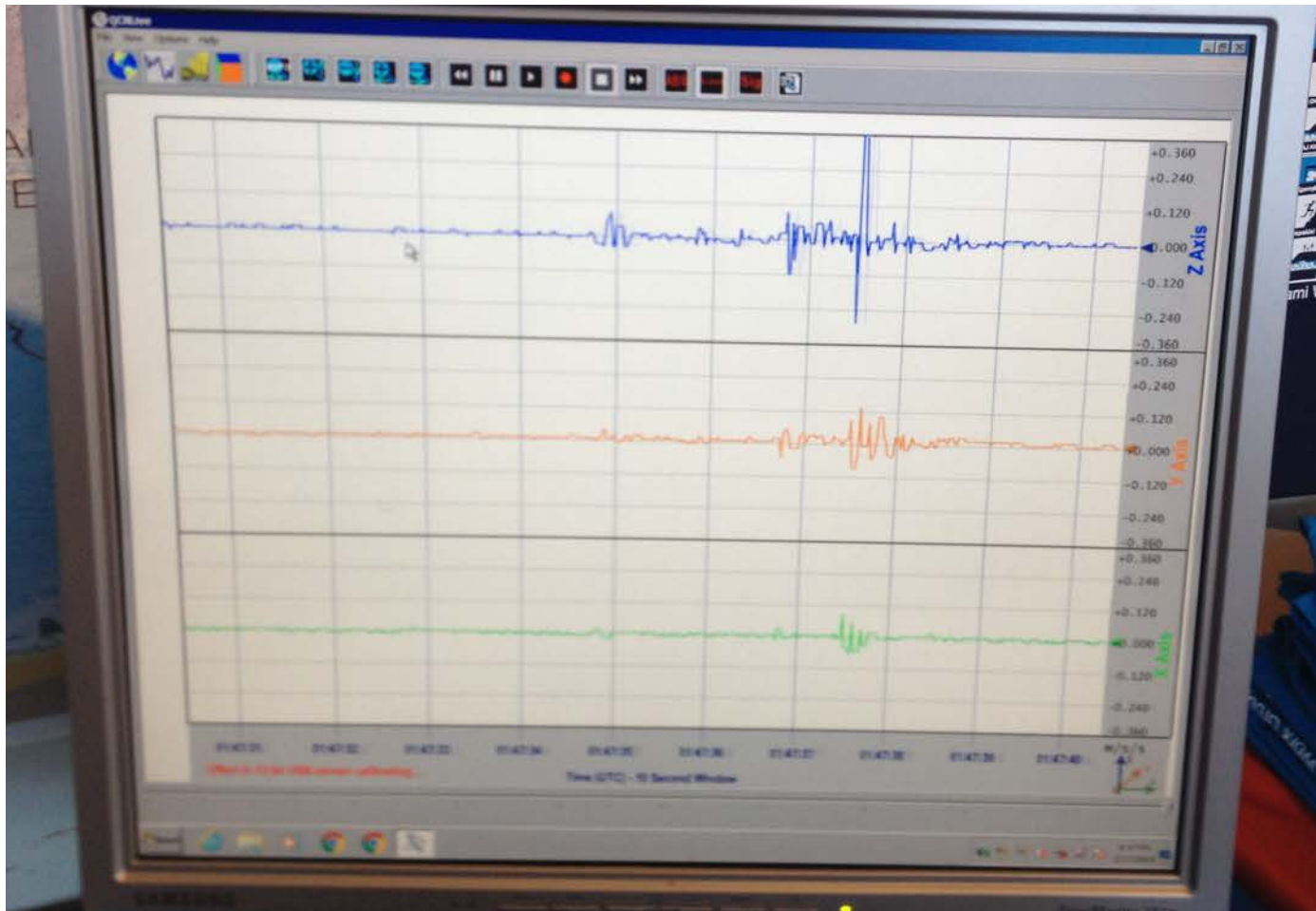
The image shows a computer monitor displaying the CISNdisplay software interface. The screen is divided into several sections:

- Top Bar:** Includes the application name "QWClient", the version "CISN Display, Version 1.7", and the system clock "Thu 1:34 PM Stephen Tillinghast".
- Menu Bar:** Contains "File", "View", "Layers", "Event", "Tools", and "Help".
- Header:** Features the "CISNdisplay" logo, the text "The California Integrated Seismic Network Partner with the Advanced National Seismic System", and the "ANSS" logo.
- Main Map:** A world map showing seismic activity with yellow and blue square markers. The markers are concentrated in the Pacific Ocean, particularly around the West Coast of North America and the South Pacific.
- Right Panel:** A list of recent seismic events with columns for "Date/Time" and "M" (Magnitude). The list shows events from 2016/08/17 to 2016/08/18, with magnitudes ranging from 1.1 to 2.5.
- Bottom Panel:** Contains a "Notice: Earthquake data may be preliminary and subject to change." and a "Not Connected: click for details" message.

Reading the story of Kamome



Making your own earthquake with the Quake Catcher



The Wave Tank – always a crowd favorite





Thank You

What you see in this room is a result of the efforts of the Redwood Coast Tsunami Work Group (RCTWG), an organization of local, state and federal agencies, tribes, relief and service groups, land managers, and businesses from Del Norte, Humboldt and Mendocino Counties. The group was formed in July 1996 to define the needs of local jurisdictions to mitigate the North Coast earthquake and tsunami hazard and to promote a coordinated, consistent mitigation program for all coastal areas. The RCTWG is part of the California Earthquake Alliance, a state organization of regional work groups that foster preparedness throughout the state.

NOAA - National Weather Service Eureka Forecast Office

HSU Geology

Clarke Museum

American Red Cross

Pacific Watershed Associates (PWA)

U.S. Geological Survey (USGS)

Humboldt Community Emergency Response Team (CERT)

Del Norte County Disaster Animal Response Team (DART))

Redwood National and State Parks

California State Parks

Boy Scout Troop 99, VFW - McKinleyville

Humboldt County Sheriff's Office of Emergency Services

Humboldt County Public Works

Humboldt County Local Oversight Program

Humboldt State University/University Center

California Office of Emergency Services

California Geological Survey

Earthquake Country Alliance

The Wildlands Conservancy

Trinidad Rancheria

Cascadia Earthscope Earthquake Tsunami Education Project

Humboldt County Fair

Frontier Internet

Ferndale High School

Humboldt County Fair Association

.....and other members of the RCTWG

