



***After Action Report***

**West Coast Tsunami Warning  
June 14, 2005**

**August 2005**

**Oregon Emergency Management**

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We wish to thank all of the emergency managers, elected officials, officers from sheriff's departments, police departments and fire districts, and state agency representatives that took the time to report their experiences and offer their recommendations based on the events along the Oregon coast on June 14, 2005.

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## Acronyms

BC	British Columbia
CA	California
DART	Deep ocean Assessment and Reporting of Tsunamis
DOGAMI	Oregon Department of Geology and Mineral Industries
EAS	Emergency Alert Systems
EDO	Executive Duty Officer
EM	Emergency Manager
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
HI	Hawaii
LEDS	Law Enforcement Data System
M	Magnitude
MFR	WFO Medford, OR
NAWAS	National Warning System
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation
NTHMP	National Tsunami Hazard Mitigation Program
NWR	NOAA Weather Radio
NWS	National Weather Service
NWSI	National Weather Service Instruction
NWWS	NOAA Weather Wire Service
ODOT	Oregon Department of Transportation
OEM	Oregon Emergency Management
OERS	Oregon Emergency Response System
OSP	Oregon State Police
OWP	Oregon Warning Point
PDM	Pre-Disaster Mitigation
PSAP	Public Safety Answering Points
PDT	Pacific Daylight Time
PQR	WFO Portland, OR
PTWC	Pacific Tsunami Warning Center
RAINS	Regional Alliance for Infrastructure and Network Security
SAME	Specific Area Message Center
TIB	Tsunami Information Bulletin
TRC	TsunamiReady Community
TWC	Tsunami Warning Center
UGC	Universal Generic Codes
USCG	United States Coast Guard
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WA	Washington
WC/ATWC	West Coast/Alaska Tsunami Warning Center
WCM	Warning Coordination Meteorologist
WFO	Weather Forecast Office

## Executive Summary

The magnitude 7.2 (preliminary magnitude 7.4) earthquake and Tsunami Warning issued for the West Coast of the United States on June 14, 2005, serves as a credible test of readiness for emergency officials in interpreting and communicating critical information and enacting emergency operations to protect the welfare of the residents and visitors along the Oregon coast. Following the heightened awareness from the Indian Ocean earthquake and tsunami, along with repeated public meetings and outreach regarding Oregon's tsunami preparedness activities, the overall response from participating evacuees was favorable. Much of this review of the June 14th event concerns failures in communications systems and shortcomings in emergency protocols, along with numerous examples of human behavior that, during an actual destructive tsunami, would be responsible for deaths and injuries that could be otherwise avoided.

On the positive side, the investment of tsunami mitigation in Oregon during the past ten years to build a culture of tsunami awareness along the Oregon coast paid off. It is estimated that up to 10,000 people may have evacuated, either on their own or at the request from local officials. Some of the communities that reported notable evacuations include Seaside and Cannon Beach in Clatsop County, Manzanita, Nehalem, Wheeler, and Rockaway Beach and many others in Tillamook County, Yachats and portions of Lincoln City and Newport in Lincoln County, Bandon in Coos County, as well as Port Orford and Gold Beach in Curry County. Many other communities cleared their beaches and low-lying areas.

Oregon's entire coastline has a delineated tsunami inundation zone, based on the 1995 State Senate Bill 379. Through the federal/state partnership of the National Tsunami Hazard Mitigation Program (NTHMP), ten Oregon communities have completed high resolution modeling and mapping for tsunami inundation hazards and at least eighteen community areas have Tsunami Evacuation Map Brochures that identify suggested routes to high ground and general emergency preparedness information. Continued federal funding of the NTHMP will allow for the remainder of the coast to be mapped. Many more communities have Tsunami Hazard and Evacuation Route signs in place to direct evacuees to safety. Schools annually practice earthquake and tsunami safety drills that require evacuation from inundation areas.

However, problems involving emergency operations surfaced during this event that demonstrate the importance of well developed tsunami specific evacuation plans, robust communication infrastructure to insure dependable redundancy, regular drills and updated training for all emergency staff, and coordinated local, regional and state roles during tsunami warnings.

Likewise, there were shortcomings in notifying residents, businesses and visitors of the tsunami warning and local evacuations. This serious concern was voiced during the resulting public meetings and in numerous written, telephoned and emailed communications to elected and emergency officials. The strongest recommendation is for increased sirens in remote locations and in high pedestrian traffic areas. Also, there were requests for increased tsunami information in hotels and vacation rentals, greater public involvement in evacuation planning activities, and in general, a greater capacity for officials to quickly disseminate public safety information.

The role of the media and the effective use of the Emergency Alert System (EAS) must be examined. Emergency managers often recommend the public to tune in to television and radio for critical instructions, but there were widespread problems here. Many stations could not receive the EAS signals due to technical problems and operational assumptions that someone else would issue the EAS signal for their area. Similarly, NOAA Weather Radios (NWR) that relay EAS did not function due to technical failures or needed software/coding upgrades. This was especially frustrating for emergency managers, since they have strongly promoted NWR to the public as a reliable alternative for emergency notification.

Finally, the general public must accept personal responsibility for understanding what to do during a tsunami watch or warning and how to respond to an ordered tsunami evacuation. Despite the amount of literature, signs and tsunami drills recently conducted in communities along the coast, many residents did not know if they lived in or outside of dangerous tsunami zones and called 911 centers for advice. This single problem was repeated in every city and county along the coast and catastrophically impaired emergency dispatch centers from doing their jobs. Additionally, far too many people exhibited poor judgment in getting in their cars to drive to high ground, when they could have very easily walked in a shorter amount of time. There were far too many people stuck in traffic, which delayed or prevented those with limited mobility to rely on their vehicles for safety. Worst of all, curious spectators headed towards the water for a view of the anticipated tsunami. These people placed themselves in direct risk of becoming potential victims and their actions may impact the ability of others to evacuate and may delay or distract emergency officials that have limited time to notify their areas of responsibility.

Overall, this was an important and unrepeatable test for the State of Oregon's ability to respond to an imminent tsunami threat along its coast. Because of the number of communities at or near sea level with growing populations, Oregon has possibly the highest vulnerability on the west coast to a near shore tsunami. It has been suggested that a Cascadia tsunami poses the greatest potential catastrophic loss of life to the state of Oregon - ahead of earthquakes, flooding and wildfire. It must be said that if there had been a significant tsunami generated from this earthquake, many people would likely have been killed or injured. Fortunately there are many good examples to draw from, such as the recent Tsunami Outreach Program in Seaside, which will be used as a grassroots-based template for instilling a "Culture of Awareness" in communities along the Oregon coast.

This After Action Report from Oregon Emergency Management examines the timelines of the events on June 14, the critical components of emergency operations involved in receiving and issuing tsunami warnings and evacuations, and puts forward ten findings with recommended actions to improve or refine existing operations that will mitigate future losses during the next inevitable Oregon tsunami.

## Tsunami Warning Timeline for June 14, 2005 (all times PDT)

Federal	19:51 Offshore Earthquake M7.2	State/Local
Coordination message sent from PTWC to WC/ATWC 19:55		
WC/ATWC issues Bulletin #1 "Tsunami Warning for CA, OR, WA, BC" 19:56		19:58 OERS receives WC/ATWC Bulletin #1 via Weather Wire, email, and NAWAS
PTWC issues Bulletin #1 "No Tsunami Watch or Warning" 19:59		19:59 LEDS distributes WC/ATWC Bulletin #1
		20:02 LEDS distributes PTWC Bulletin #1
		20:04 OERS contacts Coastal PSAPs via NAWAS to relay WC/ATWC Bulletin #1. to Questions immediately begin about PTWC Bulletin (no warning?). 20:08 OERS reads PTWC Bulletin and concurs there is no tsunami warning in effect.
WFO Medford contacts OERS via NAWAS to question PTWC Bulletin. Requests OERS contact WC/ATWC for clarification of tsunami warning. 20:10		20:09 OERS pages OEM Mgmt. and Exec. Duty Officer (EDO) for M 7.4 EQ and no tsunami warning in effect
		20:12 OERS contacts Coastal PSAPs via NAWAS to affirm there is a Tsunami Warning / Watch in effect.
		20:20 OERS pages OEM Mgmt. /EDO to affirm Tsunami Warning / Watch in effect
WC/ATWC estimate for tsunami arrival at Crescent City, CA 20:29		20:06 OERS receives numerous calls from public, PSAPs, LEMs, and Media to 20:09 requesting further information and clarification on tsunami warning status
		20:39 OERS pages EDO
WC/ATWC estimate for tsunami arrival at Charleston, OR 20:44		20:41 EDO calls in and is aware of Tsunami Warning
WC/ATWC calls PTWC to discuss warning cancellation 20:52		20:46 OERS pages EDO Plus Group
WC/ATWC issues Bulletin #2 Tsunami Warning canceled 21:09		21:10 OERS contacts Coastal PSAPs via NAWAS to cancel Tsunami Warning

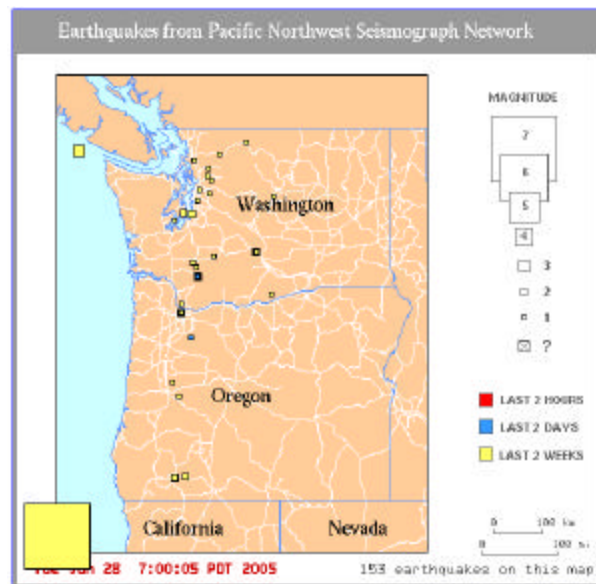
## Overview of Earthquake

US Geological Survey Statement:

A major earthquake occurred at 02:50:53 (UTC) on Wednesday, June 15, 2005 (Tuesday, June 14, 2005 at 7:50:53 PM Pacific Daylight Time). The magnitude 7.2 event has been located OFF THE COAST OF NORTHERN CALIFORNIA.

This earthquake occurred in a deformed section of the southernmost Juan de Fuca plate that is commonly called the Gorda plate. The epicenter lies to the west of the Cascadia Subduction Zone. Light shaking from this earthquake was widely felt along the northern California - southern Oregon coastline.

Preliminary analysis of the quake indicates that it resulted from slip on a NE striking, left-lateral, strike-slip fault; this type of mechanism has been documented for other earthquakes having locations in the interior of the Gorda plate. This earthquake did not produce a damaging tsunami, although, a small ~3 centimeter tsunami wave was observed on sensitive tide gauges. Earthquakes with strike-slip mechanisms are less likely to produce large tsunamis because they cause relatively little vertical ground displacement.



Earthquakes are common in the Gorda plate, which is subjected to north-south compression due to the north-west moving Pacific Plate that collides with the southern boundary of the Gorda Plate along the east-west Mendocino Fracture Zone. This quake occurred approximately 67 miles west of the epicenter of the November 8, 1980 7.2M earthquake. There have been 3 other quakes of magnitude  $M > 6$  that have occurred with 50 miles radius of the epicenter of this quake (August 16, 17 1991 and July 24 1996). Reference: <http://earthquake.usgs.gov/eqinthenews/2005/usziae/>

### *Relevance of seismic detection to tsunami warning*

The strike/slip nature of this earthquake caused many emergency officials and geoscientists to assert that a tsunami warning may not have been necessary. Because the seismological community has a history of similar activity in this area, this point has raised a critical question to the WC/ATWC staff regarding the methodology of how tsunami warnings are based on known fault behavior that are unlikely to produce a tsunami. But, an earthquake of this type could still produce a damaging local tsunami from an underwater landslide, which there are many historical precedents. Likewise, the time necessary to determine the fault mechanism with a high degree of certainty would reduce valuable notification time, since this event was of a significant magnitude so close to a populated shoreline. Therefore, the issuance of a Tsunami Warning was sound.



## Overview of Critical Emergency Operation Functional Areas

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### A. Tsunami Warning Centers

#### The West Coast/Alaska Tsunami Warning Center (WC/ATWC)

The WC/ATWC in Palmer, Alaska is responsible for the detection, location, and determination of potentially tsunamigenic earthquakes occurring in the coastal areas of Alaska, British Columbia, Washington, Oregon, California, as well as the U.S. Atlantic and Gulf of Mexico coasts. It has a secondary responsibility for the detection and evaluation of earthquakes located outside its regional area of responsibility (AOR) and is the backup center for the PTWC.

At 19:51 pm PDT, on Tuesday, June 14, 2005, a magnitude 7.2 earthquake occurred 85 miles northwest of Eureka, California (CA). NWS policy (NWSI 10-701) requires a tsunami warning to be issued for earthquakes with an initially determined magnitude of 7.0 to 7.5 within a two-hour wave travel time. Accordingly, the WC/ATWC issued a tsunami warning at 19:56 pm PDT for coastal areas from the California-Mexico Border to the north tip of Vancouver Island, BC. The earthquake did produce a small tsunami. A 10-15 centimeter wave was recorded at the Crescent City, CA tide gauge. Tide gauge data were received at the Tsunami warning Centers (TWC) at approximately 21:00 pm PDT along with DART data indicating a negligible tsunami. Per NOAA policy, subsequent updates are to be issued hourly. After confirmation that a destructive tsunami did not form, the WC/ATWC cancelled the warning at 21:09 pm PDT. The WC/ATWC Tsunami Warning and Cancellation is provided in Appendices A and C.

#### Pacific Tsunami Warning Center (PTWC)

The PTWC, located at Ewa Beach, Oahu, Hawaii, has primary tsunami warning responsibility for all of the Pacific Basin except the West Coast of North America. They coordinate closely with the WC/ATWC during any strong earthquake or potential tsunami event anywhere in the Pacific, and they have backup responsibility for WC/ATWC.

It is NOAA Policy for the PTWC to issue a Tsunami Information Bulletin (TIB) for the Pacific Basin after the WC/ATWC has issued a Tsunami Warning. PTWC copied the data in the WC/ATWC warning and issued a TIB at 19:59 pm PDT. The first sentence stated, "THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT ALASKA – BRITISH COLUMBIA – WASHINGTON – OREGON – CALIFORNIA."

The sentence after the stand-alone headline "Tsunami Information Bulletin" read: "THIS MESSAGE IS FOR INFORMATION ONLY. THERE IS NO TSUNAMI WARNING OR WATCH IN EFFECT." Universal Generic Codes (UGC) for the West Coast states were included in the product and therefore the product received wide distribution. The PTWC TIB is provided in Appendix B.

(\*Source: National Weather Service, *Western Region Service Assessment, West Coast Tsunami Warning, June 14, 2005*. June 2005).

## **B. National Weather Service**

### **1. Portland Weather Field Office (PQR)\***

On duty forecasters received WC/ATWC warning via NAWAS and broadcast the information on NOAA Weather Radio (NWR) transmitters located in Astoria, Newport, and Eugene at 20:11 pm PDT.

While PQR was performing local NWR/EAS dissemination, the PTWC bulletin was issued. Misreporting by the regional and local media of a “No Tsunami Warning” message caused numerous calls into the PQR staff. Since PTWC products are not coded to produce alarms at PQR, valuable staff time had to be used to track down the product on the Internet and answer telephone queries.

The NWR did not function properly for this event. Weather Field Offices do not have an effective means to monitor the quality of NWR in outlying portions of their coverage areas. During this event, the coastal transmitters were experiencing signal quality problems and as a result, many NWR receivers did not tone alert and most commercial radio stations did not activate EAS. The Florence radio station did broadcast the EAS message because they received their audio signal from a parent station in Eugene.

The PQR staff participated in numerous media interviews by telephone along with two television interviews broadcast live from their office. It was made clear by the staff interviewed that the tsunami warning was not a test.

### **2. Medford Weather Field Office (MFR)\***

Office forecaster was first notified of an earthquake by a phone call from a concerned citizen whose dishes had been shaking. The NAWAS message of the tsunami warning soon followed. Once text warning messaging arrived, the office phones began ringing. The forecaster focused on the calls and not the warning dissemination.

At approximately 20:10, the forecaster heard the Oregon State Warning Point (OERS) mention over NAWAS that the tsunami warning was cancelled. The MFR forecaster contacted OERS and on NAWAS questions “no warning.” Since MFR had only seen the Bulletin 1 at that time, he requests that OERS contact WC/ATWC for clarification.

The MFR forecaster made a decision to call the EAS stations individually, but had difficulty reaching stations due to busy phone lines. Coos County was contacted at 20:18 and EAS was activated for this county. The warning was added to the NWR broadcast at 20:40.

(\*Source: National Weather Service, *Western Region Service Assessment, West Coast Tsunami Warning, June 14, 2005*. June 2005).

### **3. TsunamiReady Communities**

The National Weather Service's TsunamiReady program is an excellent incentive for communities to reach at least a minimum standard of readiness. Oregon currently has six communities (Cannon Beach, Manzanita, Wheeler, Nehalem, Rockaway Beach and Lincoln City) and one county (Tillamook) that have been designated TsunamiReady Communities (TRC) by the National Weather Service. The main goal of this designation is to improve public safety during tsunami emergencies.

The TsunamiReady program certification requires a large investment of time and resources from the local communities. These investments include installing and maintaining emergency notification infrastructure, evacuation planning, and conducting drills and education activities. Many coastal communities have limited resources to carry out these program requirements. Since meeting the program criteria is a local responsibility, TsunamiReady participation could be encouraged by the permanent increased allocation for the annual tsunami budgets for the five states in the National Tsunami Hazard Mitigation Program mentioned below.

### **4. National Tsunami Hazard Mitigation Program**

NOAA'S National Tsunami Hazard Mitigation Program has been instrumental in increasing the capacity of the five member states (Alaska, Hawaii, California, Oregon, and Washington) to conduct tsunami run up modeling and mapping and to tailor tsunami education and outreach to local communities. Without this federally funded program and the state allocations, there would be little, if any, tsunami programs in Oregon.

Currently, the paramount concern of tsunami programs is to evacuate people out of harm's way. But this does little for reducing risk to the built environment and how a community recovers from a tsunami. Beyond risk assessment, education programs and emergency notification, a community can take steps to become "tsunami resilient" by reducing its overall vulnerability to tsunami damage and potential economic losses. Tsunami resiliency includes rebuilding schools and critical facilities outside of inundation zones, hardening bridges and infrastructure for surviving a coastal earthquake and tsunamis, and continuity planning for business resumption.

The federal partners in the NTHMP (NOAA, USGS, FEMA and NSF) provide a strong direction for tsunami resistant communities. For example, FEMA's Pre-Disaster Mitigation (PDM) Grant Program can support local efforts to undertake priority hazard mitigation projects identified in local and county Hazard Mitigation Plans. Hazard Mitigation Planning and (PDM) grants are a proven means for Oregon communities to reduce their risk and create a more livable and sustainable community.

## **C. State of Oregon: Agencies Involved in June 14<sup>th</sup> Tsunami Warning**

### **1. Oregon Emergency Management**

Emergency operations at the state level begin with the anticipated onset of a damaging event that overwhelms the local/county response capacity. The 24-hour on-duty staff at the Oregon Emergency Response System (OERS) have the responsibility, as the Oregon Warning Point (OWP), to notify state and local emergency personnel of earthquakes and tsunamis. On June 14<sup>th</sup>, at 19:58 hours, the OWP received the WC/ATWC call down on the Federal NAWAS circuit regarding the off shore earthquake and the Tsunami Warning.

At 20:04 OWP initiated the state NAWAS call down of the Tsunami Warning to the county warning points. During the call, questions arose from at least two counties about the simultaneous receipt of a Tsunami Information Bulletin from PTWC. The Law Enforcement Data System (LEDS) receives the NOAA Weather Wire messages and delivers them to county and local Public Safety Answering Points (PSAPs) warning points and law enforcement offices. There were many reports of dispatch personnel receiving the LEDS relay of the PTWC Information Bulletin at the same time or before the NAWAS call down and assuming it meant that the WC/ATWC Warning was invalid or canceled.

At 20:07 OWP attendant reads PTWC message aloud and concurs/announces, "There is No Tsunami Warning or Watch in Effect," but advises there could be small waves in low-lying areas and requests information to be passed to local emergency managers.

At 20:09 OWP pages OEM management and Executive Duty Officer (EDO) to notify them of M 7.4 earthquake and no tsunami warning.

Following 20:10 contact from Medford NWS office regarding PTWC bulletin, OWP institutes 20:17 NAWAS call down to affirm WC/ATWC Tsunami Warning. At 20:20 OWP pages OEM management and the EDO to confirm tsunami warning.

21:10 OWP passes on WC/ATWC Bulletin 2 via NAWAS to county warning points that Tsunami Warning is cancelled.

### **2. Oregon State Police (OSP)**

Oregon State Police were notified of the tsunami warning at their Northern and Southern Communication Centers via the State NAWAS call down. On-duty officers along the coast were involved in local evacuation operations and reported this was a very good learning experience, but expressed a need for quicker information updates on potential tsunami.

### **3. Oregon Department of Transportation (ODOT)**

ODOT's initial role in tsunami response is to assist local jurisdictions with evacuation by providing traffic control on US 101 and other state highways, and by notifying motorists on state highways of actions they should take.

Communications was the main problem ODOT personnel noted. Without communications, there was little or no coordination. It is noted there was a great deal of confusion that night.

There was a problem with the LEDS/ODOT interface and ODOT Station 2 (north and central Oregon Coast) did not directly receive the tsunami warnings or updates off of the LEDS system to ODOT. Station 2 provided notification by pager to their ODOT notification list around 2038.

ODOT Station 3 (southwest Oregon) received the tsunami warning via the Emergency Alert System and LEDS around 2008. ODOT highway maintenance personnel were on standby. ODOT Region 3 was ready to activate its ODOT Regional Emergency Operations Center in Roseburg. ODOT employees report that attempts to contact coastal locations by landlines and cell phones were not successful and a message of "all circuits are busy at this time please try again" was received.

ODOT is installing Highway Advisory Radio (HAR) in 12 locations along the Oregon Coast Highway, US 101. The main purpose of the system is to alert motorists of closures and detours on US 101. When installation is complete, it can also be used to broadcast tsunami information. The system is not yet fully installed. Ten of the 12 HAR transmitters are working and the other two (both in locations serving the central Oregon coast) are being installed. Signs with flashing beacons to alert motorists to tune their radios to the HAR frequency when flashing are also being installed.

The ten radio transmitters that are installed now are programmed to broadcast NOAA weather radio information 24 hours a day when not being used for other messages. So the NOAA weather information was being broadcast, although most of the signs could not yet be used to tell motorists to tune in. We received comments that although the ODOT HAR system was heard to broadcast NOAA weather radio, which included tsunami information, other weather information that did not pertain to the tsunami was also being broadcast. ODOT anticipates testing software that will enable the system to broadcast tsunami information in about a month.

It was also noted that an ODOT contractor was doing night work on US 101 near the Yaquina Bay Bridge. When people evacuated from the Hatfield Science Center, they found themselves held up in a work zone because the ODOT contractor had not been notified of the tsunami. ODOT will be working on a way to provide this notification to its contractors in the future.

**4. Oregon Parks and Recreation**

The exposure and vulnerability of visitors to coastal parks is clearly illustrated by the deaths of 4 members of a family camping on Beverly Beach the night of the tsunami from the 1964 Alaska Good Friday earthquake.

A quick estimate of the number of Oregon State Park campground rentals in coastal parks during the peak summer occupancy season, based on 2004 figures, establishes that nearly all 3,118 campsites are occupied every day in July and August. A conservative estimate of 3.3 people for each campsite means that 11,000 people may be in remote locations overnight and outside of broadcast media warnings, the audible range of local sirens, or difficult to reach by an emergency official. These campers do not reflect the even higher number of day visitors, overflow camping sites, and the remaining parks run by BLM, US Forest Service and local jurisdictions that will be difficult to reach with an emergency notification.

At this time, there are no tsunami evacuation maps for Oregon State Parks. OEM and DOGAMI have been working with South Beach State Park to develop a pilot project for creating evacuation maps and products for visitors and campers. The process for integrating this map into existing or new products will guide development of similar maps along the Oregon coast.

Following the June 14<sup>th</sup> event, Parks officials held a meeting with coastal park managers. A State Parks tsunami task force is being assembled to discuss emergency communications, planning and procedures, employee availability, and notification networks with local jurisdictions. OEM and DOGAMI will participate in this task force.

**5. Oregon Department of Geology and Mineral Industries (DOGAMI)**

DOGAMI has a supporting emergency operations role in the initial response to a tsunami by providing timely scientific information within the State ECC for OEM, the office of the Governor, other State officials, and the media.

Emergency notification protocols for DOGAMI points of contact have been reviewed and updated following the June 14<sup>th</sup> event.

## **D. Coastal Counties and Local Jurisdictions**

The following summaries were reported to the OEM Earthquake and Tsunami Programs Coordinator by emergency, law enforcement, and elected officials via telephone interviews and written communications. The following overviews represent an abbreviated selection of all emergency operations along the coast on the evening of June 14, 2005. The counties and cities are listed from north to south.

- 1. Clatsop County** – Called for limited evacuation for beaches only. Had technical problems in the county EOC with EAS equipment.
  - a. Warrenton – Decision was made early to not call a general evacuation, but to use the Fire Department to clear the beaches and turn around cars of sightseers (estimates 36 vehicles). Based on distance from source, official tried to verify potential tsunami by using online tide gauges. He estimated a low to minimal risk based on current inundation maps and size of earthquake. Approximately 50 vehicles arrived at assembly area with people self evacuating.
  - b. Seaside – Overall, their official was pleased with evacuation and level of participation and views it as a testament to their Tsunami Outreach Program. Almost 300 evacuees were counted on Broadway alone. He is critical of the public education message about distant tsunamis having a four-hour arrival time. This caused many people to drive rather than walk, which in turn caused a heavy traffic problem. City's 911 Dispatch called OERS to confirm Tsunami Warning message. Sirens were activated, but difficult to hear on the beach. He recommends US Coast Guard to fly along beaches with loudspeakers for warnings. Cell phone networks overloaded, especially due to high use at assembly areas.
  - c. Cannon Beach, Tsunami Ready Community – City official felt like warning information was good and evacuation went well, according to plan. Estimates over 95% participation. All six sirens were sounded. Most residents walked to high ground. Main vehicle traffic was from tourists. Police instructed automobile evacuees to get out of their cars and walk. Corporate restaurants contacted their headquarters for instructions on closing to evacuate. Many restaurants lost revenue from unpaid dinner bills, but none have complained. Some NOAA Weather Radios worked, some did not. City 911 was overwhelmed.
  
- 2. Tillamook County, Tsunami Ready County** – Estimated that 3,800 people (82% of inundation area) evacuated. US Coast Guard station evacuated two vessels to deep water. American Red Cross contacted immediately to begin process for staging relief points. Utilized all 32 sirens along county coast. Expressed problems with NOAA Weather Radios. Need improved coordination and communication with parks and campgrounds. Estimated 2,000 vehicles on Neah-Kah-Nie Mountain.

- a. Manzanita, Tsunami Ready Community – Evacuation went smoothly. Sounded two sirens. Saw primary issues to be addressed as conflicting Tsunami Warning Center messages and inaccurate reporting by the media. Estimates evacuation of nearly 2,000 people. Their 911 call center was so swamped with calls that they couldn't set off the sirens a second time. Used a zone command and stationed a firefighter at each assembly area to provide authority.
  - b. Rockaway Beach, Tsunami Ready Community – Official stated that response of community went, “fairly well,” with over 90% participation in the call for evacuation. Three sirens were sounded and neighbors contacted other neighbors, some by using bullhorns. Areas identified for future work include improved access to assembly areas, no cell phone service at assembly areas, and TV news kept saying there was, “No Warning.”
- 3. Lincoln County** – Limited evacuations along beaches and low-lying areas only. EAS tone didn't work, which prevented activation of NOAA Weather Radios. Heavy incoming calls to 911 Center.
- a. Lincoln City, Tsunami Ready Community – Have two sirens, but only one worked. Did not receive call from county 911. Concern for Chinook Winds Casino to get quick notification.
  - b. Depoe Bay – When Fire Department received page of tsunami warning, firemen gathered equipment and evacuated to high ground. Have received criticism for actions. Despite the call for sirens, feels that they are not cure-all because of expense, high maintenance, and behavior in rough weather. Concerns that tsunami signs are only in city area, not throughout fire district and for remote roads and beaches. For emergency alert, some remote areas on beaches are only accessible by four-wheel ATV and takes over an hour to cover.
  - c. Newport – No general evacuation was called. Emergency officials worked with State Parks to advise people at beaches and low-lying areas to head to high ground. Officials decided to monitor NOAA buoys for signs of tsunami and expressed dissatisfaction with sparse information for judgment of evacuation. Concern that if there were a real tsunami, it would be difficult to reach everyone. Around Newport, residents live in pockets and may have to rely on NOAA Weather radios. Asks how will transient population get the information? Official is critical of stability of high ground following Cascadia earthquake. Tsunami signs have been stolen.
  - d. Waldport – Did not evacuate or sound sirens. Have policy to get rescue equipment to high ground first. Officials were on standby and would not evacuate unless wave was on the way. Felt that warning information was accurate.



- e. Yachats – Evacuation called and went well. Have staged two citywide evacuation drills in the last nine months. Based on general public education, this event fell outside of the distant vs. near tsunami definitions. Yachats had written protocol and initiated call down and drive through. Consider importance of sirens to be paramount. Need to designate difference between safe ground and assembly areas. Over 500 phone calls the following day to say thank you and recognize the role of tsunami champion. Asking for tsunami standards for sirens and hotel information. Worried about a similar event during winter and risk of exposure. Asks for contribution up front of blankets, not body bags.
4. **Lane County** – EAS was automatically issued by NWS. No evacuations were issued in Lane County coastal areas. No follow-up EAS message was broadcast from the Lane County Sheriff’s Office. In hindsight, the Incident Commander felt they should have opened up the Emergency Operation Center and issued an EAS evacuation notice automatically but noted that the initial main emphasis was a tsunami *watch* and there was confusion with whether an actual tsunami had been generated thus making it hard for public safety officials to determine if evacuations were warranted.
    - a. Florence – No evacuation called. Dispatch center delivered warning 20 minutes late. Dispatch center received 180 calls. Recommends an auto launch feature for Emergency Operations during future tsunami warnings. Public has been instructed that during emergency to tune in to local radio, but local station only provided warning information every 15 minutes.
  5. **Douglas County, Reedsport** – Confusion regarding both tsunami warning centers messages. No evacuation called. Deputy cleared beaches. US Coast Guard launched vessels. Dispatch received many incoming calls asking what to do.
  6. **Coos County** – Sheriff and Emergency Management received different tsunami reports and therefore, the Sheriff was uncertain about directing EM to proceed with the activation of EAS for the evacuation for a tsunami. Need for “Warning” section in Tsunami Annex. 911 received over 200/ 911 calls alone with an additional 200 calls on business lines asking for information regarding the tsunami warning. Three specific issues were most noted:
    - 1) Which way to higher ground?
    - 2) Am I in the inundation zone?
    - 3) Is it true that we have a tsunami warning?
    - a. North Bend – Because of the public confusion over conflicting messages, their dispatch center was paralyzed from incoming calls. Decided to check with Crescent City to confirm if there was a tsunami before calling evacuation. Warning was cancelled before decision to evacuate made. Need public education.

Complaints that public not advised of warning cancellation. Chief called Crescent City for copy of tsunami plan.

- b. Coos Bay – Police sent patrol to Empire boat ramp for evacuation, set up cones, and used Public Address system. People drove over cones. Cones set up again and patrol car used for barricade. Port of Coos Bay did not get notification from Coos Bay Police Department, but was notified privately. Will help Charleston Fire to install warning siren. No Standard Operating Procedures, but will begin to write. Wants to be notified with pager that has warning tone.
  - c. Charleston – Fire Department moved equipment from low-lying area, then made evacuation notification.
  - d. Bandon – Once warning was understood and evacuation called, everything went well. Restaurant owners pushed customers and employees to go. Old Town evacuated in five minutes. Their 911 dispatch was all clogged up. Need better education to inform those that do not need to evacuate how to shelter in place.
7. **Curry County** – Emergency manager received late notification. Need networking of existing sirens between agencies (county/local and federal/state) for coordinated alerts.
- a. Gold Beach – Earthquake reported felt by State Police. Confusion over different tsunami messages caused delayed evacuation order. Sirens activated. Residents took warning very seriously and evacuated. Several remote areas could not be notified by emergency personnel before expected arrival time of tsunami.
  - b. Brookings – Did not receive call down notice from Curry County Sheriff and did not call an evacuation. There were over 200 calls into Brookings Police Dept. dispatch due to confusion over different Tsunami Warning Center messages and conflicting information from media. California’s communication of information was 10 minutes ahead of local information and caused confusion of accuracy. Commented on conflict between NAWAS and LEDS messages.

## **E. Media and the Emergency Alert System (EAS)**

The media have a vital role in communicating emergency information to the public. While sirens may provide an alert notification of an impending event, most people tune into their television or radio for detailed information, instructions, and updates. Many media respondents received the message over the Associated Press (AP) Wire. In some cases, the media broadcasted the tsunami warning to the public before local emergency managers received it.

The Emergency Alert System (EAS) provides the means for multiple emergency management points of origin to issue and relay information to local and regional broadcast media markets. During the June 14<sup>th</sup> tsunami warning, the EAS was initiated at several locations that were supposed to provide redundant tsunami warning message delivery to many users and the primary information for most of the public via television and radio coverage. For much of the coast this did not happen.

This EAS signal is encoded with specific information for the types of emergency (tsunami warning, Amber Alert) and the code for intended local transmitters and receivers to fire and transmit the tone and voice message. Many of the prefix codes in the tsunami warning messages were unrecognized at the local receiving end.

There were technical problems also. Poor audio quality phone lines were responsible for not activating NOAA Weather Radios (NWR) and EAS boxes in radio stations. Some signal quality problems with the NWR transmitters occurred on the north coast, which prevented NWRs from tone alerting and activating media outlet's EAS equipment in this region.

Without the NWR/EAS message acting as the prompt for broadcast media to relay information, many television stations misinterpreted the messages from the two TWCs and either wasted valuable time trying to sort out the appropriate message or gave the wrong information and told the public there was no tsunami warning.

Likewise, today's radio stations often have no one staffing them at night and some are entirely automated from distant production offices. Some local residents and visitors tuned to stations to find no mention of the tsunami, while others could only get break in reporting every fifteen minutes during regular programming.

Protocols for EAS responsibility were a problem too. The coverage range of regional vs. local broadcast media means that Portland area stations may provide the widest coverage along the northern Oregon coast, but these stations cannot be EAS activated by local or county emergency managers on the coast. For example, NWS protocols only activate EAS for tsunami messages at the coastal level and OEM does not issue EAS activations for tsunamis. This resulted in many examples of regional programming not delivering accurate and timely tsunami information to coastal communities.

## **F. Regional Alliances for Infrastructure and Network Security (RAINS)**

Emergency managers in Clatsop and Tillamook Counties commented on the positive performance of the Regional Alliance for Infrastructure and Network Security (RAINS) “Connect and Protect” Service in notifying subscribers of the tsunami warning and providing supporting evacuation information.

RAINS’ Connect & Protect™ service captures NOAA/National Weather Service’s tsunami warnings when issued, and immediately sends localized alerts via computers, pagers and cell phones, to local public and private organizations, and citizens responsible for public safety—thus dramatically increasing the speed and reach of the warnings within a community.

Under a contract with OEM, and working in cooperation with the City of Portland’s Bureau of Emergency Communications, RAINS expanded the functionality of its Connect & Protect online emergency notification program to process the official tsunami and oceanic earthquake alerts to the Pacific Coast. The alerts are now distributed directly from NOAA through the Connect & Protect network without human intervention to a community-based network of public safety stakeholders. The service targets recipients based on specific geographic location, and severity of incident—ensuring the right information is delivered to the right individual at the right time.

**About RAINS:** RAINS is a non-profit, private/public alliance formed to accelerate development and deployment of innovative technology for homeland security. RAINS has forged alliances with over 60 technology companies, multiple research universities, critical infrastructure providers, federal, state, and local agencies, and first responders. Founded in 2001, RAINS is a real-world working model for information sharing, supporting the government mandate to move from a “need to know” to “need to share” emergency communications framework. Its Connect & Protect™ secure information sharing service was a finalist for the Mitretek Innovation Award from Harvard University’s JFK School of Government. For more information visit: [www.rainsnet.org](http://www.rainsnet.org)

## Findings and Recommendations

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**Finding 1:** The West Coast/Alaska Tsunami Warning Center (WC/ATWC) acted appropriately in following required procedure by issuing a Tsunami Warning for their Area of Responsibility (AOR) which includes AK, CA, OR, WA, and BC.

**Recommendation 1a:** Improve certainty of issuing tsunami warnings by updating and improving resolution of seismic instrumentation of associated Cascadia fault structures and systems to more quickly determine the fault mechanisms of offshore earthquakes.

**Recommendation 1b:** Improve coordination between regional seismic networks to provide coverage of adjacent boundary areas to promote more accurate and timely event determinations.

**Finding 2:** Oregon Warning Points should not have received and based actions on the Pacific Tsunami Warning Center (PTWC) Tsunami Information Bulletin. Multiple incidents of message misinterpretation occurred from the PTWC issuing their standard Tsunami Information Bulletin for their AOR (international partners and US island territories) that stated there was “No Tsunami Warning or Watch in effect.”

**Recommendation 2:** Require cross-referenced tsunami messages issued from the West Coast/Alaska Tsunami Warning Center (WC/ATWC) and the Pacific Tsunami Warning Center (PTWC) to prevent confusion and perceived contradiction by officials, the media, and the public.

**Finding 3:** There were numerous examples of protocol failures in emergency operation plans for a tsunami watch/warning and evacuation. Since tsunami events are infrequent, a significant number of employees had no experience responding to a tsunami warning.

**Recommendation 3a:** Operation plans of state agencies (OEM, ODOT, OSP, Parks and Recreation, and DOGAMI, etc.) for tsunami emergencies should be reviewed and updated regarding primary and supporting responsibilities.

**Recommendation 3b:** State, county and local emergency staff should be regularly trained and drilled on all tsunami protocols.

**Recommendation 3c:** Develop a model tsunami evacuation plan for state/county/local emergency management that addresses the following:

- Operational protocols for tsunami watch/warning;
- Protocols for operations during heavy dispatch traffic with backup measures;
- Conformity between Evacuation Annex and Tsunami Annex in EOP;
- Standardized public information statements for official use (w/Spanish versions);

- Identification of evacuation routes or recommended roads;
- Identification of high ground/safe areas and assembly areas (w/GPS coordinates);
- Tsunami inundation maps (high resolution if available or SB 379);
- Tsunami Evacuation maps and brochures (local and county scales);
- Mapping of areas that require drive by or door to door alert notification, and;
- Planning for safety of vulnerable residents, service employees and tourists.

**Finding 4:** Emergency communication problems to county and local officials occurred due to:

- Technical failures in transmitters and phone lines;
- Equipment down due to scheduled mechanical servicing for repairs and upgrades;
- Transmission of incorrect Federal Information Processing Standards (FIPS) coding or use of sub-standard phone lines with poor audio quality, and;
- Overloaded 911 county and local dispatch centers due to incoming calls prevented or delayed completion of emergency call down protocols by dispatch staff.

**Recommendation 4a:** Ensure that redundant emergency notification systems, the foundation of the TsunamiReady Program, are functioning and reliable by providing support to state, regional, and local communications networks.

**Recommendation 4b:** Coordinate discussion and provide guidance to county and local jurisdiction inquiries about siren systems and other emergency notification systems.

**Finding 5:** Media communicated incorrect information (no warning or watch only) and poor or failed operations of local and regional Emergency Alert System (EAS) prevented much of the public from receiving accurate and timely notice of Tsunami Warning.

**Recommendation 5a:** Review and update protocols for Emergency Alert System (EAS) operations at state, regional and local levels during tsunami watches and warnings.

**Recommendation 5b:** Partner with DOGAMI to work with media to reinforce public information role of media during emergency and clarify policies and procedures for receiving tsunami messages and delivering information.

**Recommendation 5c:** Work with State Emergency Communications Committee to update EAS protocols for tsunami warnings and evacuations and communicate to broadcasters through Oregon Association of Broadcasters.

**Recommendation 5d:** Support use of functional EAS text for September 2005 NWS Tsunami Warning test to validate message sending and receiving functionality due to repairs and upgrades following June 14<sup>th</sup> communications failures.

**Recommendation 5e:** Encourage broad emergency operations testing and public participation in tsunami evacuation drills during NWS September 2005 tsunami warning test to confirm functionality of tsunami warning protocols and assure public of emergency messaging capacity.

**Finding 6:** Overall, most TsunamiReady Communities performed as well or better than other communities, with some exceptions due to faulty communications systems and inadequate emergency operations planning. Since TsunamiReady recognizes the minimum criteria for readiness, some communities may have a greater capacity to address a tsunami warning.

**Recommendation 6a:** Work with state emergency managers on increasing requirements for TsunamiReady Communities that include local adoption of tsunami inundation maps and evacuation maps, tsunami hazard mitigation plans, and formalizing procedures for conducting tsunami specific evacuations.

**Recommendation 6b:** Since coastlines concentrate people and development around vacation and recreation activities, the TsunamiReady Program should develop specific materials and guidance for hotel and rental lodging, service-based businesses, chambers of commerce, and tourists.

**Recommendation 6c:** The coast has a growing population of retirees that face difficulty during an emergency with mobility and access to information. Special treatment of vulnerable populations should be considered a requirement during the review for TsunamiReady approval.

**Recommendation 6d:** Encourage role of community volunteers (CERT, Citizen Corp) in public education activities for TsunamiReady program.

**Finding 7:** Support coast-wide goal for “tsunami resilient” communities

**Recommendation 7a:** Geographical research and analysis for vulnerability of coastal communities to Cascadia earthquake and tsunami impacts.

**Recommendation 7b:** Pre-determine/identify incentives for Pre-Disaster Mitigation Grant projects that improve resilience of coastal communities to earthquake and tsunami hazards.

**Recommendation 7c:** Research on vertical evacuation design and designation in new and existing buildings.

**Finding 8:** The public seemed to respond with support for the evacuation effort and respect for the potential risk. Nearly all of the reports from local officials, the media and personal contacts state that people did not mind the inconvenience or that the warning was ultimately canceled. Tillamook County, and the cities of Cannon Beach and Seaside reported orderly evacuations and a high percentage of participation.

**Recommendation 8a:** Emphasis of National Tsunami Hazard Mitigation Program support should be risk based and treat the states along the Cascadia Subduction Zone, including others in the Pacific basin, with the greatest priority.

**Recommendation 8b:** Share results from Seaside Tsunami Outreach Pilot Program to other coastal communities and provide support for individualized grassroots tsunami outreach activities.

**Recommendation 8c:** Seek out partners and funding for statutory requirements of Oregon Senate Bill 557 (if passed).

**Finding 9:** The delivery of timely and accurate tsunami warning and evacuation information to residents, visitors and employees is critical. Primary concerns from the public:

- No notice from officials or media that there was a tsunami warning and feeling left in harm's way;
- Hearing of the tsunami warning, but not getting a message to evacuate from an official;
- Confusion on appropriate action based on conflicting messages from broadcast media, internet, word of mouth, and emergency officials (watch vs. warning vs. no warning vs. canceled warning).

**Recommendation 9a:** NOAA Weather Radio is endorsed by state, county and local emergency managers for use in public institutions, residences, and private businesses. Coordinated efforts must be made to ensure the public's faith in NWR to provide reliable and redundant emergency information in the event of a tsunami alert.

**Recommendation 9b:** Encourage broad participation in NWS September 2005 tsunami warning test to confirm functionality of EAS and assure public of emergency messaging capacity.

**Recommendation 9c:** Visitors and campers in coastal parks and beaches represent tens of thousands of people at risk during peak summer and holiday periods. Tsunami awareness and evacuation information should be developed and provided consistently in all parks and recreation areas along the coast.



**Finding 10:** The June 14<sup>th</sup> event demonstrated numerous examples of dangerous public behavior such as:

- Curious spectators traveling into the tsunami zone,
- Reliance on automobiles for evacuation and causing gridlock, and;
- Unnecessary calls to 911 dispatch centers for advice.

**Recommendation 10:** Ongoing work on public education for tsunami awareness, preparedness and response concerning appropriate public behavior:

- *Do not call 911 for general questions or information.* Unless it is a life-threatening emergency, public reaction to tsunami alert should have a prescribed course of action.
- *Do not go to the beach or low-lying areas.* Spectators can quickly become victims and may impede emergency officials from notifying others and may restrict evacuation operations.
- *If you have been informed of a tsunami warning – evacuate.* Do not assume you will get a follow up notification from an official. It may be the only notice you receive.
- *Determine your risk and evacuation route before there is a tsunami warning.* Residents and visitors should evaluate if they live, work or play in tsunami inundation zones. Walking to high ground from these safe areas or identifying them on a map ahead of time will help your piece of mind during an evacuation.
- *Tsunami evacuation brochures not available for some residents and visitors.* All current tsunami brochures are being reprinted by the State in large quantities so that supplies are available for wide distribution. Future tsunami inundation and evacuation mapping is scheduled out until 2012 and will be expedited depending on future funding based on pending federal tsunami legislation.

## Appendix A: West Coast/Alaska Tsunami Warning Center - Bulletin Number 1

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WEPA41 PAAQ 150256  
TSUWCA

TO - TSUNAMI WARNING SYSTEM PARTICIPANTS IN  
ALASKA/BRITISH COLUMBIA/WASHINGTON/OREGON/CALIFORNIA  
FROM - WEST COAST AND ALASKA TSUNAMI WARNING CENTER/NOAA/NWS  
SUBJECT - TSUNAMI WARNING BULLETIN - INITIAL  
BULLETIN NUMBER 1  
ISSUED 06/15/2005 AT 0256 UTC

...A TSUNAMI WARNING IS IN EFFECT FOR THE COASTAL AREAS  
FROM THE CALIFORNIA-MEXICO BORDER TO THE NORTH TIP OF  
VANCOUVER I.-BC. INCLUSIVE...

...A TSUNAMI WATCH IS IN EFFECT FOR THE COASTAL AREAS FROM  
THE NORTH TIP OF VANCOUVER I.-BC. TO SITKA-AK...

...AT THIS TIME THIS BULLETIN IS FOR INFORMATION ONLY FOR  
OTHER AREAS OF ALASKA...

### EARTHQUAKE DATA

PRELIMINARY MAGNITUDE - 7.4  
LOCATION - 41.3N 125.7W - 90 MILES NW OF EUREKA-CA.  
300 MILES NW OF SAN FRANCISCO-CA.  
TIME - 1851 ADT 06/14/2005  
1951 PDT 06/14/2005  
0251 UTC 06/15/2005

### EVALUATION

IT IS NOT KNOWN - REPEAT NOT KNOWN - IF A TSUNAMI EXISTS BUT A  
TSUNAMI MAY HAVE BEEN GENERATED. THEREFORE PERSONS IN LOW  
LYING COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR  
LOCAL EMERGENCY OFFICIALS. PERSONS ON THE BEACH SHOULD MOVE TO  
HIGHER GROUND IF IN A WARNED AREA. TSUNAMIS MAY BE A SERIES OF  
WAVES WHICH COULD BE DANGEROUS FOR SEVERAL HOURS AFTER THE  
INITIAL WAVE ARRIVAL.

\$\$

PZZ130-131-133-134-132-135-150-153-156-110-250-210-255-350-  
353-356-450-455-550-530-535-555-670-673-650-655-750-WAZ001-  
002-005-006-007-008-009-010-011-013-014-015-016-021-ORZ001-  
002-021-022-CAZ001-002-005-007-006-075-074-009-034-035-039-  
040-046-041-042-043-150456-  
COASTAL AREAS FROM THE CALIFORNIA -MEXICO BORDER TO THE  
NORTH TIP OF VANCOUVER I.-BC. INCLUSIVE.

...A TSUNAMI WARNING IS IN EFFECT FOR THE COASTAL AREAS  
FROM THE CALIFORNIA-MEXICO BORDER TO THE NORTH TIP OF  
VANCOUVER I.-BC. INCLUSIVE...

### ESTIMATED TIMES OF INITIAL WAVE ARRIVAL

CRESCENT CITY-CA	2029 PDT JUN 14	ASTORIA-OR	2154 PDT JUN 14
CHARLESTON-OR	2044 PDT JUN 14	TOFINO-BC	2157 PDT JUN 14

SAN FRANCISCO-CA 2123 PDT JUN 14                      SAN PEDRO-CA                      2200 PDT JUN 14  
SEASIDE-OR                      2126 PDT JUN 14                      LA JOLLA -CA                      2214 PDT JUN 14  
NEAH BAY-WA                      2148 PDT JUN 14

\$\$

PKZ032-031-042-034-033-035-041-036-AKZ023-024-025-026-028-  
029-027-150456-

COASTAL AREAS FROM THE NORTH TIP OF VANCOUVER I.-BC. TO  
SITKA-AK.

...A TSUNAMI WATCH IS IN EFFECT FOR THE COASTAL AREAS FROM  
THE NORTH TIP OF VANCOUVER I.-BC. TO SITKA-AK...

ESTIMATED TIMES OF INITIAL WAVE ARRIVAL

LANGARA-BC    2244 PDT JUN 14    KETCHIKAN-AK    2257 ADT JUN 14  
SITKA-AK       2227 ADT JUN 14

\$\$

PKZ176-175-172-170-171-155-150-132-136-138-137-130-141-140-  
120-121-129-127-125-126-128-052-051-053-022-012-043-013-  
011-021-AKZ191-185-181-171-145-111-101-121-125-131-135-017-  
020-018-019-021-022-150456-

COASTAL AREAS FROM SITKA-AK. TO ATTU-AK.

...TSUNAMI INFORMATION STATEMENT...

NO - REPEAT NO - TSUNAMI WATCH OR WARNING IS IN EFFECT FOR  
THE COASTAL AREAS FROM SITKA-AK. TO ATTU-AK.

FOR INFORMATION ONLY - ESTIMATED TIMES OF INITIAL WAVE ARRIVAL

YAKUTAT-AK	2317 ADT JUN 14	CORDOVA-AK	0007 ADT JUN 15
KODIAK-AK	2332 ADT JUN 14	DUTCH HARBOR-AK	0013 ADT JUN 15
JUNEAU-AK	2334 ADT JUN 14	COLD BAY-AK	0034 ADT JUN 15
SEWARD-AK	2339 ADT JUN 14	ADAK-AK	0038 ADT JUN 15
VALDEZ-AK	2357 ADT JUN 14	HOMER-AK	0044 ADT JUN 15
SAND PT.-AK	2358 ADT JUN 14	SHEMYA -AK	0119 ADT JUN 15

\$\$

THE PACIFIC TSUNAMI WARNING CENTER AT EWA BEACH HAWAII WILL  
ISSUE BULLETINS FOR OTHER AREAS OF THE PACIFIC.

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS  
WARRANT. THE TSUNAMI WATCH/WARNING WILL REMAIN IN EFFECT  
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE  
WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION AND ETA SITES.

## Appendix B: Pacific Tsunami Warning Center – Bulletin Number 1

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TSUNAMI BULLETIN NUMBER 001  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0259Z 15 JUN 2005

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT  
ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

... TSUNAMI INFORMATION BULLETIN ...

THIS MESSAGE IS FOR INFORMATION ONLY. THERE IS NO TSUNAMI WARNING  
OR WATCH IN EFFECT.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0251Z 15 JUN 2005  
COORDINATES - 41.3 NORTH 125.7 WEST  
LOCATION - OFF COAST OF NORTHERN CALIFORNIA  
MAGNITUDE - 7.4

EVALUATION

NO DESTRUCTIVE PACIFIC-WIDE TSUNAMI THREAT EXISTS BASED ON  
HISTORICAL EARTHQUAKE AND TSUNAMI DATA.

HOWEVER - EARTHQUAKES OF THIS SIZE SOMETIMES GENERATE LOCAL  
TSUNAMIS THAT CAN BE DESTRUCTIVE ALONG COASTS LOCATED WITHIN  
A HUNDRED KILOMETERS OF THE EARTHQUAKE EPICENTER. AUTHORITIES  
IN THE REGION OF THE EPICENTER SHOULD BE AWARE OF THIS  
POSSIBILITY AND TAKE APPROPRIATE ACTION.

THIS WILL BE THE ONLY BULLETIN ISSUED FOR THIS EVENT UNLESS  
ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS  
FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

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## Appendix C: West Coast/Alaska Tsunami Warning Center – Bulletin Number 2

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WEPA41 PAAQ 150409

TSUWCA

TO - TSUNAMI WARNING SYSTEM PARTICIPANTS IN  
ALASKA/BRITISH COLUMBIA/WASHINGTON/OREGON/CALIFORNIA  
FROM - WEST COAST AND ALASKA TSUNAMI WARNING CENTER/NOAA/NWS  
SUBJECT - TSUNAMI WARNING BULLETIN - FINAL (CORRECTED COPY)  
BULLETIN NUMBER 2  
ISSUED 06/15/2005 AT 0409 UTC

...THE TSUNAMI WARNING AND WATCH STATUS IS CANCELED FOR  
CALIFORNIA - OREGON - WASHINGTON - BRITISH COLUMBIA - AND  
ALASKA...

EARTHQUAKE DATA  
PRELIMINARY MAGNITUDE - 7.4  
LOCATION - 41.4N 125.6W - 85 MILES NW OF EUREKA-CA.  
300 MILES NW OF SAN FRANCISCO-CA.  
TIME - 1851 ADT 06/14/2005  
1951 PDT 06/14/2005  
0251 UTC 06/15/2005

WATER LEVELS REMAIN NORMAL AT ALL COASTAL SITES.  
NO WAVE HAS BEEN DETECTED.

EVALUATION  
NO TSUNAMI DANGER EXISTS FOR ALASKA - BRITISH COLUMBIA -  
WASHINGTON - OREGON OR CALIFORNIA. HOWEVER SOME AREAS MAY  
EXPERIENCE SMALL SEA LEVEL CHANGES. AS LOCAL CONDITIONS  
CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL  
CLEAR DETERMINATIONS MUST BE MADE BY LOCAL AUTHORITIES.

\$\$  
PKZ032-031-042-034-033-035-041-036-PZZ130-131-133-134-132-  
135-150-153-156-110-250-210-255-350-353-356-450-455-550-  
530-535-555-670-673-650-655-750-AKZ023-024-025-026-028-029-  
027-WAZ001-002-005-006-007-008-009-010-011-013-014-015-016-  
021-ORZ001-002-021-022-CAZ001-002-005-007-006-075-074-009-  
034-035-039-040-046-041-042-043-150549-  
COASTAL AREAS OF CALIFORNIA - OREGON - WASHINGTON - BRITISH  
COLUMBIA - AND ALASKA.

...THE TSUNAMI WARNING AND WATCH STATUS IS CANCELED FOR  
CALIFORNIA - OREGON - WASHINGTON - BRITISH COLUMBIA - AND  
ALASKA...

\$\$  
THE PACIFIC TSUNAMI WARNING CENTER WILL ISSUE A FINAL BULLETIN.  
THIS WILL BE THE LAST WEST COAST AND ALASKA TSUNAMI WARNING  
CENTER WATCH/WARNING BULLETIN ISSUED FOR THIS EVENT.  
THIS INFORMATION IS ALSO POSTED AT WCATWC.ARH.NOAA.GOV.  
\$\$

**Enrolled  
Senate Bill 557**

Sponsored by Senator MORRISETTE; Senators KRUSE, RINGO, SHIELDS, C STARR, VERGER,  
Representatives BOONE, KRIEGER, ROBLAN

CHAPTER .....

AN ACT

Relating to tsunami warning system; and prescribing an effective date.

**Be It Enacted by the People of the State of Oregon:**

**SECTION 1. { + (1) As used in this section:**

(a) 'Transient lodging facility' means a hotel, motel, inn, condominium, any other dwelling unit or a public or private park that is made available for transient occupancy or vacation occupancy as those terms are defined in ORS 90.100.

(b) 'Tsunami inundation zone' means an area of expected tsunami inundation, based on scientific evidence that may include geologic field data and tsunami modeling, determined by the governing board of the State Department of Geology and Mineral Industries, by rule, as required by ORS 455.446 (1)(b) and (c).

(2) The Office of Emergency Management, in consultation and cooperation with the State Department of Geology and Mineral Industries, shall:

(a) Develop and adopt by rule tsunami warning information and evacuation plans for distribution to transient lodging facilities located in a tsunami inundation zone; and

(b) Facilitate and encourage broad distribution of the tsunami warning information and evacuation plans to transient lodging facilities and other locations within tsunami inundation zones frequented by visitors to the area.

(3) The office is not required to carry out the duties assigned under subsection (2) of this section if sufficient moneys are not available under section 4 of this 2005 Act. + }

**SECTION 2. { + (1) The Office of Emergency Management, in consultation with the State Department of Geology and Mineral Industries, shall establish by rule a uniform tsunami warning signal, including rules specifying the type, duration and volume of the warning signal and the location of warning signal delivery devices, for use on the Oregon coast.**

(2) The office is not required to carry out the duties assigned under subsection (1) of this section if sufficient moneys are not available under section 4 of this 2005 Act. + }

**SECTION 3. { + Except as provided in sections 1 (3) and 2 (2) of this 2005 Act, the Office of Emergency Management shall adopt the rules required by sections 1 (2)(a) and 2 (1) of this 2005 Act not later than March 1, 2006. + }**

**SECTION 4. { + The Office of Emergency Management or the State Department of Geology and Mineral Industries may seek and accept gifts, grants and donations from any source to finance all or part of the duties assigned under sections 1 and 2 of this 2005 Act. + }**

**SECTION 5. { + This 2005 Act takes effect on the 91st day after the date on which the regular session of the Seventy-third Legislative Assembly adjourns sine die. + }**

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**Passed by Senate July 30, 2005**

.....  
Secretary of Senate

.....  
President of Senate

**Passed by House August 2, 2005**

.....  
Speaker of House

**Received by Governor**

.....M.,.....,2005

**Approved:**

.....M.,.....,2005

.....  
Governor

**Filed in Office of Secretary of State**

.....M.,.....,2005

.....  
Secretary of State