Tsunami Emergency Guidebook for Oregon Mass Media

Oregon
Emergency
Management

ISSUE DATE: SEPTEMBER 2007

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Introduction

The Pacific Coast of Oregon is at risk from tsunamis. These destructive waves can be caused by coastal or submarine landslides or volcanism, but they are most commonly caused by large submarine earthquakes.

Tsunamis are generated when these geologic events cause large, rapid movements in the sea floor that displace the water column above. That swift change creates a series of high-energy waves that radiate outward like pond ripples. Local offshore tsunamis would strike the adjacent shorelines within minutes. The Pacific Coast is at risk both from locally and distantly generated tsunamis.

Tsunami waves can continue for hours. The first wave can be followed by others a few minutes or a few hours later, and the later waves are commonly larger.

Warnings

When an earthquake that might generate a Pacific Coast tsunami is detected, the West Coast/ Alaska Tsunami Warning Center calculates the danger to the north-east Pacific Coast and notifies the states and communities at risk. If the earthquake occurs off our coast, however, there may be no time to send out hazard warnings. The first waves could arrive within 30 minutes of the earthquake. The only tsunami warning might be the earthquake itself.

Broadcasters

This guidebook provides a concise overview of the notification process used to send tsunami alerts to public information broadcasters, local jurisdictions and the public. It includes a Tsunami Warning Flow Chart that shows how information is sent to broadcasters, a contact list of tsunami experts who can provide credible tsunami information during a tsunami event, and Oregon coastal community evacuation maps of regions most susceptible to tsunamis.

One CD-ROM and one DVD accompany this guidebook (located in the binder sleeves): Tsunami evacuation brochures published by the Oregon Department of Geology and Mineral Industries and U.S. National Tsunami Hazard Mitigation Program Selected Interviews.

Coastal Tsunami Evacuation Maps

Oregon coast maps appear in geographic order. Each map includes a symbol key that pinpoints tsunami hazard zones, evacuation routes, and safer assembly areas for people.

Tsunami Warning Flow Chart

HOW THE TSUNAMI WARNING SYSTEM WORKS

West Coast / Alaska Tsunami Warning Center (Palmer, Alaska)

→ ***TSUNAMI WARNING MESSAGE*** →

NWS sends Tsunami EAS Message
State OERS *and*
Local Jurisdictions *and*
Broadcasters *and*
Public (via NOAA Weather Radio)

↓

State OERS

1. **Relays NWS Tsunami Warning**
2. **Issues Supplemental Tsunami EAS**

To: **County Warning Points**
Broadcasters
Public

↓

County and Local Warning Points

1. **Contact Local Emergency Officials**
2. **Have Evacuation Authority**
3. **Conduct Emergency Operations**

↓

Tsunami Warning Cancellation
Issued by West Coast/Alaska Tsunami Warning Center

All Clear/Re-entry Notification
Issued by Local Emergency Officials

Oregon Emergency Management

WC/ATWC: West Coast/Alaska Tsunami Warning Center
OERS: Oregon Emergency Response System
NWS: National Weather Service Coastal Offices
EAS: Emergency Alert System

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Subject Matter Expert Contacts

Federal Government

TSUNAMI NUMERICAL MODELING

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atwater@usgs.gov_
Tel: (206) 553-2927

State of Oregon

EARTH SCIENCES INFORMATION OFFICER

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Fax: (541) 265-5241

Subject Matter Expert Contacts

TSUNAMI WARNING CENTER

West Coast/Alaska Tsunami Warning Center

PALMER, ALASKA
Tel: (907) 745-4212
(Warning Center)

ANCHORAGE, ALASKA
Tel: (907) 271-4767
(NWS Alaska Region PIO)

EMERGENCY ALERT SYSTEM (EAS)

National Weather Service

PORTLAND
Tel: (503) 261-9248
(unlisted media line)

MEDFORD
Tel: (541) 773-1525
(unlisted media line)

Oregon Emergency Management

EXECUTIVE DUTY OFFICER
Oregon Emergency Response System (OERS)
Tel: (503) 378-6377

Tsunami Bulletin (Example)

From West Coast/Alaska Tsunami Warning Center

BULLETIN
PUBLIC TSUNAMI MESSAGE NUMBER 1
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
1241 PM PST SAT DEC 17 2005

... THIS MESSAGE IS FOR TEST PURPOSES TO SHOW AN EXAMPLE
WEAK51 MESSAGE...

... A TEST TSUNAMI WARNING IS IN EFFECT WHICH INCLUDES THE CALIFORNIA – OREGON – WASHINGTON – BRITISH COLUMBIA AND ALASKA COASTAL AREAS FROM POINT ARENA CALIFORNIA TO SITKA ALASKA...

... A TEST TSUNAMI WATCH IS IN EFFECT FOR THE CALIFORNIA COASTAL AREAS FROM POINT CONCEPTION CALIFORNIA TO POINT ARENA CALIFORNIA AND FOR THE ALASKA COASTAL AREAS FROM SITKA ALASKA TO YAKUTAT ALASKA...

A TSUNAMI WARNING MEANS... ALL COASTAL RESIDENTS IN THE WARNING AREA WHO ARE NEAR THE BEACH OR IN LOW-LYING REGIONS SHOULD MOVE IMMEDIATELY INLAND TO HIGHER GROUND AND AWAY FROM ALL HARBORS AND INLETS INCLUDING THOSE SHELTERED DIRECTLY FROM THE SEA. THOSE FEELING THE EARTH SHAKE... SEEING UNUSUAL WAVE ACTION... OR THE WATER LEVEL RISING OR RECEDING MAY HAVE ONLY A FEW MINUTES BEFORE THE TSUNAMI ARRIVAL AND SHOULD EVACUATE IMMEDIATELY. HOMES AND SMALL BUILDINGS ARE NOT DESIGNED TO WITHSTAND TSUNAMI IMPACTS. DO NOT STAY IN THESE STRUCTURES.

ALL RESIDENTS WITHIN THE WARNED AREA SHOULD BE ALERT FOR INSTRUCTIONS BROADCAST FROM THEIR LOCAL CIVIL AUTHORITIES. THIS TSUNAMI WARNING IS BASED SOLELY ON EARTHQUAKE INFORMATION — THE TSUNAMI HAS NOT YET BEEN CONFIRMED.

(continued next page)

A TSUNAMI WATCH MEANS... ALL COASTAL RESIDENTS IN THE WATCH AREA SHOULD PREPARE FOR POSSIBLE EVACUATION. A TSUNAMI WATCH IS ISSUED TO AN AREA WHICH WILL NOT BE IMPACTED BY THE TSUNAMI FOR AT LEAST TWO HOURS. WATCH AREAS WILL EITHER BE UPGRADED TO WARNING STATUS OR CANCELED.

AT 1230 PM PACIFIC STANDARD TIME ON DECEMBER 17 AN EARTHQUAKE WITH PRELIMINARY MAGNITUDE 7.3 OCCURRED 40 MILES SOUTHEAST OF PORT ALICE BRITISH COLUMBIA.

THIS EARTHQUAKE MAY HAVE GENERATED A TSUNAMI. IF A TSUNAMI HAS BEEN GENERATED THE WAVES WILL FIRST REACH TOFINO BRITISH COLUMBIA AT 127 PM PST ON DECEMBER 17. ESTIMATED TSUNAMI ARRIVAL TIMES AND MAPS ALONG WITH SAFETY RULES AND OTHER INFORMATION CAN BE FOUND ON THE WEB SITE WCATWC.ARH.NOAA.GOV.

TSUNAMIS CAN BE DANGEROUS WAVES THAT ARE NOT SURVIVABLE. WAVE HEIGHTS ARE AMPLIFIED BY IRREGULAR SHORELINE AND ARE DIFFICULT TO PREDICT. TSUNAMIS OFTEN APPEAR AS A STRONG SURGE AND MAY BE PRECEDED BY A RECEDING WATER LEVEL. MARINERS IN WATER DEEPER THAN 600 FEET SHOULD NOT BE AFFECTED BY A TSUNAMI. WAVE HEIGHTS WILL INCREASE RAPIDLY AS WATER SHALLOWS. TSUNAMIS ARE A SERIES OF OCEAN WAVES WHICH CAN BE DANGEROUS FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL. DO NOT RETURN TO EVACUATED AREAS UNTIL AN ALL CLEAR IS GIVEN BY LOCAL CIVIL AUTHORITIES.

THE PACIFIC TSUNAMI WARNING CENTER WILL ISSUE TSUNAMI BULLETINS FOR HAWAII AND OTHER AREAS OF THE PACIFIC OUTSIDE CALIFORNIA / OREGON / WASHINGTON / BRITISH COLUMBIA AND ALASKA.

ADDITIONAL BULLETINS WILL BE ISSUED HALF-HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE. FOR FURTHER INFORMATION STAY TUNED TO NOAA WEATHER RADIO... YOUR LOCAL TV OR RADIO STATIONS... OR SEE THE WEB SITE WATC.ARH.NOAA.GOV.

THIS IS A TEST MESSAGE. DO NOT TAKE ACTION BASED ON THIS TEST MESSAGE.
$$

Tsunami Bulletin (EAS Protocol)

From Oregon Emergency Response System

The purpose of this section is to provide guidance for stations to participate in the event of a tsunami warning. The purpose is to provide the warnings to the people in the coastal areas of the following coastal counties:

Clatsop
Tillamook
Lincoln
Lane
Douglas
Coos
Curry

The goal is to reach people that live, work and visit in or near the impacted areas by broadcasting alerts on all of the stations received in those areas. This will include some of the stations that broadcast from the inland valleys as well.

The broadcaster's role during a tsunami alert will consist of multiple alerts. This type of an event can leave the public confused as to if this event is real and as a consequence, the following sequence of actions fulfills the purpose of providing alerting that states the same message from multiple authorities. The sequence of alerts is outlined as follows:

1. The first alert will be broadcast from the National Weather Service (NWS) on the NOAA Weather Radio. It is considered that once the NWS has made the decision to issue the alert, a considerable knowledge exists that this event could have an effect on the lives of people along the coast. The event code used will be TSW.

2. It is conceivable that some NOAA transmitters may not function during the event. Also some stations may not be able to receive these alerts from NOAA transmitters either directly or relayed by a primary station. To cover this scenario, the Oregon Emergency Response System, will issue a second alert using the TSW event code.

3. The third alert is an optional alert for the use by local emergency officials. In Oregon, only local emergency officials are authorized to order an evacuation which is the final result of a tsunami event. These would be transmitted by local relay networks and use the EVI event code.

Know the terms used by the West Coast/Alaska Tsunami Warning Center

Tsunami Warning

A Tsunami Warning is issued by the Tsunami Warning Centers when a potential tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

Tsunami Watch

A Tsunami Watch is issued by the Tsunami Warning Centers to alert emergency management officials and the public of an event that may later impact the Watch area. The Watch area may be upgraded to a Warning or Advisory (or canceled) based on updated information and analysis. Therefore, emergency management officials and the public should prepare to take action. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway.

Know the terms used by the West Coast/Alaska Tsunami Warning Center

Tsunami Advisory

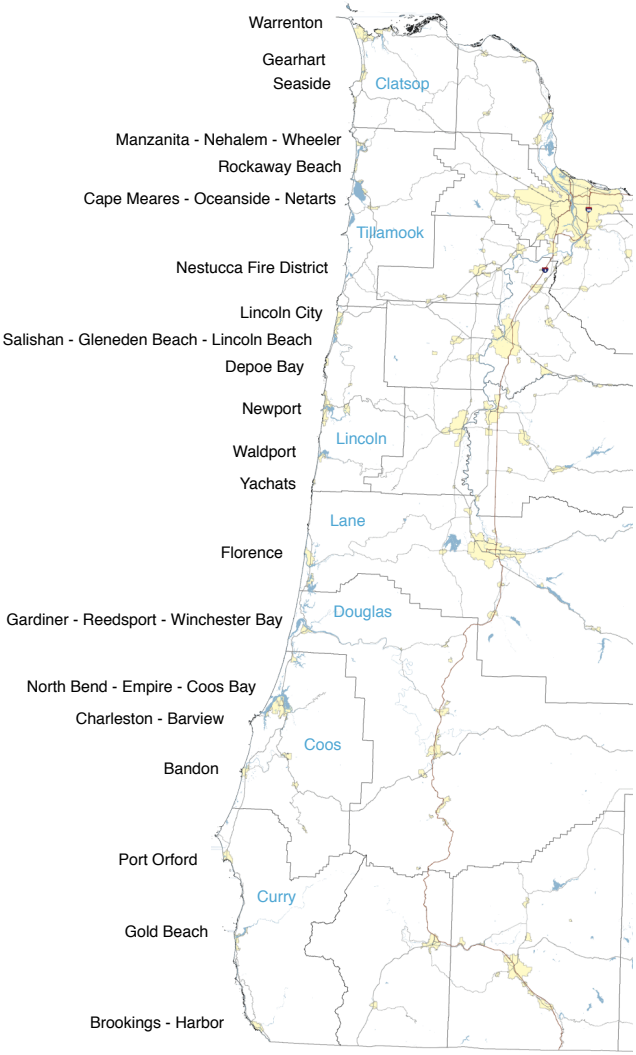
A Tsunami Advisory is issued by the Tsunami Warning Centers due to the threat of a potential tsunami that may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, but significant widespread inundation is not expected for areas under an Advisory. Appropriate actions to be taken by local officials may include closing beaches, evacuating harbors and marinas, and the repositioning of ships to deep waters when there is time to safely do so. Advisories are normally updated to continue the Advisory, expand/contract affected areas, upgrade to a Warning, or cancel the Advisory.

Information Statement

An Information Statement is issued to inform emergency management officials and the public that an earthquake has occurred. In most cases, Information Statements are issued to indicate there is no threat of a destructive tsunami affecting the issuing Tsunami Warning Center's Area of Responsibility and to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. An Information Statement may, in appropriate situations, caution about the possibility of destructive local tsunamis. Information Statements may be re-issued with additional information, though normally these messages are not updated. However, a Watch, Advisory or Warning may be issued for the area, if necessary, after analysis and/or updated information becomes available.

Oregon Coast

Tsunami Evacuation Maps for the listed communities appear on the following pages in geographic order from north to south



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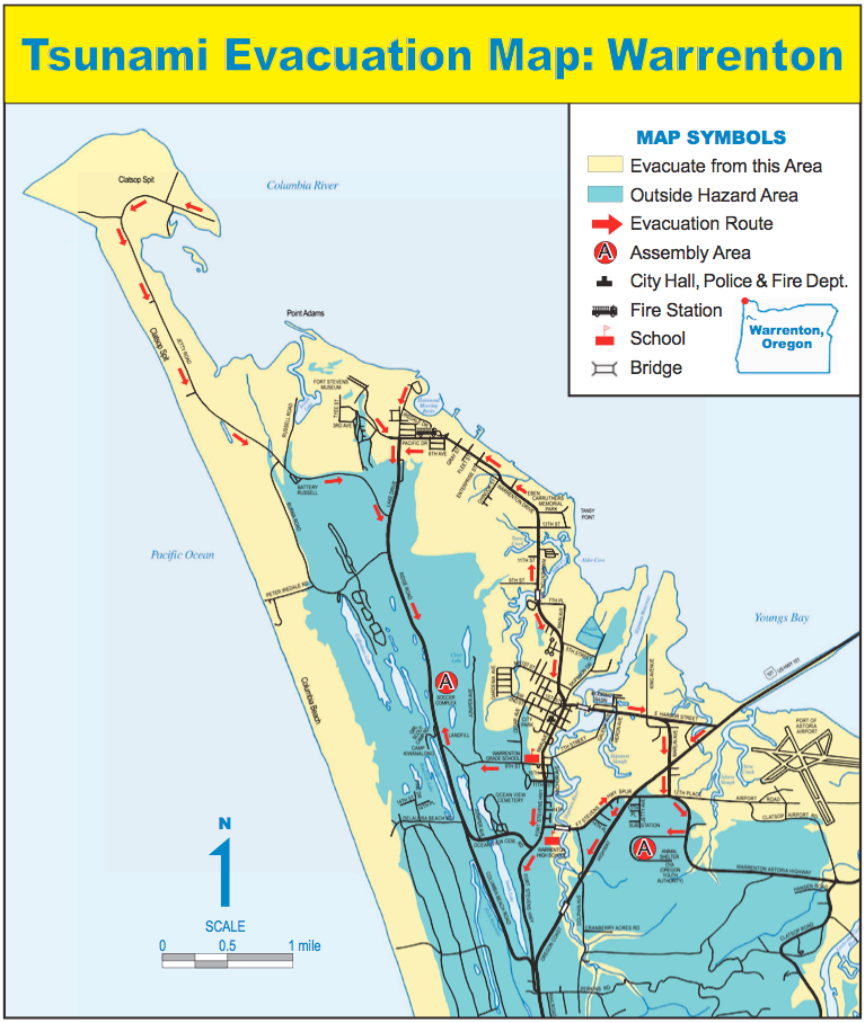
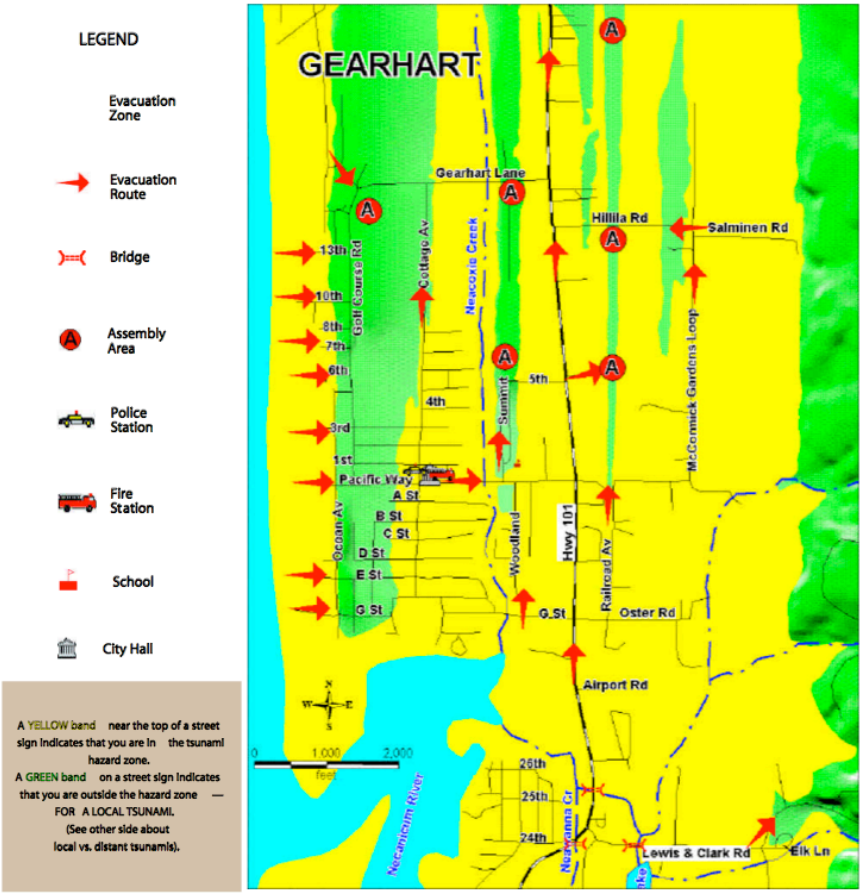
Clatsop County

Warrenton



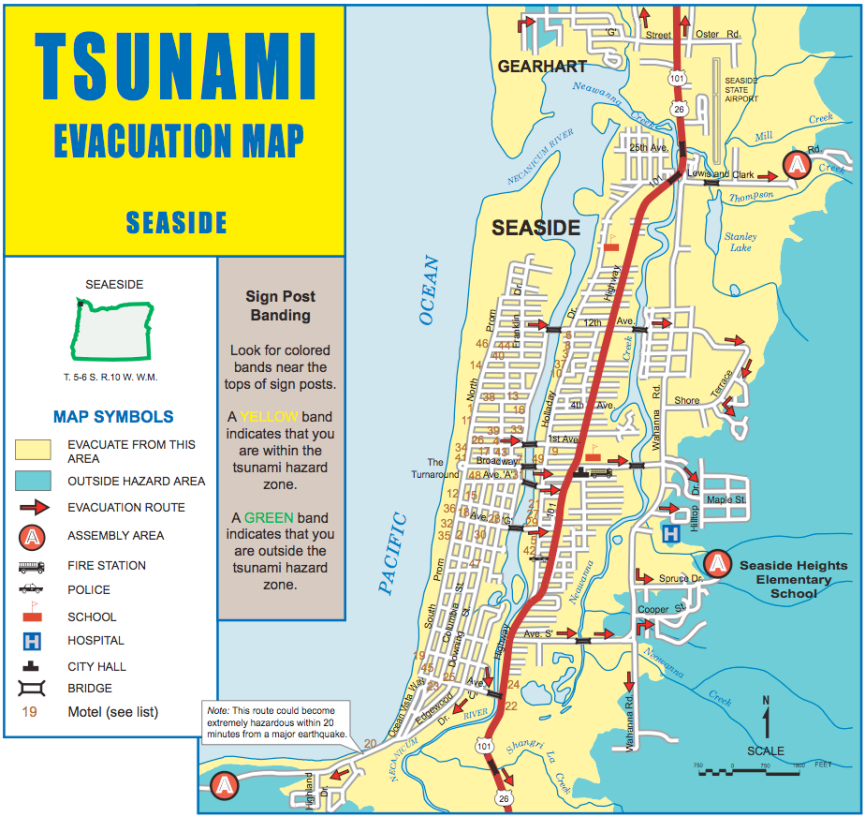
Clatsop County

Gearhart



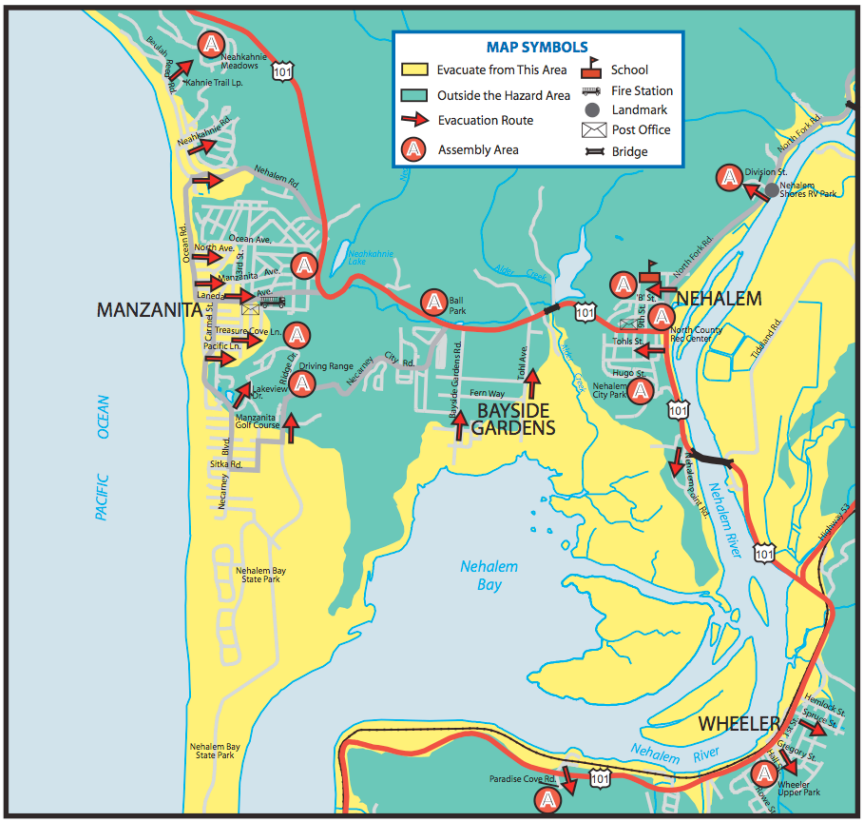
Clatsop County

Seaside



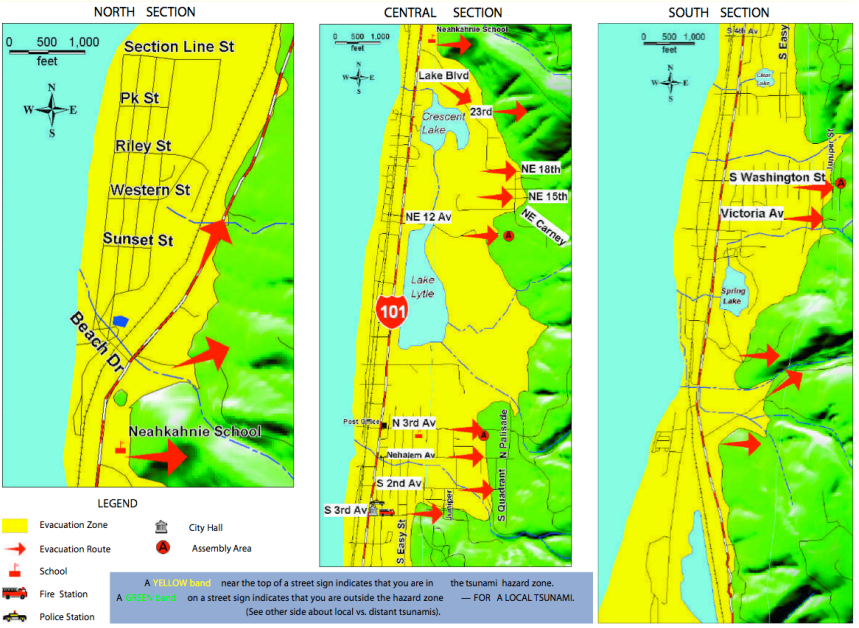
Tillamook County

Manzanita - Nehalem - Wheeler



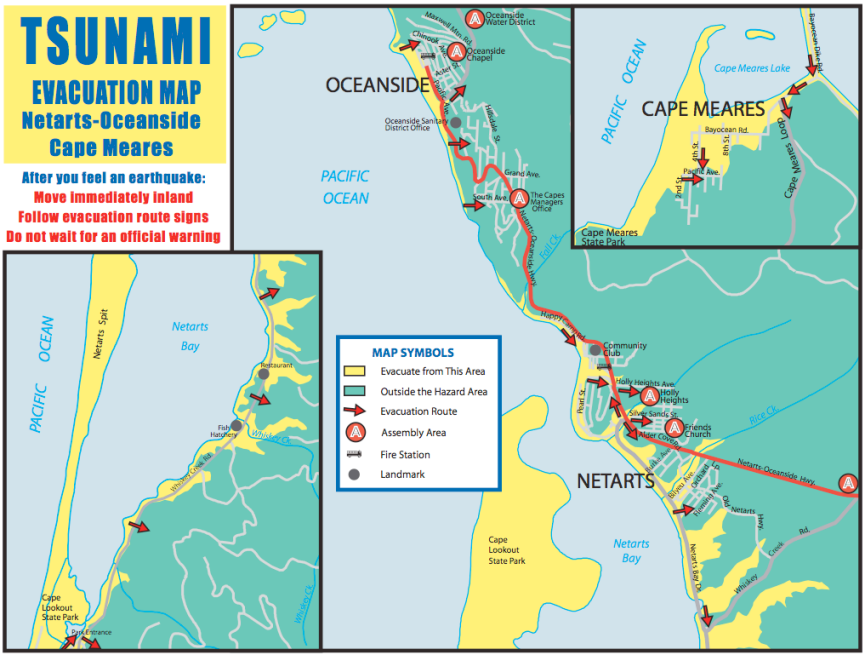
Tillamook County

Rockaway Beach



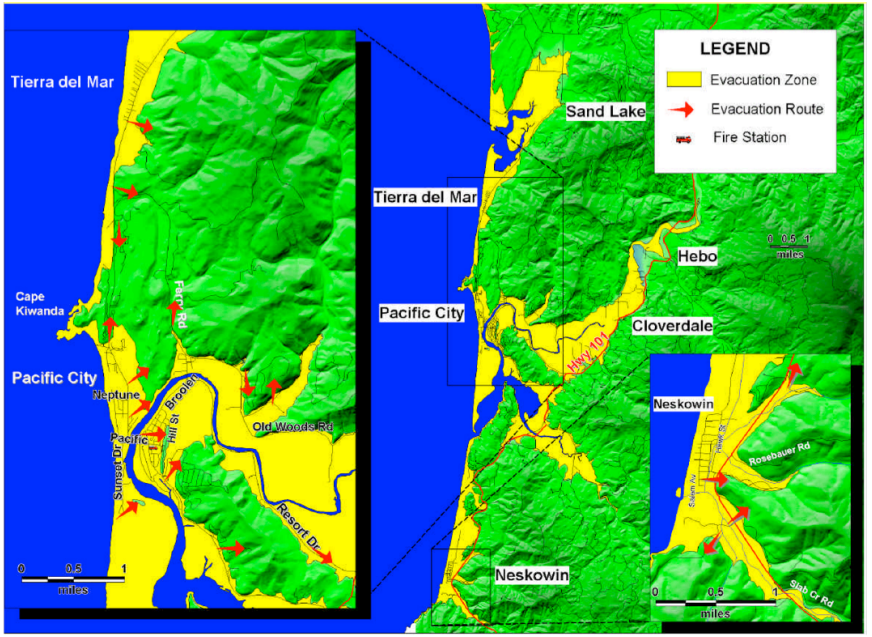
Tillamook County

Cape Meares - Oceanside - Netarts



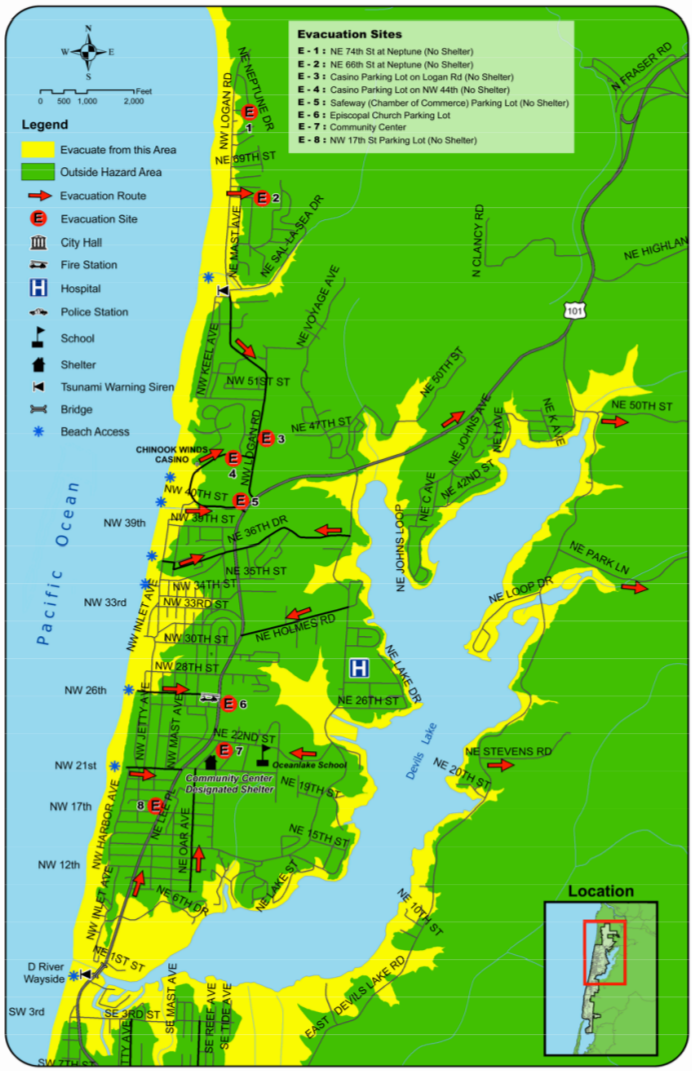
Tillamook County

Nestucca Fire District - South County



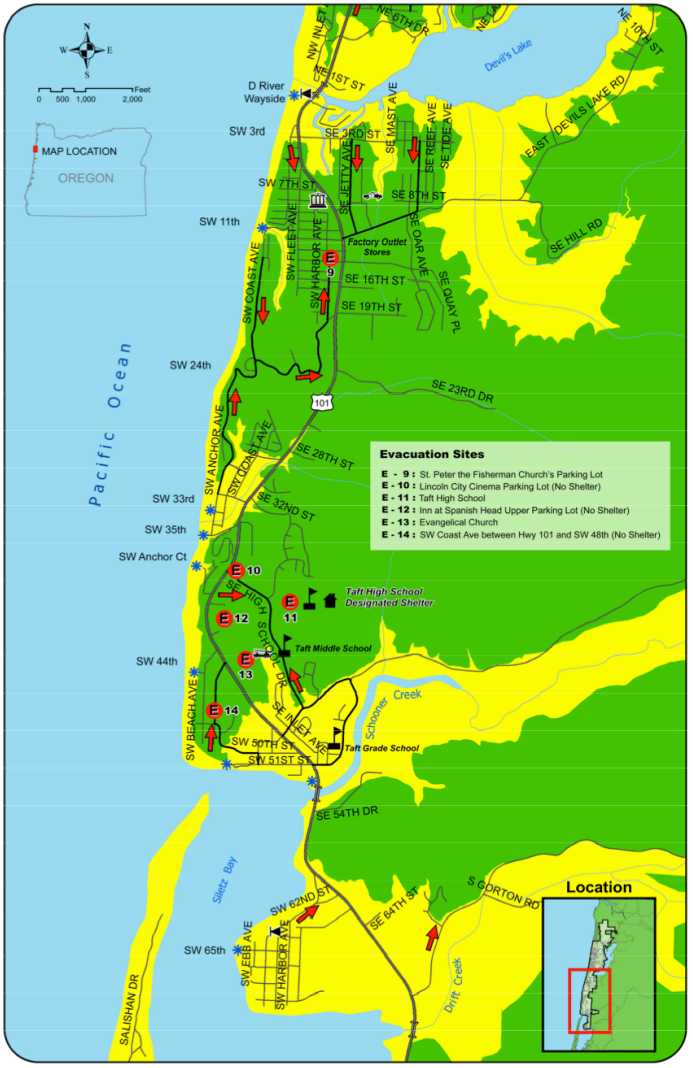
Lincoln County

Lincoln City North



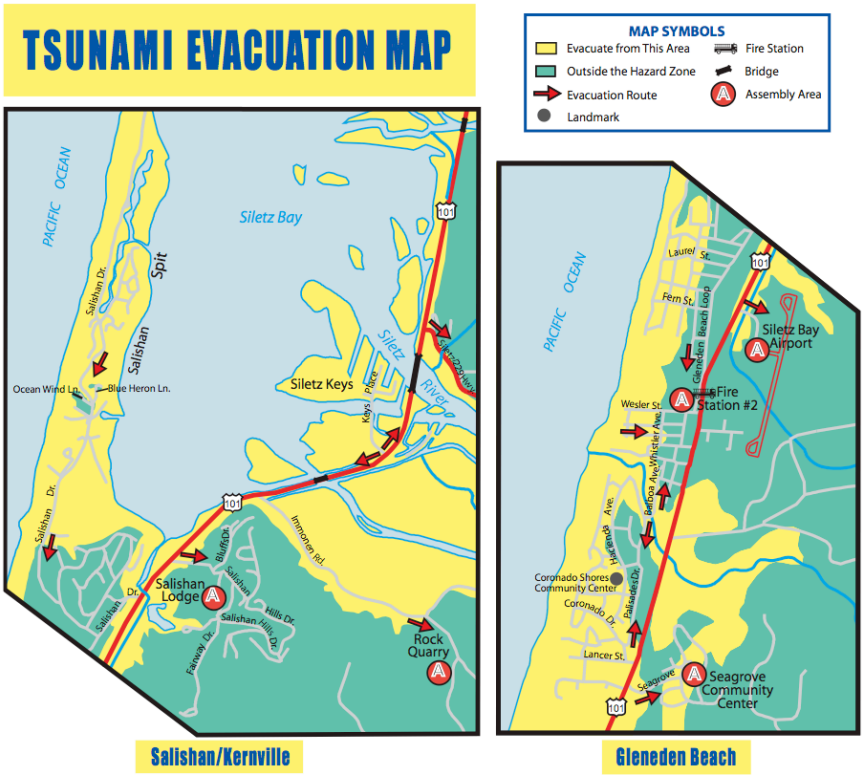
Lincoln County

Lincoln City South



Lincoln County

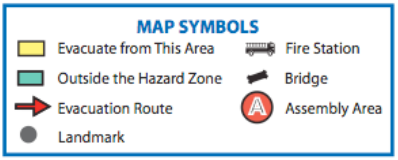
Salishan / Kernville - Gleneden Beach



Lincoln County

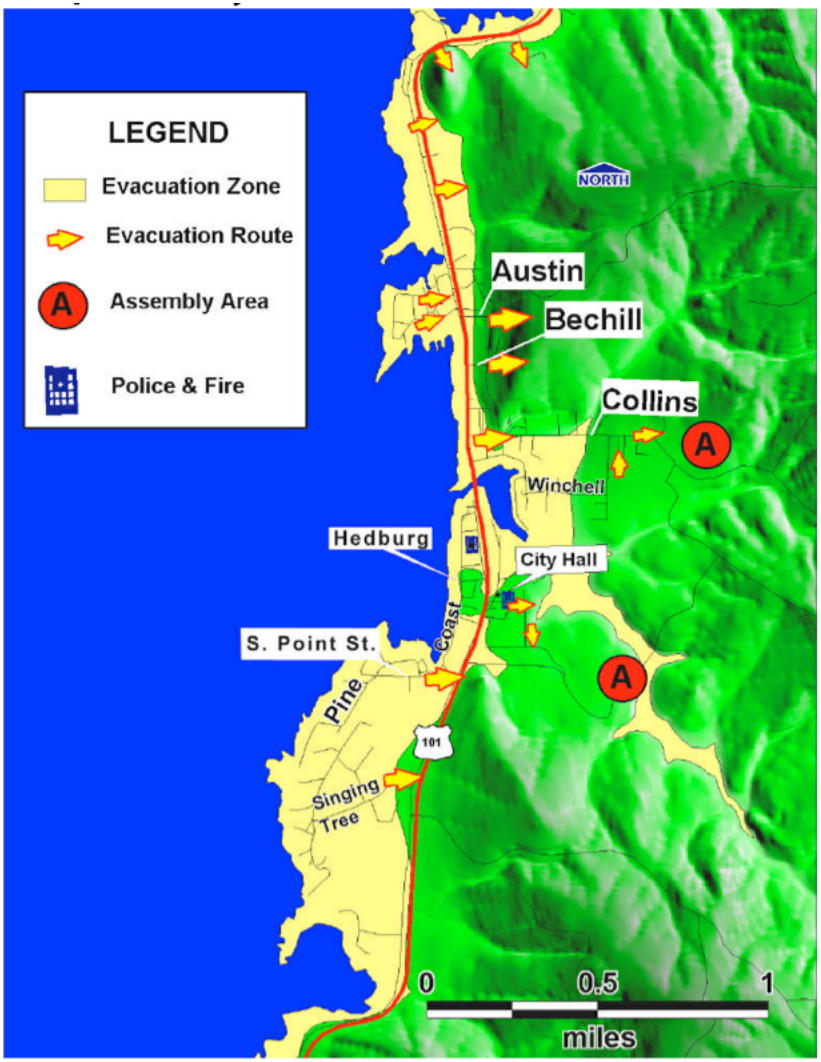
Lincoln Beach

Lincoln Beach



Lincoln County

Depoe Bay

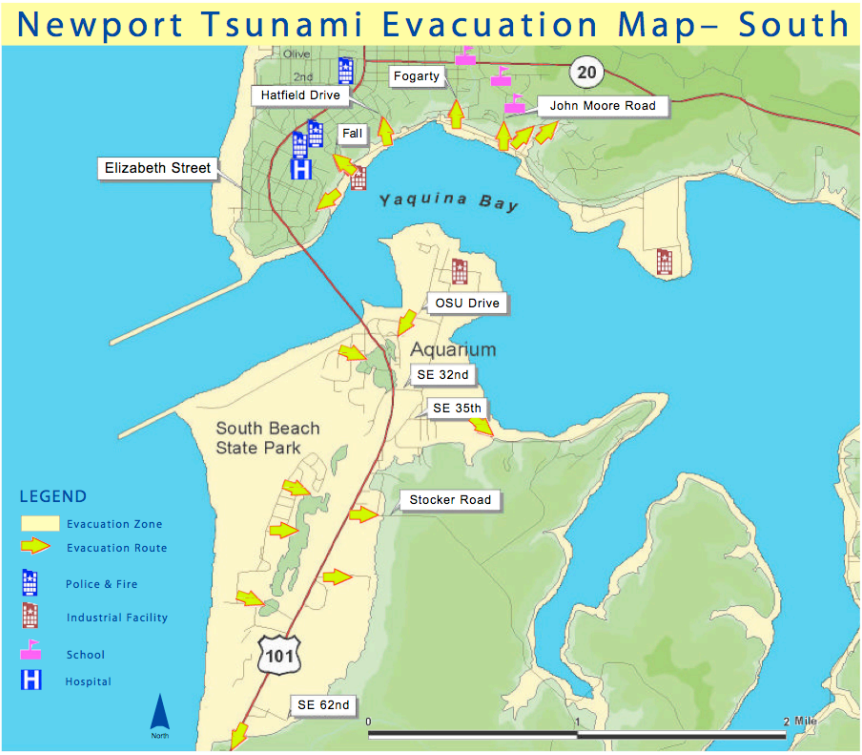


Lincoln County

Newport

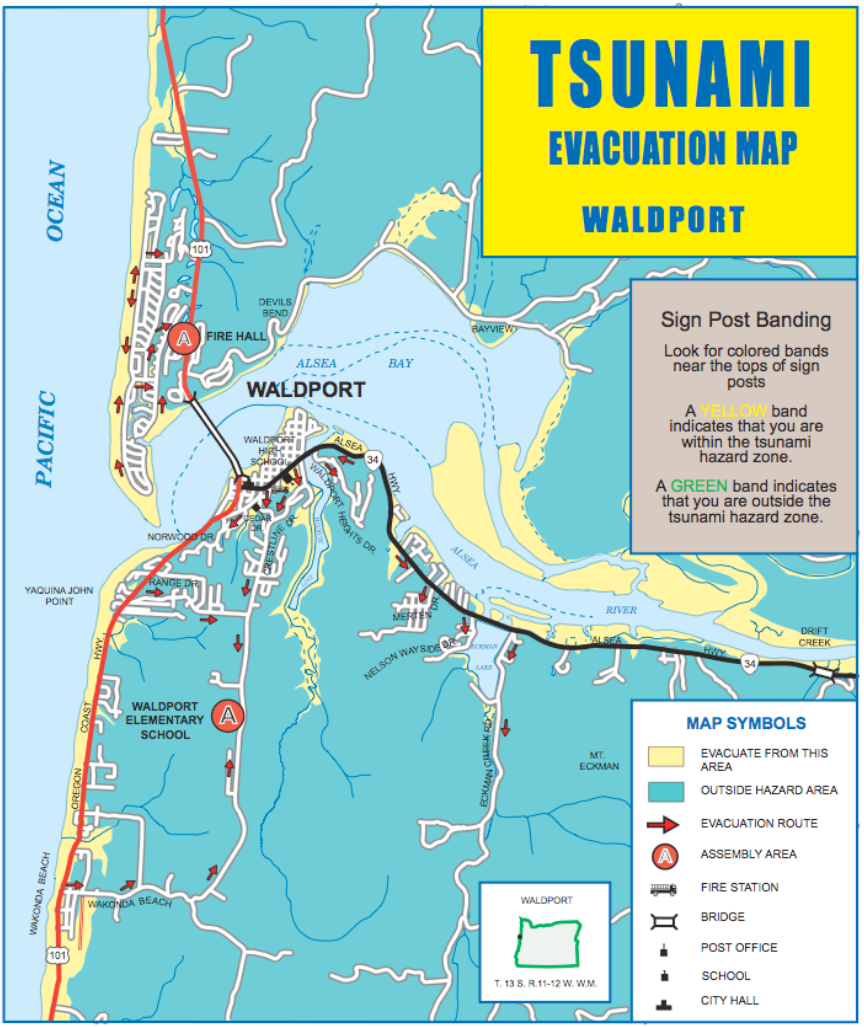
Lincoln County

Newport



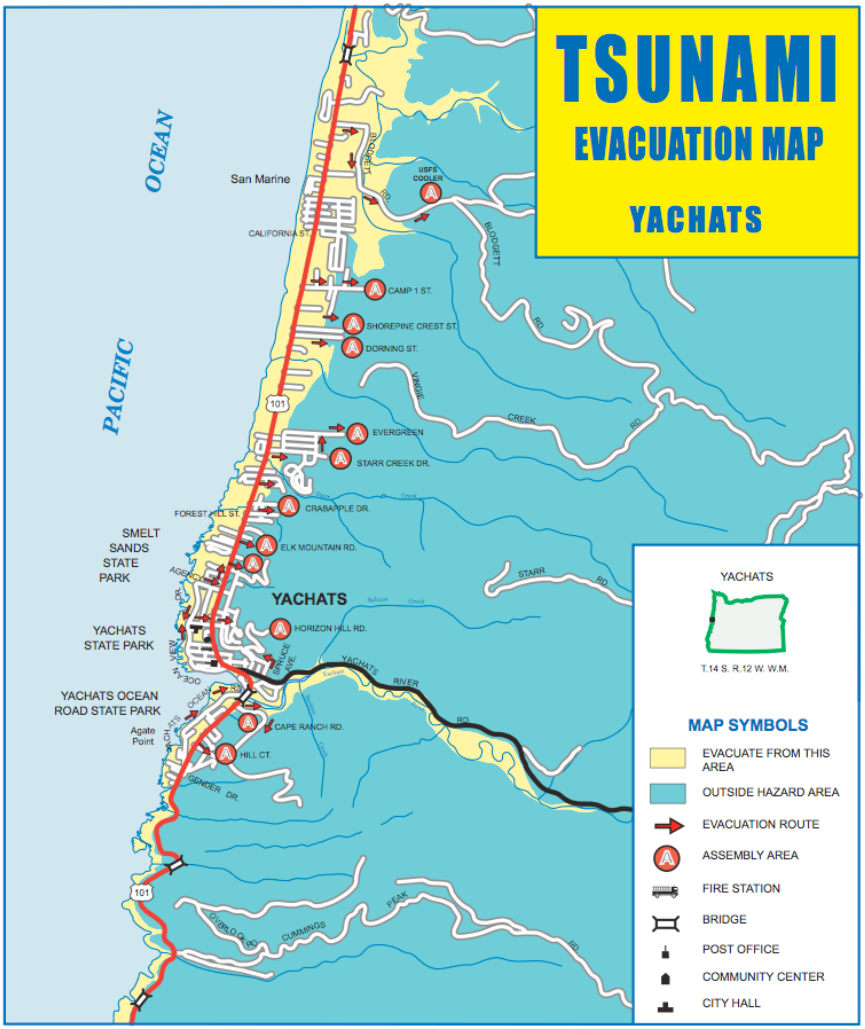
Lincoln County

Waldport



Lincoln County

Yachats

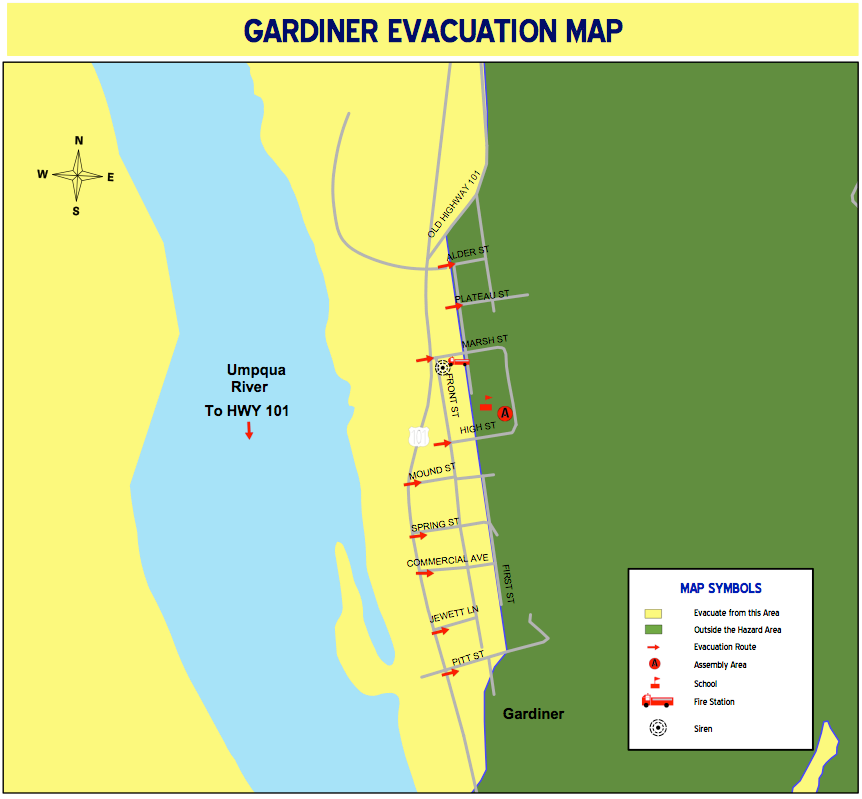


Lane County

Florence

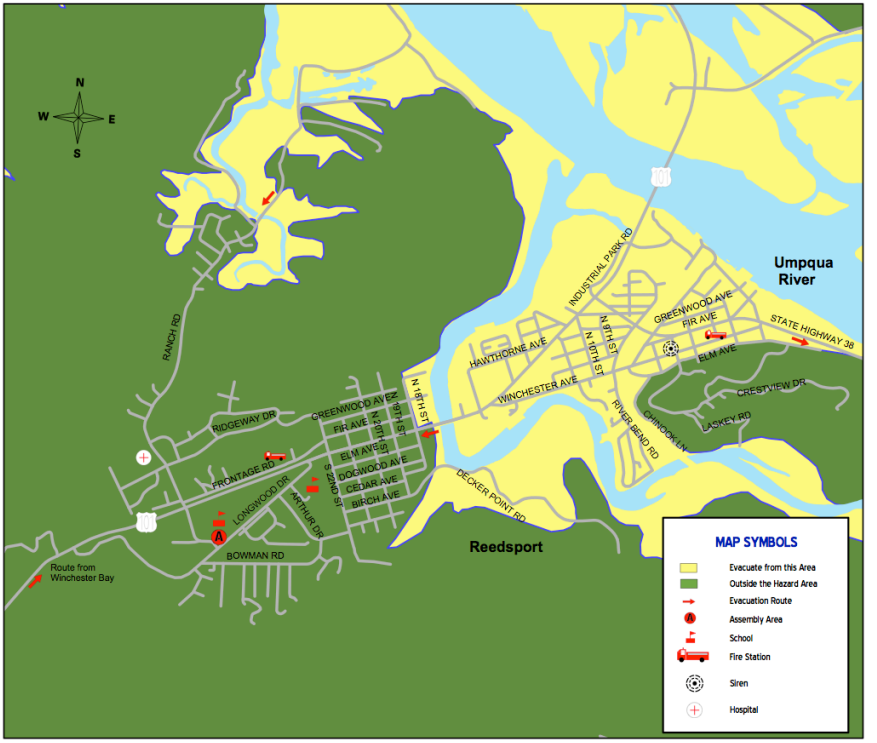
Douglas County

Gardiner



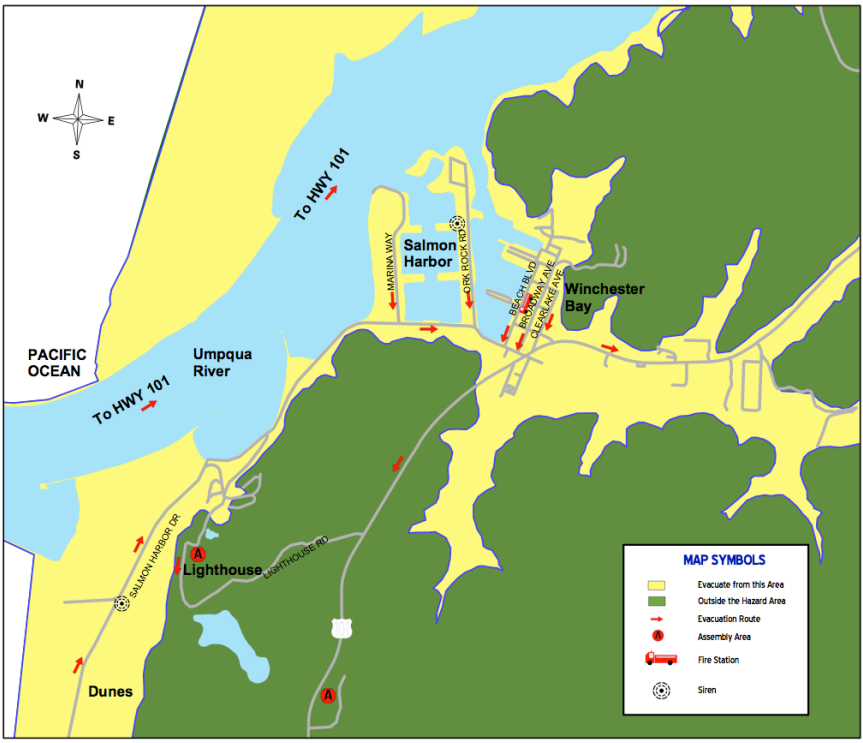
Douglas County

Reedsport



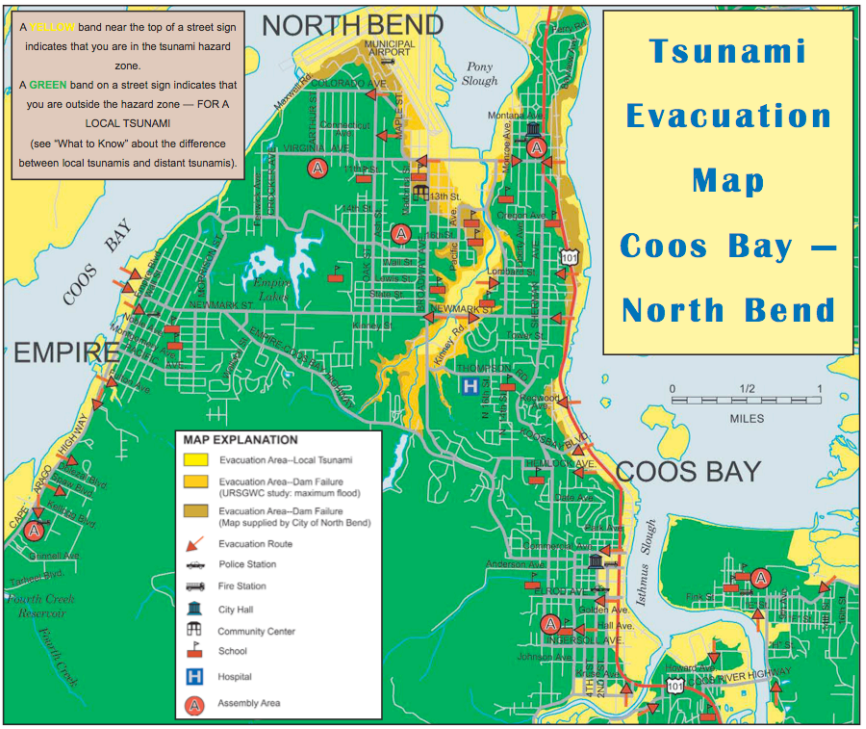
Douglas County

Winchester Bay



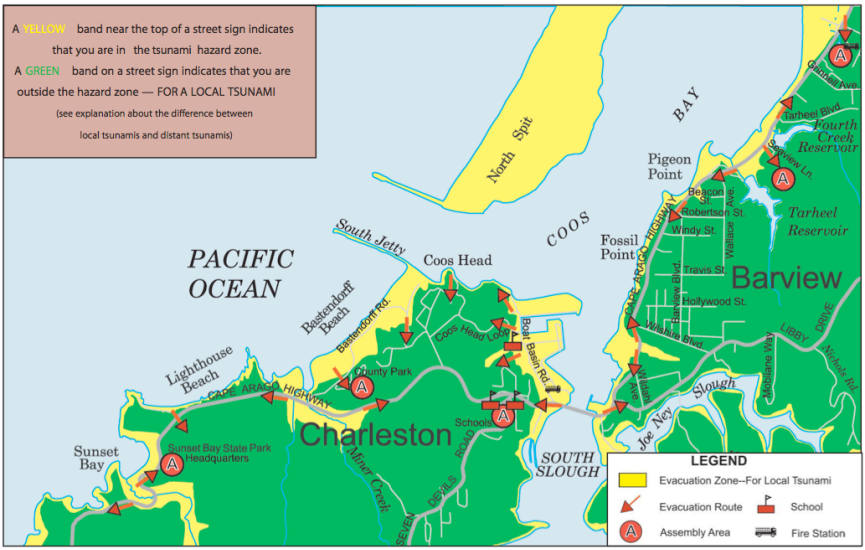
Coos County

North Bend - Empire - Coos Bay



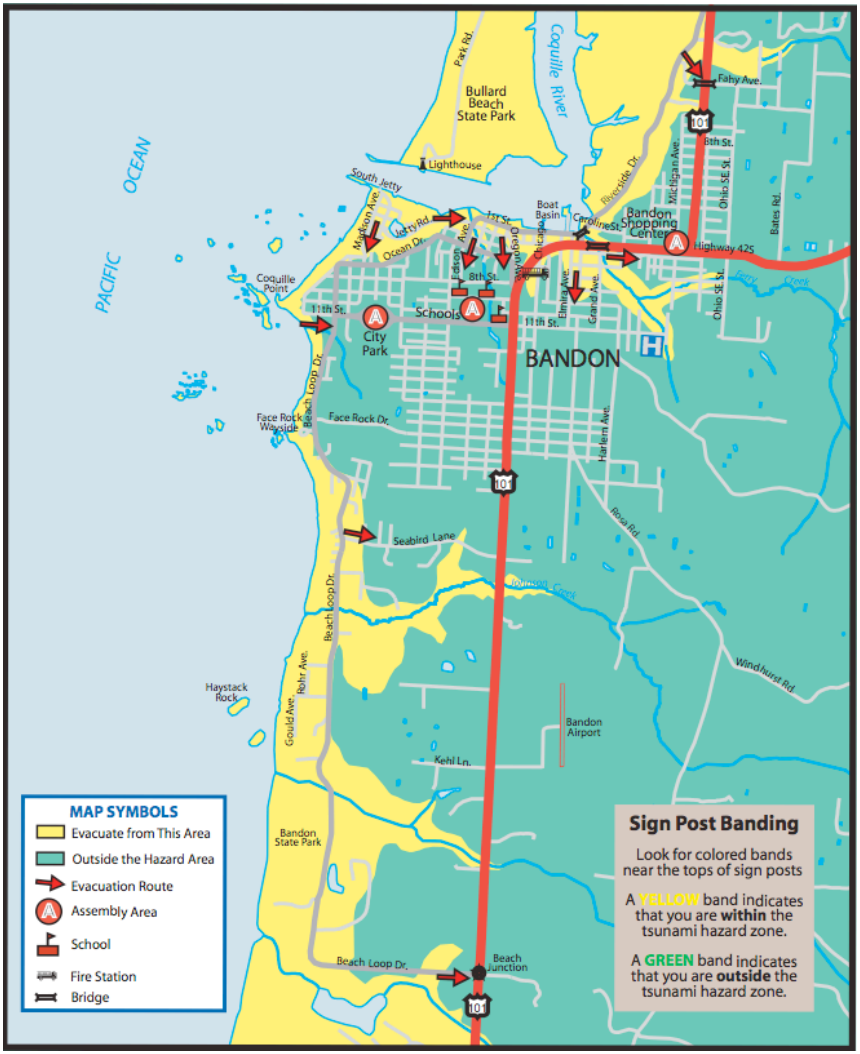
Coos County

Charleston - Barview



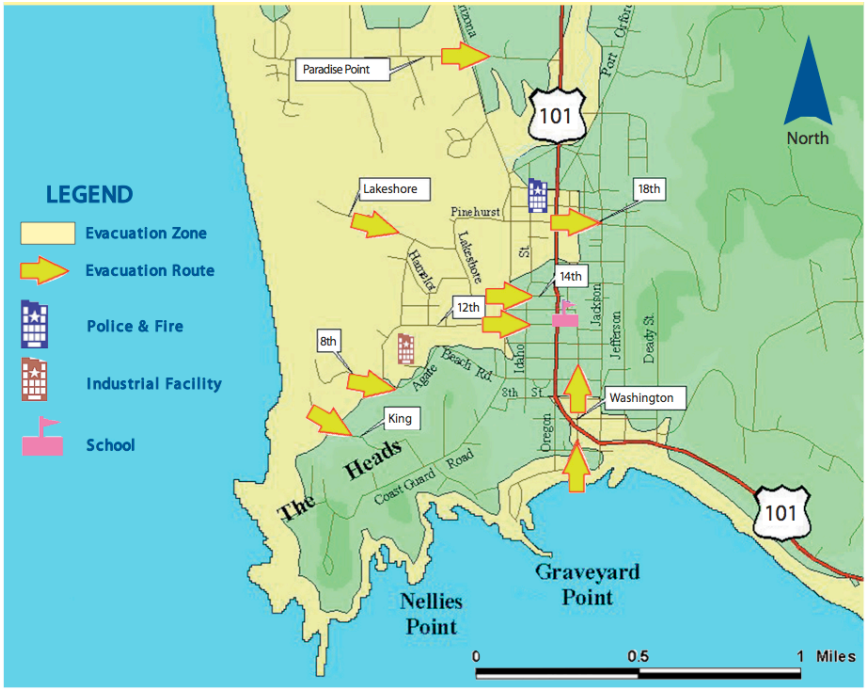
Coos County

Bandon



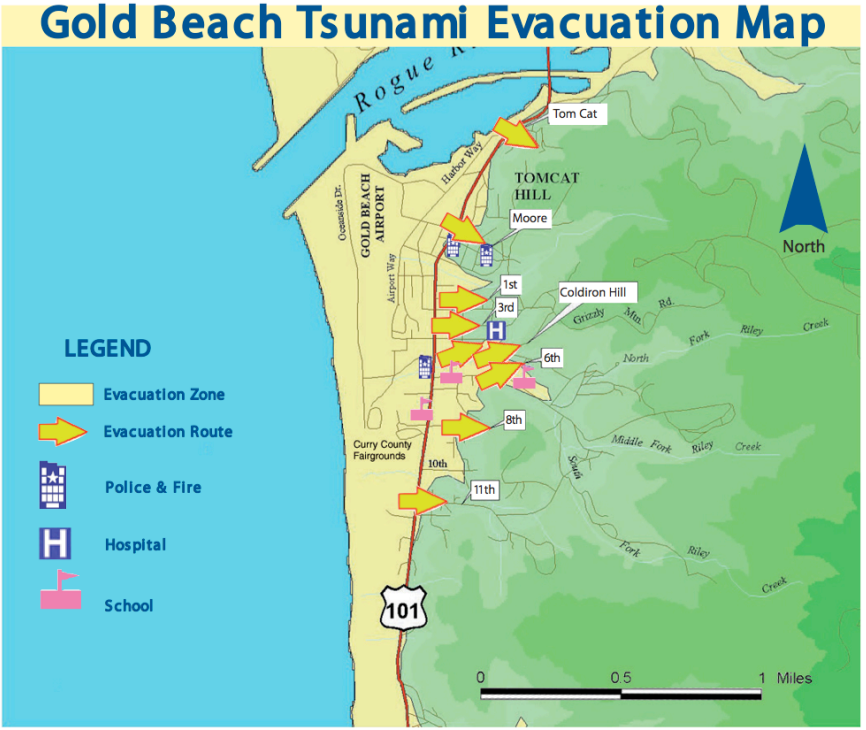
Curry County

Port Orford



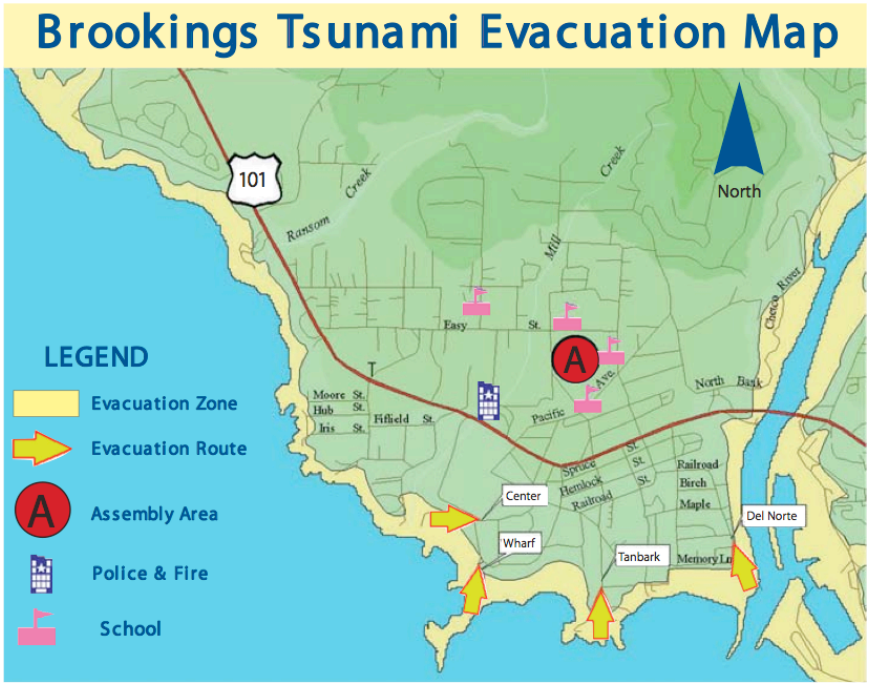
Curry County

Gold Beach



Curry County

Brookings



Curry County

Harbor

Tsunami Fact Sheet

What is a tsunami?

A tsunami is a series of waves typically generated by vertical displacement of the sea floor or lake bed caused by an earthquake. Tsunamis can cause significant death and destruction, with the greatest impact in areas closest to the source. The initial tsunami wave can arrive on shore within minutes of an earthquake, or up to several hours later, depending upon distance from the source.

Have we experienced a tsunami?

Yes. Local tsunamis triggered by earthquakes on the Cascadia Subduction Zone offshore Oregon as well as distant tsunamis caused by earthquakes across the Pacific Ocean basin have struck the oregon Coast. The last local tsunami occurred in A.D. 1700 leaving an indelible mark in Native Tribal legends. Damaging distant tsunamis reached Oregon's shorelines as recently as 1960 and 1964.

Will a tsunami strike again?

Yes. Great earthquakes in the Pacific Ocean basin generating distant tsunamis that could impact Oregon's coast occur at a rate of about six every 100 years. There is a 10 to 14 percent chance in the next 50 years of a magnitude 9 earthquake on the Cascadia Subduction Zone that would generate a much more destructive tsunami. Such large but infrequent earthquakes and tsunamis occur about every 500 years, on average.

Who is at risk?

Communities along the Pacific Coast and along estuaries, are at the greatest risk. In a Cascadia Subduction Zone earthquake, the level of the coastal region could drop up to six feet, and tsunami waves could reach 80 feet at the open coast, over-topping several low-lying coastal communities. Oregon's at-risk residential and employee population is approximately 40,000 on the outer coast, excluding tourists and transient populations that could increase the number significantly.

Special note:

In its earthquake and tsunami potential, the Cascadia Subduction Zone resembles the Sunda Trench off the coast of Sumatra Island, Indonesia. The Sunda Trench produced giant earthquakes and tsunamis in December 2004 and March 2005 that killed more than 284,000 people and displaced another 1.1 million people in the Indian Ocean basin. Waves from the December 2004 tsunami reached 100 feet in places and traveled inland as far as five miles on Sumatra.