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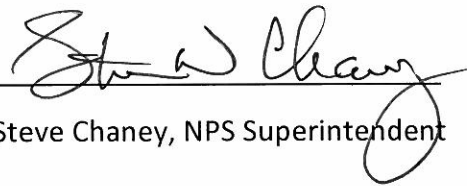
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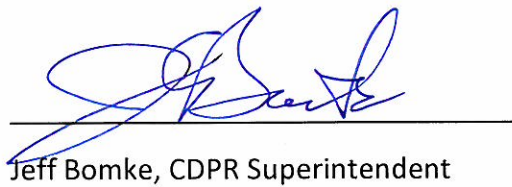
REDWOOD NATIONAL AND STATE PARKS

Tsunami Ready and Tsunami Contingency Plan

Updated July 2011

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Overview

Redwood National and State Parks (RNSP) was designated a Tsunami Ready Community in July 29, 2009. RNSP has a dual role of providing tsunami education and outreach to park staff and visitors as well as the responsibility as emergency responders to a tsunami impacting the coastal areas in and adjacent to the parks. To address both these issues, the Parks' Tsunami Ready Plan was integrated with the Tsunami Contingency Plan. The purpose of this plan is to minimize the loss of life and property during a tsunami.

This plan is divided into two sections—a Tsunami Ready Community Plan and a Tsunami Contingency Plan. The **Tsunami Ready Community Plan** highlights the parks educational materials, and activities, overviews the tsunami warning and notification system, and reviews the tsunami evacuation routes and signs. The **Tsunami Contingency Plan** details the parks planned emergency response to an official tsunami warning. This section establishes procedures for the notification and control of populated areas along the Pacific coast of Humboldt and Del Norte Counties which lie within and adjacent to the RNSP boundary in the event of an official tsunami warning. It also provides a coordinated response with Humboldt and Del Norte Counties and the Yurok Tribe.

Tsunami Ready Plan

There are two different types of tsunamis that can impact the north coast and each requires a different response. A distant source tsunami would come from a large earthquake in the Pacific basin with a long travel time to our coast. In contrast, a local source tsunami would come from a large earthquake right off our coast like a Cascadia subduction zone earthquake and arrive at our beaches within 5-10 minutes. As a result, tsunami warnings may come as an **official warning** or a **natural warning**. Official tsunami warnings provide time for notification and a planned evacuation similar to the 2011 Japan tsunami. In contrast, a natural tsunami warning is ground shaking, a loud roar from the ocean, or the ocean receding from your coast. Natural warning signs are the signal to go immediately to high ground or inland—a tsunami may inundate the coast minutes after the initial ground shaking.

EDUCATION

A critical component of safety planning for tsunami hazards depends on increased awareness of the hazard coupled with tsunami education programs. To be effective, these programs need to provide a prioritized educational message whereby the most important points are always communicated first. The RNSP plans provides a coordinated and consistent tsunami educational program using products that target the public, park staff, park family members, and other park stakeholders. All of these products are founded on the basic educational message content of the next section.

Educational Material Highlights

Tsunami Facts - Tsunamis are commonly caused by distant large earthquakes along the Pacific Ocean, by local large earthquakes, or large underwater landslides off the coast. Since 1933, 34 tsunamis have been recorded or observed in northern California and five have been damaging to Crescent City (1952, 1960, 1964, 2006, and 2011). These tsunamis damaged and/or threatened lives along the RNSP and the north coast.

- A tsunami is a series of waves or surges.
- The first wave is almost never the largest.
- Surges may arrive for at least 12 hours and in some cases much longer.
- The time between surges may be at irregular intervals and there may be long periods of calm before the next surge hits.

If you are on the coast and feel the ground shake—no matter how small—move immediately off the beach and seek more information to see if a tsunami has been generated.

A tsunami could come from a nearby source and the only warning you will get is ground shaking.

Natural and Official Tsunami Warnings

You may find out that a tsunami is coming in two ways:

Natural Warning

Ground shaking, a loud ocean roar, or the water receding unusually far exposing the sea floor, are all nature's warnings that a tsunami may be coming. If you observe any of these natural warning signs, immediately move to higher ground or inland. A tsunami may arrive within minutes and may last for at least 12 hours or longer. Stay away from beaches and low coastal areas until told by emergency personnel that the danger has passed.

Official Warning

You may be notified that a Tsunami Warning has been issued by: TV and radio stations, door-to-door contact by emergency responders, NOAA weather radios, or in some cases, by outdoor sirens or announcements from airplanes. Move away from the beach and seek more information without using a phone. Tune into local radio or television stations for more information. Follow the directions of emergency personnel who may ask you to evacuate low lying coastal areas.

Both Natural and Official Warnings are equally important.

Respond to whatever you hear or observe first!

Tsunami Vulnerability - Generally, beaches and low-lying areas close to the coast—lagoons, bays, and river mouths—are vulnerable to the high velocity, debris-strewn waters of a tsunami. The greatest impact from a distant source tsunami to RSNP could be:

- inundation of the coastline and coastal lagoons (Freshwater and Espa Lagoon; the inundation of Lagoon Creek is unlikely)
- the partial inundation of the Klamath River and mouth of Redwood Creek and sloughs
- inundation of Crescent City (Headquarters Building) and Elk River Slough and Kuchel Visitor Center.
- potential flooding of coastal roadways, picnic, and camping areas including Freshwater Spit, Gold Bluff Beach, Enderts Beach, Nickel Creek Campground, and Crescent Beach.

Distant source tsunamis can cause a range of impacts from strong ocean currents with no inundation of the coastline to destructive waves with heights over 20 feet. Large distant source tsunamis could have substantially high run up heights and potentially inundate park buildings and facilities in the coastal zone (Park Headquarters and Kuchel Visitor's Center).

Public Educational Products

Beach Safety Multi-Hazard Brochure - This brochure (Enjoying the Beach - Tips to Stay Safe While Enjoying the North Coast) is available to park visitors and provides integrated and consistent educational messaging for the major beach hazards of Redwood National and State Parks including tsunamis, sneaker waves, tides, and rip currents (Posted on InsideREDW at <http://inpredwgis2/redw/office/parkoffice.cfm?office=edumaterials>).

Park's Visitor Guide (newspaper) - The back of the standard Park visitor guide provides park hazards information in the section "Protect Yourself ..." The Tsunami section contains basic tsunami safety information for park visitors to survive this hazard.

Interpretive curriculum -Park interpreters provide basic tsunami safety awareness information during presentations to park visitors when such information is appropriate such as campfires, while out roving, or other activities that involve the public.

Park Staff Educational Products

RNSP Earthquake and Tsunami Employee Guide – This guide provides information to help RNSP staff prepare for and respond to large earthquakes and tsunamis on the north coast (Appendix A).

Employee Safety Training – Employees are provided tsunami safety training when they first begin working at Redwood National and State Parks as part of seasonal training or within their prospective work groups. Tsunami education in RNSP also occurs every year in March in conjunction with the Tsunami Warning Communications Test (see section on Tsunami Contingency Plan, Annual Tsunami Warning Communications Test). Earthquake education occurs every year in October by participating in the California ShakeOut Drill (<http://www.shakeout.org/>).

Tsunami Brochures for Humboldt and Del Norte Counties – These brochures provide tsunami preparedness information and tsunami evacuation zone maps for communities throughout the north coast region where park staff and their families live, travel, and recreate. They are available to assist park staff in ensuring the safety of their families.

Interpreters Training Manual – An earthquake and tsunami training manual (Shake, Rattle, and Roll—Awakening the Public's Curiosity of Geology via Interpretation) was developed for RNSP. The manual provides the background information and material for park interpreters to educate park visitors on earthquake and tsunamis in RNSP.

Active Earth Kiosk – The display is an interactive touch screen museum display with web pages about plate tectonics, earthquakes, volcanoes, and tsunamis. The interpretive display is located at the Kuchel Visitor's Center on the south end of the parks and is available for use by the public. The exhibit was created by the Incorporated Research institutions for Seismology (IRIS).

WARNING AND NOTIFICATION SYSTEMS

Tsunamis generated by earthquakes in the Pacific Ocean that could impact the RNSP coastline can be detected. The arrival time of the first potentially destructive waves can be estimated with sufficient reliability to provide early warning to people in the coastal areas. Current technology cannot estimate wave heights, arrival times of subsequent waves, or the shape and duration a tsunami at any specific location.

The West Coast and Alaska Tsunami Warning Center (WCATWC) monitors seismic activity throughout the Pacific basin and provides tsunami information as needed to area emergency response agencies through a variety of warning methods. The WCATWC will broadcast messages to all California, Oregon, Washington, British Columbia, and Alaska emergency agencies after the occurrence of a significant earthquake (> 7.0 magnitude) located anywhere in the Pacific Ocean basin.

The **WCATWC will provide initial warning notification to local emergency response agencies** (County OES) including NORCOM.

The National Weather Service is the primary public warning agency on the north coast using the Emergency Alert System (EAS) and NOAA weather radios. The local National Weather Service office will reissue WCATWC Tsunami Warning Bulletins affecting the north coast to the public via the EAS. NOAA weather radios broadcast both Tsunami Watch and Warning Bulletins.

If a Tsunami Warning is issued, the Humboldt and Del Norte County OES in consultation with our local National Weather Service Office will determine if evacuation of the coastal areas or harbors is necessary.

Northern Communications (NORCOM) is the radio dispatch service for and serves as the official warning center for RNSP, and is on the WCATWC and NWS tsunami warning distribution list.

The emergency will last until a message from the WCATWC or County OES has communicated that the warning is officially cancelled. A general public All-Clear will be officially announced using all alert methods available. If a tsunami occurs along the coast, the public will also be warned that hazardous currents and water surface disturbances may continue in harbors and boating channels for several hours after the last surge.

The West Coast/Alaska Tsunami Warning Center issues tsunami messages which include: a tsunami warning, watch, advisory, and information statement. Each message has a distinct meaning relating to local emergency response. Tsunami messages are described in the Emergency Alert Systems-Tsunami Message Definitions table which has links to examples. **Only the Tsunami Watch and Warning will be broadcast on NOAA weather radios by the Emergency Alert System.**

Emergency Alert System - Tsunami Message Definitions

Last Updated 1/2008

WCATWC Message Definitions: <http://wcatwc.arh.noaa.gov/Products/msgdefs.htm>

Tsunami Warning: The highest level of tsunami alert. a tsunami warning is issued 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. [For an example of the National Weather Service \(NWS\) format tsunami warning CLICK HERE.](#) [For a warning cancellation, CLICK HERE.](#)

Tsunami Watch: The second highest level of tsunami alert. a tsunami watch is issued to alert emergency management officials and the public of an event which 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. [For an example of the NWS format tsunami watch CLICK HERE.](#)

Tsunami Advisory: The third highest level of tsunami alert. A tsunami advisory is issued due to the threat of a potential tsunami which 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. [For an example of the NWS format tsunami advisory CLICK HERE.](#)

Tsunami Information Statement: A tsunami information statement is issued to inform emergency management officials and the public that an earthquake has occurred, or that a tsunami warning, watch or advisory has been issued for another section of the ocean. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami 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. [For an example of the NWS format information statement CLICK HERE.](#)

Tsunami Siren Activation

Activation of all tsunami sirens is coordinated through the Eureka National Weather Service (NWS) with Humboldt and Del Norte County OES. Sirens will be controlled by the NWS and will turn on automatically when the EAS is activated and will have a manual back-up to turn sirens on. A controller for the Orick tsunami siren was installed in 2010.

A siren signals people to get off the beach and seek further information without using a phone.

Sirens provide a notification to people outdoors and may also have a limited range or spotty coverage depending on ambient conditions (wind and waves). Testing of sirens by the NWS indicate that they are not effective for people inside buildings. It is important to have multiple ways to receive information (NOAA weather radios, park radios, etc).

Tsunami siren protocols are currently being developed and this section will be updated as new information is received from County OES and the NWS. **At this time, tsunami sirens will have a wailing tone that is broadcast for three minutes. Siren tests will have a steady tone for one minute.**

NOAA Weather Radios

Park facilities in the coastal high hazard zone are all equipped with NOAA Weather Radios with the Emergency Alert System. Tsunami Watch and Warning messages are broadcast by the EAS. Tsunami Advisory or Information messages are not broadcast. In the event of a Tsunami Warning or Watch, RNSP staff monitoring NOAA Radios should make an announcement over the intercom at the facilities.

	What to tell people
General Information	• A tsunami is a series of waves or surges. • The first wave is almost never the largest. • Surges may arrive for at least 12 hours and in some cases much longer. • The time between surges may be at irregular intervals and there may be long periods of calm before the next surge hits.
Tsunami WARNING	• Tsunami Warning has been issued. • An inundating wave is possible • Stay off all beaches and low lying coastal areas • Estimated tsunami arrival time is at XXXX • Stay alert for more information
Tsunami WATCH	• Tsunami Watch has been issued • Danger level not yet known • Estimated tsunami arrival time is at XXXX • Stay alert for more information
Tsunami ADVISORY	• A tsunami capable of producing strong currents or waves dangerous to people in or very near the water is imminent or expected. • Stay away from the beach (including docks and harbors) and out of the water. • Significant widespread inundation is not expected. • Estimated tsunami arrival time is at XXXX • Currents may be hazardous for several hours after the initial wave

The programming instructions for the NOAA weather radios are located next to the radios including what to do in case of a Tsunami Warning, Watch, or Advisory bulletin (Appendix B). Also included is the RNSP Earthquake and Tsunami Employee Guide (see Appendix A). See also section on the Annual Tsunami Warning Communications Test for procedures to follow during the annual test.

Facilities with NOAA Weather Radios	
Facility	Location
Kuchel Visitors Center	Front office next to park radio (Interpretation)
South Operations Center	Front information desk next to park radio
Gold Bluffs Beach	Ranger residence (removed until occupied)
Prairie Creek Ranger Station	Ranger office
Crescent Beach Education Center (CBEC)	Front desk (Interpretation)
Crescent City Headquarters	Front desk at Visitor Center (Interpretation) and Chief Ranger's Office
Aubell (Law Enforcement)	Front office next to bay station (Law Enforcement)
NOC (Maintenance Facility)	Maintenance secretary's desk (Maintenance)

EVACUATION ROUTES AND SIGNS

Evacuation Routes (for large local tsunamis)

For large local tsunamis, evacuation routes have been developed for the Orick Valley and for Crescent City (see evacuation maps in Appendix C) and provide a quick escape route from a large local tsunami—where ground shaking is your warning. Evacuation routes allow a person to walk to a safe elevation in less than 10 minutes. Strong ground shaking from a large earthquake will potentially damage roadways, bridges, and drop power lines.

Evacuate on foot. If your only evacuation route is blocked by downed power lines, carefully cross without touching the wires. If evacuation is impossible, go to the upper floor of a sturdy building or climb a tree—this should only be used as a last resort. Get to high ground and stay there.

If you are in a low-lying coastal area with no evacuation route head to high ground. Go at least 100 feet above sea level on the open coast or at least 2 miles inland—every foot upward or inland can make a difference.

Park Location	Evacuation Route
Crescent City Headquarters	Evacuate the building and walk north uphill past 9 th Street. Stay away from the Fair Grounds (Appendix C-Crescent City map).
South Operations Center	Turn right after exiting the front of the building. Walk south on Highway 101 until you reach Hufford Road (past the Palm Motel). Turn right on Hufford Road (toward Hidden Beach). Walk until you reach the first steep driveway on the right (Scenic View Drive) Walk up the steep driveway until you reach the top (Appendix C-Orick map).
Kuchel Visitor Center	Evacuate south to Highway 101 and move quickly uphill near the Highway 101 road cut. Get higher than the power-line elevation (Appendix C-Orick map).

Projected tsunami inundation maps for the California coastline are posted by county at:

http://www.consrv.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/Statewide_Maps.aspx

Humboldt and Del Norte Counties have developed maps that identify tsunami evacuation zones and safe areas for large local tsunamis. Maps are posted on InsideREDW.

Tsunami Hazard Signs



Evacuation Route Signs: Signs with directional arrows are used to direct people along formal evacuation routes. **Evacuation routes are for large local tsunamis where ground shaking is your warning** and requires evacuation on foot to high ground as quickly as possible.



Tsunami Hazard Zone Signs: “Entering” and “Leaving” tsunami hazard zones signs are posted along all county and state roadways. These signs serve as general educational tools to indicate which areas should be evacuated during a tsunami, with an emphasis on large local tsunamis. These signs also serve as evacuation aides for areas that do not have formal evacuation routes, and they identify areas that are safe. If you are located in a safe area, stay where you are.



Tsunami Educational Signs: For beach access points, educational signs are used that carry the basic message: “In case of earthquake, go to high ground or inland”. These signs also have an iconic image that conveys the same message.



Multi-Hazard Signs: Some sites around the Parks will see deployment of multi-hazard signs that integrate the message from the above tsunami educational signs with other beach hazards such as sneaker waves and rip currents.

Tsunami Contingency Plan

SCOPE

This section outlines Redwood National and State Park's (RNSP) planned response to an official tsunami warning. This plan establishes procedures for the notification and control of populated areas along the Pacific coast of Humboldt and Del Norte Counties which lie within the RNSP boundary in the event of an official tsunami warning. It also provides a coordinated response with Humboldt and Del Norte Counties and the Yurok Tribe.

The purpose of this plan is to minimize the loss of life and property, and to provide for re-entry into areas that may have been evacuated and/or damaged by a tsunami. This plan includes information taken directly from the Humboldt Tsunami Contingency Plan and was developed in coordination with Humboldt and Del Norte Counties Office of Emergency Services, National Weather Service, and the Yurok Tribe.

TIME-MINUS CONCEPT IMPLEMENTATION

The Time-Minus concept is to ensure prioritized, critical field operations are conducted at time intervals which allow for their completion and will be implemented by cooperating response agencies. The T-Minus times can be used in conjunction with a practical checklist for what to accomplish when. Overall Command-level response operations T-minus benchmarks will be coordinated through the County Emergency Operations Center.

Below is a simple example of a T-minus implementation for a distant-source tsunami event:

- T-zero: Projected time of initial tsunami wave arrival
- T-30 min: All responder personnel shall leave danger areas**
- T-1 hour: All identified road closures shall commence
- T-3 hours: Tsunami Warning Bulletin issued
- T-6 hours: Tsunami Watch Bulletin issued

The implementation of the T-Minus concept is obviously dependent on how distant the source of the tsunami. A tsunami originating in Japan (at least 8 hours travel time) will allow much more preparation time than will a tsunami originating in Alaska (at least 4 hours travel time). The closer the source of a tsunami event, the more T-Minus tasks will require immediate implementation. For the closest-source tsunamis, only some basic response operations may be possible.

TSUNAMI CONTINGENCY PLAN ACTIVATION

This Tsunami Contingency Plan will be activated by RNSP upon notification from NORCOM that a Tsunami Advisory, Watch, or Warning has been issued for our section of coast, or notice from Humboldt and/or Del Norte County OES that the County Tsunami Contingency Plans have been activated. This plan will be used in conjunction with the Humboldt and Del Norte County Emergency Operations and Tsunami Contingency Plans and the Yurok Tribe Tsunami Plan.

The current communications capabilities allow for almost instant public notification of Tsunami Bulletins. In many cases, the public will be notified at the same time (or, shortly thereafter) as law enforcement and emergency responders. Public notification will come from multiple sources such as NOAA weather radios, radio and TV stations, e-mail, and in some cases by sirens and by civil air patrol along beaches in Humboldt and Del Norte Counties. Redundant forms of notification are needed to ensure staff and the public receives Tsunami Warnings.

Tsunami Warning and Watch Messages received by NORCOM will be broadcast on park radios. RNSP staff, visitor information centers and administrative offices should receive a Tsunami Bulletin from park radios, NOAA Weather Radios, e-mail, and in some cases by siren if activated.

RNSPs response to a Tsunami Advisory, Watch or Warning will vary depending on the time of year/season, time of day, and park staffing. It is important to remember that every situation is unique and will require some judgment. Response to a tsunami event that occurs in the middle of the night during the winter will be significantly different than a daytime event at the height of visitor season during the summer. Law enforcement staffing varies through the year and that will also affect the parks' response. Fire personnel will also be trained to help support emergency response to a tsunami. Based on past experience, during an event the phone lines will be over loaded and RNSP should plan on communicating without using phones.

- **After receiving a Tsunami Warning, Watch, or Advisory**, the park will initiate the RNSP Tsunami Contingency Plan.
 - ✓ RNSP law enforcement (LE) and emergency responders will note the estimated tsunami arrival time and monitor the situation.
 - ✓ **LE will call NORCOM to ensure they notify RNSP of all tsunami messages and confirm that the park covers coastal areas in both Del Norte and Humboldt County.**
 - ✓ All employees will be notified of a tsunami advisory, watch, or warning by e-mail and park radios and through other communication channels. Employees will be directed to leave all beaches and low-lying coastal areas, estuaries, and river mouths.
 - ✓ The Superintendent (or designee) will place a message on the Employee Emergency Call in Number (707-465-7322) with information to employees.

- **In the event of a Tsunami Warning (tsunami with significant widespread inundation is imminent or expected)**
 - ✓ At T-3 hours or earlier, RNSP law enforcement will evacuate the public from the beach and low-lying coastal areas (including estuaries and river mouths), and coastal campgrounds. Trail closure signs will be posted. Road barriers will be put in place to control traffic.
 - ✓ RNSP law enforcement will notify occupants in the following park residences: Wolf Creek, Prairie Creek, Mill Creek, and Hiouchi housing, and/or evacuate Gold Bluffs Beach housing.
 - ✓ If an evacuation is ordered, RNSP Employees will leave the Park Headquarters building, Gold Bluffs Beach Entrance Kiosk and housing, and Kuchel Visitor Center. Follow Employee Release Plan posted on InsideREDW.
 - ✓ At T-1 hour, all road closures will be in effect.
 - ✓ At T-30 min, **all RNSP LE will cease warning and movement activities 1/2 hour before the tsunami estimated time of arrival (ETA) and report to NORCOM when they are outside of tsunami hazard zone.**
- **In the event a Tsunami Warning is issued with less than T-3 hours then:**
 - ✓ Law enforcement will need to determine appropriate emergency response for posting trail closures, setting up road blocks, and evacuating coastal areas depending on staffing, time of day, and other factors.
 - ✓ At T-30 minutes, **All RNSP LE will cease warning and movement activities 1/2 hour before the tsunami estimated time of arrival (ETA) and report to NORCOM when they are outside of tsunami hazard zone.**
- **In the event of a Tsunami Watch (Danger level not yet known)**
 - ✓ The tsunami watch may be upgraded to a warning or advisory or canceled.
 - ✓ If a warning or advisory is issued see the appropriate section below.
 - ✓ If the Tsunami Watch is cancelled all employees will be notified by LE.
- **In the event of a Tsunami Advisory (Strong currents and dangerous waves likely. NO significant widespread inundation expected)**
 - ✓ All employees will stay off of the beaches, estuaries, river mouths, and harbors.
 - ✓ LE will close all trails that lead to the beach based on the locations of the tsunami advisory and will close Enderts beach and Gold Bluffs Beach.

Areas of RNSP responsibility for notification and evacuation (if ordered by County OES) include:

Freshwater Lagoon and beach area, Gold Bluffs Beach, Coastal Drive, Wilson Creek/False Klamath Cove, and Enderts/Crescent Beach. RNSP will coordinate activities with CHP and Humboldt/Del Norte County Sheriff's Department.

ACCESS

No entry by anyone will be made into evacuated areas until two hours after the ETA if no tsunami is detected AND after the All-Clear message has been promulgated, OR a Restricted Access message has been promulgated.

If tsunamis occur along the RNSP coastline, no entry by anyone will be made into evacuated areas until several hours after the last significant wave passes AND/OR the Restricted Access message has been promulgated (see Access Announcements).

ACCESS ANNOUNCEMENTS

Two types of access announcements are possible following a tsunami warning. These two access announcements are distinctly different. It is very important that responders understand the difference between the two announcements and that the correct access announcement is communicated to the public.

Access Announcements*
<u>Emergency Responder Restricted Access:</u> The "Restricted Access" announcement is for emergency response personnel only and shall be promulgated through official communications systems. This announcement does not apply to the general public. It advises when it is safe for search and rescue and official damage assessment teams to re-enter the area. Emergency response personnel re-entering an evacuated area should be aware of the expected tidal heights/times and the possibility of unstable water fluctuations in the aftermath of a significant tsunami event. If tsunami waves occur in the area, the "Restricted Access" announcement for emergency response personnel will generally be given two hours after the last significant wave passes. Other conditions may require local authorities to delay the "Restricted Access" announcement.
<u>General Public All-Clear:</u> If no tsunami was generated, a general public "All-Clear" announcement will be given two hours after the estimated time of arrival of the initial projected wave. All persons will be allowed to re-enter the evacuated area. If a tsunami was generated, the evacuation zone will remain in effect until at least two hours after the last significant wave passes AND after local authorities have assessed the situation. The general public "All-Clear" announcement will not be given until local authorities are satisfied the area is secure. If extensive damages occurs, it may be many hours or even days before the public is allowed back into the damage area.
*From Humboldt County Tsunami Contingency Plan (E-6-A Emergency Responder "Restricted Access" and E-6-B General Public "All-Clear")

TRAFFIC CONTROL ASSIGNMENTS

If an order is issued to evacuate people from projected inundation areas, designated responding federal, state, local, and tribal agencies will assume responsibility for establishing and operating roadblocks at selected traffic control points adjacent to tsunami hazard zones along the coastline (see Table: Traffic Control Assignments). RNSP will ensure contingency plans are in effect and personnel are trained for their roadblock assignments. The Parks will work in cooperation with Orick Valley Fire Department, California Department of Transportation, California Highway Patrol, the Yurok Tribe, and Humboldt and Del Norte County Public Works to place signs, barricades and operate roadblocks.

Roadblocks are not to stop traffic until one hour before the projected estimated time of arrival (ETA) of the initial tsunami. If the arrival of the tsunami is imminent traffic will be stopped immediately.

Each agency will ensure that personnel staffing roadblocks understand that no entry by anyone is to be made back into evacuated areas (see ACCESS section above).

RNSP Storage Locations for Road Barriers

- Elk Meadows restroom/janitors closet
- Shed by gate at CBEC

Each storage location should contain barriers, closure signs, tsunami brochures, flashers, extra batteries, and sandbags. Flashers are tested once a year during the Tsunami Warning Communications Test to make sure they are operational.

Table: Traffic Control Assignments

Agency Assignments	Control Point	Stop Traffic
RNSP - place signs and barricades and staff roadblocks	Davison Road at Davison Ranch at the junction of Elk Meadow parking lot and Gold Bluff Beach access. (Barricades and signs will be stored at the Elk Meadows restroom/janitors closet.)	Westbound
	Klamath Beach Road at Alder Camp Rd Junction. RNSP will work in conjunction with the Yurok Tribe for this road closure.	Westbound
	At the junction of Enderts Beach Road and Highway 101. (Barricades will be stored in shed by gate at CBEC.)	Southbound
California Dept. of Transportation - Place signs and barricades and staff roadblocks	Hwy 101 at south end of Orick. At the junction of Highway 101 and Hilton Road	Southbound
	Hwy 101 at south end of Freshwater Lagoon	Northbound
California Highway Patrol - provide response vehicles and uniformed law enforcement personnel to establish and staff roadblocks	Orick Hwy 101 at South edge of Orick	Southbound
	Hwy 101 at Freshwater Lagoon	Northbound
	Klamath Hwy 101 at south end of town	Southbound
	Hwy 101 at north end of town	Northbound
	Crescent City HWY 101 at Burger King	Southbound
	HWY 101 at North of Vista Point	Northbound
Humboldt county Public Works Department - place signs and barricades and staff roadblocks	Hufford Road at Highway 101 in Orick (road to north levee and hidden beach)	Westbound
Orick Valley Fire Department – provide response vehicles and staff to warn and/or evacuate threatened coastal and river residents in the Orick Valley and inland areas of Freshwater Lagoon.		

RNSP Beach, Trail, Campground and Facility Closures

- **In the event of a Tsunami Warning**, a tsunami with significant widespread inundation is expected. RNSP will close all beaches, coastal campground and trails, and evacuate coastal facilities. Residents at the Wolf Creek, Prairie Creek, Mill Creek, and Hiouchi housing units will be notified of the tsunami hazard, but the Gold Bluffs Beach housing unit will be evacuated. Also, during a Tsunami Warning, access to trails will most likely be inaccessible to visitors due to road closures and trail closed signs may not be needed.
- **In the event of a Tsunami Advisory**, a tsunami may produce strong currents or waves that are dangerous to people in or near the water. No significant widespread inundation is expected. RNSP will close all beaches, coastal campgrounds and trails, but Park Headquarters and Kuchel Visitor's center will remain open. Residents at the Gold Bluffs Beach, Wolf Creek, Prairie Creek, Mill Creek, and Hiouchi housing units will be notified of the tsunami hazard. Stay away from the beach including docks and harbors and out of the water.

List of RNSP Coastal Resources

Beaches and Campgrounds

- Enderts Beach
- Enderts Beach picnic area
- Nickel Creek campground
- Wilson Beach Parking Lot and area
- Lagoon Creek Parking Lot and area
- Gold Bluffs Beach and Kiosk
- Gold Bluffs Beach campground
- Minor's Ridge backcountry campground
- Ossagon backcountry campground

Buildings and Facilities

- Crescent City Headquarters
- Gold Bluffs Beach Ranger Residence
- Kuchel Visitor's Center

Trail (Trail Closed signs (Appendix D) are stored with barricades - Shed by gate to CBEC and Elk Meadows Restroom/Janitor's closet)

- Coastal trail (Enderts Beach)
- Damnation Creek trail
- Coastal trail (southern end near Damnation Creek)
- Coastal trail (northern end near Lagoon Creek)
- Hidden Beach trail (near Trees of Mystery)
- Coastal trail (southern end near Requa)
- Caruthers Cove trail
- Ossagon trail
- Miners Ridge trail (Prairie Creek)
- James Irvin trail (Prairie Creek)
- Skunk Cabbage trail

POST TSUNAMI EVENT-SEARCH AND RESCUE

No search and rescue operations shall commence until after receipt of the Restricted Access announcement for emergency responders. All search and rescue operations shall be coordinated with the County Emergency Operations Centers to ensure any required additional resource assignments are prioritized and based on need.

INITIAL RECONNAISSANCE/ASSESSMENT

No initial reconnaissance/assessment operations shall commence until after receiving a Restricted Access announcement for emergency responders. **Initial reconnaissance/assessments should, if possible, be conducted at low tide.** Initial reconnaissance/assessment results shall be immediately communicated to the County Emergency Operations Centers for accounting and for response prioritization.

ANNUAL TSUNAMI WARNING COMMUNICATIONS TEST

Every year during the Tsunami Warning Communication Test (end of March), the Safety Officer will coordinate the following activities in RNSP and follow up with a report to the Central Safety Committee:

1. NOAA Weather Radios: Change the batteries in the NOAA weather radios (four AA batteries per radio). Check that the radio programming instructions and an RNSP Employee Guide to Tsunamis are posted with the weather radio. During the test, monitor the NOAA weather radios to ensure the radios are working properly and the test tsunami warning is received.

Weather Radio Locations: Crescent City HQ, CBEC, Aubel, NOC, Prairie Creek Maintenance, Gold Bluffs Beach Kiosk, Gold Bluffs Beach Ranger Residence, SOC, KVC, and Protection Division Chief office.

2. Law Enforcement: Check storage locations for barriers and inventory materials (number of barriers, closure signs, brochures, flashers, and sandbags) and test to make sure the flashers are operational and have extra batteries.

Storage location for barriers: Elk Meadows restroom/janitors closet and shed by gate at CBEC.

3. RNSP staff will practice walking tsunami evacuation routes at HQ and SOC.
4. Send out the RNSP Earthquake and Tsunami Employees Guide to all staff so they are familiar with how to respond if a Tsunami Warning, Watch, and Advisory occurs.
5. Contact NORCOM and review their role in an official Tsunami Advisory, Watch, and Warnings and make sure tsunami bulletins are transmitted to RNSP law enforcement.

AGENCY AND TRIBAL CONTACTS FOR TSUNAMI ISSUES (updated July-2011)

Agency	Contact	Phone Number	E-mail
Humboldt County OES	Dan Larkin Humboldt County OES	707-268-2500	dlarkin@co.humboldt.ca.us
Del Norte County OES	Cindy Henderson Del Norte County OES	707-465-0430 x376 707 954-8775 (cell)	chenderson@co.del-norte.ca.us
Yurok Tribe	Mary McQuillen Chief of Public Safety	707-482-8185	MMcquillen@yuroktribe.nsn.us
National Weather Service	Troy Nicolini Warning Coordination Meteorologist	707-443-0574 x223 707-496-5959 (cell)	troy.nicolini@noaa.gov
Orick Valley Fire Dept.	Neal Youngblood Orick Valley Fire Department	707-465-7746 707-845-6753 (cell)	neal_youngblood@nps.gov
Redwood National and State Parks	Laura Denny Law Enforcement South District Ranger	707-465-7750 (work) 707-498-4360 (cell)	laura_denny@nps.gov
Redwood National and State Parks	Marshall Neeck Law Enforcement Chief Ranger	707-465-7302 (work) 707-496-0258 (cell) 707-487-0840 (home)	marshall_neeck@nps.gov
Redwood National and State Parks	Lorant Veress Law Enforcement North District Ranger	707-465-7312 (work) 707-496-0258 (cell)	lorant_veress@nps.gov
California Dept. Parks and Recreation	John Vallett Law Enforcement State Parks Chief Ranger	707-465-7789 (work) 707-599-7765 (cell)	jvallett@parks.ca.gov
Redwood National and State Parks	Brett Silver Law Enforcement State Park Supervisory Ranger	707-465-7331 (work) 707 951-0676 (cell)	bsilver@parks.ca.gov
NORCOM Dispatch		916-358-1300 (business hours) 916-358-1310 (24/7 line) 916 358-0330 (fax)	Messages to be broadcast by NORCOMM must be faxed

ACRONYM LIST

AOR	Area of Response
CAD	Computer Aided Dispatch
CEBC	Crescent Beach Education Center
CHP	California Highway Patrol
EAS	Emergency Alert System
ETA	Estimated time of arrival
LE	Law Enforcement
NOAA	National Oceanic and Atmospheric Administration
NOC	North Operations Center
NORCOM	Northern Communication
NWS	National Weather Service
OES	Office of Emergency Services
OVFD	Orick Valley Volunteer Fire Department
RNSP	Redwood National and State Parks
SOC	South Operation Center
TWC	Tsunami Warning Center
WCATWC	West Coast and Alaska Tsunami Warning Center

Appendix A: Redwood National and State Parks Employee Guide for Tsunamis

Earthquake and Tsunami Employee Guide

March 2011

*You are sitting at your desk and you feel ground shaking that lasts a long time
OR you are working on the beach and feel an earthquake, you hear a loud sound coming from the ocean
or notice the water receding. What should you do?*

This guide will help you prepare for and survive earthquakes and tsunamis in northern California.
Learn how to recognize and respond to both *official tsunami* and *natural tsunami warnings*.

Surviving the next Cascadia Subduction Zone Earthquake and Tsunami

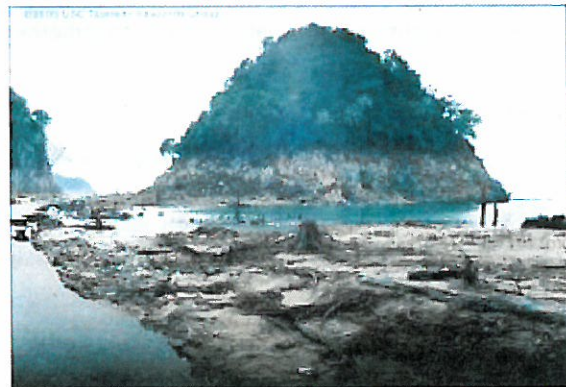
During the earthquake:

- DROP and take COVER under a sturdy desk or table, if indoors. HOLD ON until the shaking stops. In a Cascadia subduction zone earthquake there may be several minutes of strong ground shaking.
- Stay clear of items that can fall and injure you.
- Stay inside. You can be injured by breaking glass and falling objects if you run outside.
- If you are on the beach, walk to higher ground, away from the ocean as soon as it is safe for you to move.
- If you are driving, move your car to the side of the road and stop. Put on your parking brake. Stay away from structures or objects that can fall on you, such as bridges, light posts, power lines, or trees. Stay inside your car.
- If you are in the mountains, hills or coastal bluffs, be alert for falling rocks, trees, or landslides that could be loosened by the earthquake.



After the earthquake:

- Evacuate, if you are in a tsunami zone—beaches and low-lying coastal areas such as lagoons, estuaries, the Orick and Klamath River valleys and down town Crescent City. GO ON FOOT. Walk to higher ground away from the ocean as soon as it is safe to do so. Do not wait for official notification. Stay away from the coast until officials permit you to return.
- Check for injuries. Check for hazards such as fires, gas leaks, downed utility lines, and fallen objects.
- Be in communication – use your park radio, NOAA weather radio or tune into the local radio station for information. Avoid using your phone.
- Expect aftershocks. Aftershocks following large earthquakes can be large and damaging.



Vegetation stripped away by the 2004 Indonesian tsunami. Tsunami inundation was about 50 feet. Note person for scale on left side of photo. Photo by Dr. Jose Borrero

Surviving tsunamis:

- Many will survive the earthquake. Along the coast, large Cascadia zone earthquakes may kill fewer people than the tsunami that follows.
- Recognize NATURAL WARNINGS. Ground shaking, a loud ocean roar, or the water receding exposing the seafloor are all nature's warnings that a tsunami may be coming. A tsunami may arrive in minutes.
- Heed OFFICIAL WARNINGS. If a tsunami warning or advisory has been issued, move away from the beach and seek more information without using a phone—phone circuits will be overwhelmed.
- Head for High Ground and Stay There if you are on the beach or in a low-lying coastal area.

If you are on the beach and you ...

- feel an earthquake, no matter how small, leave the beach, move to higher ground or inland immediately.
- feel 20 seconds or more of ground shaking and are located in a tsunami zone. Evacuate as soon as it is safe to do so. Go on foot. Move immediately to higher ground and stay there.
- see the water recede or hear a loud roar from the ocean. Evacuate immediately and go to high ground. A tsunami may be coming.

- **Expect Many Waves.** The next wave may be bigger than the last. Waves from a tsunami may last for at least 12 hours or longer. Be prepared to wait it out and carry emergency supplies.
- **Don't Count on Roads.** During a large local earthquake roads may buckle or be blocked and bridges may be down.
- **If Evacuation is Impossible,** as a last resort go to the upper floor of a building or the roof, climb a sturdy tree. If caught by the tsunami, climb onto something that floats.



Tsunami Evacuation Routes

Tsunami evacuation routes *provide a quick escape from a large local tsunami* and are established in Crescent City, Klamath, and Orick. More than 20 seconds of ground shaking is your warning to flee to high ground and stay there. Know the closest evacuation route and walk it. If there is no evacuation route, go to an area 100 feet above sea level or 2 miles inland. Every foot inland or upwards can make a difference. Whenever you are working along the beach or in a low-lying coastal area always have an escape route planned.



SOC Tsunami Evacuation Route

- Turn right after exiting the front of the building. Walk south on Highway 101 until you reach Hufford Road (past The Palm Motel).
- Turn right on Hufford Road (toward Hidden Beach). Walk until you reach the first steep driveway (Scenic View Drive) on your right.
- Walk up the steep driveway until you reach the top.
- Stay there until you are told by emergency personnel that it is safe to leave.

Crescent City Headquarters Evacuation Route

- Evacuate the building and walk north uphill past 9th Street
- Stay away from the coast until you are told by emergency personnel that it is safe.

Remember, it may be many hours until an "all clear" is announced.

Official Tsunami Warning

(Distant Source Tsunamis)

Very large earthquakes in other areas of the Pacific Ocean can cause tsunamis that strike our coast. The 1964 Crescent City tsunami is a good example of the potential damage and loss of life from a distant source tsunami. You will not feel ground shaking before the tsunami arrives. *You may be notified that a Tsunami Warning has been issued via park radios (NORCOM), law enforcement, siren, NOAA weather radios, and local TV and radio stations.*

If you hear:

- a tsunami siren. Leave the beach and coastal areas and get more information.
- an Official Tsunami Advisory has been issued leave the beach and harbor areas—a tsunami may produce strong currents and dangerous waves in or near the water. Get more information.
- an Official Tsunami Warning has been issued leave the beach and coastal areas—a tsunami may produce dangerous, widespread, coastal flooding and powerful currents. Get more information without using your phone.
- an Official Tsunami Warning has been issued and an evacuation has been ordered, leave all tsunami hazard zones. Evacuate beaches, Kuchel Visitor's center, Gold Bluffs Beach kiosk and ranger residence, and Crescent City Headquarters—all are located in tsunami hazard zones.

Most highways and roads should not be affected by a distant source tsunami. However, if a tsunami advisory or warning is issued, and you are traveling on public roads, drive defensively and be vigilant of other drivers who may be driving recklessly because of the warning.

Family Planning

Your family may not be together when disaster strikes so create a family disaster plan.

- **Know whether you live, work, or play in a tsunami hazard zone.**
- **Inquire about emergency plans** for the school, preschool, or daycare that your children attend. (How will they communicate with families in a crisis? Do they store adequate food, water, and supplies? Are they prepared to shelter-in-place?) Most schools in Del Norte and Humboldt County are outside the tsunami Hazard Zone (exceptions—Peninsula, South Bay Elementary, and Margaret Keating Elementary School).
- **Develop a family disaster plan.** Know how to contact one another during an emergency and if separated, where you will meet. Remember—during an emergency, landlines, cell phones and internet communications may be disrupted or overwhelmed almost immediately. Text messages may get through even though your cell phone signal is weak.
- **Prepare disaster emergency kits** for your work, car and home. Be prepared to be isolated for at least a week.
- **Discuss emergency plans** with everyone in your family.
- **Identify an out-of-area contact** for family members to call or text information to. Use your contact to communicate between separated family members.
- **Plan for your pets and livestock.**

Appendix B: NOAA Weather Radio Instructions

NOAA Weather Radio (Midland WR-300)

This weather radio has been programmed for:

- Flood watch/warning
- Coastal Flood watch/warning
- Flash Flooding watch/warning
- Tsunami watch/warning
- Wildfire watch/warning
- High Wind watch/warning

To program weather radio select Menu. Use ▲ ▼ arrows to scroll through menu items.

To change a menu item, hit select.

Menu Item	Recommended Setting	Comments
Date	Set correct date	
Time	Set correct time	
Alarm	Optional	
Backlight	Normal	
Alert Mode	Siren	
Weather Channel	Channel 7	
County Code	006023 (Humboldt County) 006015 (Del Norte County)	
Defeat Siren (this turns on or off the siren for different event codes)	Turn on (alert enable) for: Flood watch/warning, Coastal Flood watch/warning, Flash Flooding, watch/warning, Tsunami watch/warning, Wildfire watch/warning, High Wind watch/warning Required Weekly Test	Use ▲ ▼ arrows to select Event Codes. Use ◀ ▶ to Alert Disable or Alert Enable. When done hit menu button.
Add Alerts	Not Applicable	
Siren Test	Demo's siren sound	
Siren Level	High	

The West Coast/Alaska Tsunami Warning Center issues tsunami messages which include a tsunami: warning, watch, advisory, and information statement. Each message has a distinct meaning relating to local emergency response and is summarized below:

Tsunami Warning -> Inundating wave possible -> Full evacuation suggested

Tsunami Watch -> Danger level not yet known -> Stay alert for more info

Tsunami Advisory -> Strong currents likely -> Stay away from the shore (including docks and harbors) and out of the water

Tsunami Information -> Minor waves at most -> No action suggested

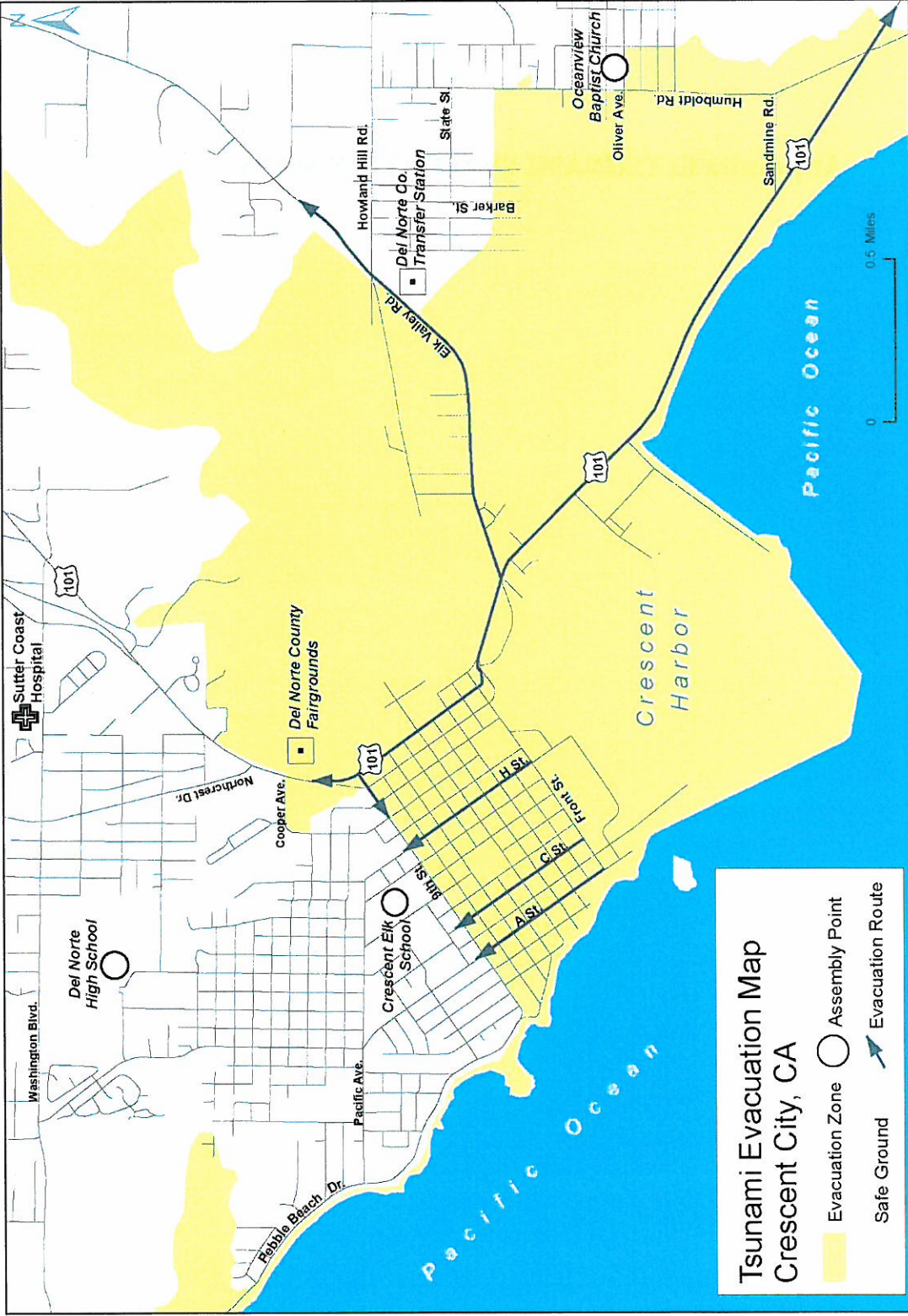
Only the Tsunami Watch and Warning will be broadcast on NOAA weather radios by the Emergency Alert System.

What to do if you are monitoring a NOAA Weather Radio and you hear a Tsunami Advisory, Watch or Warning has been issued?

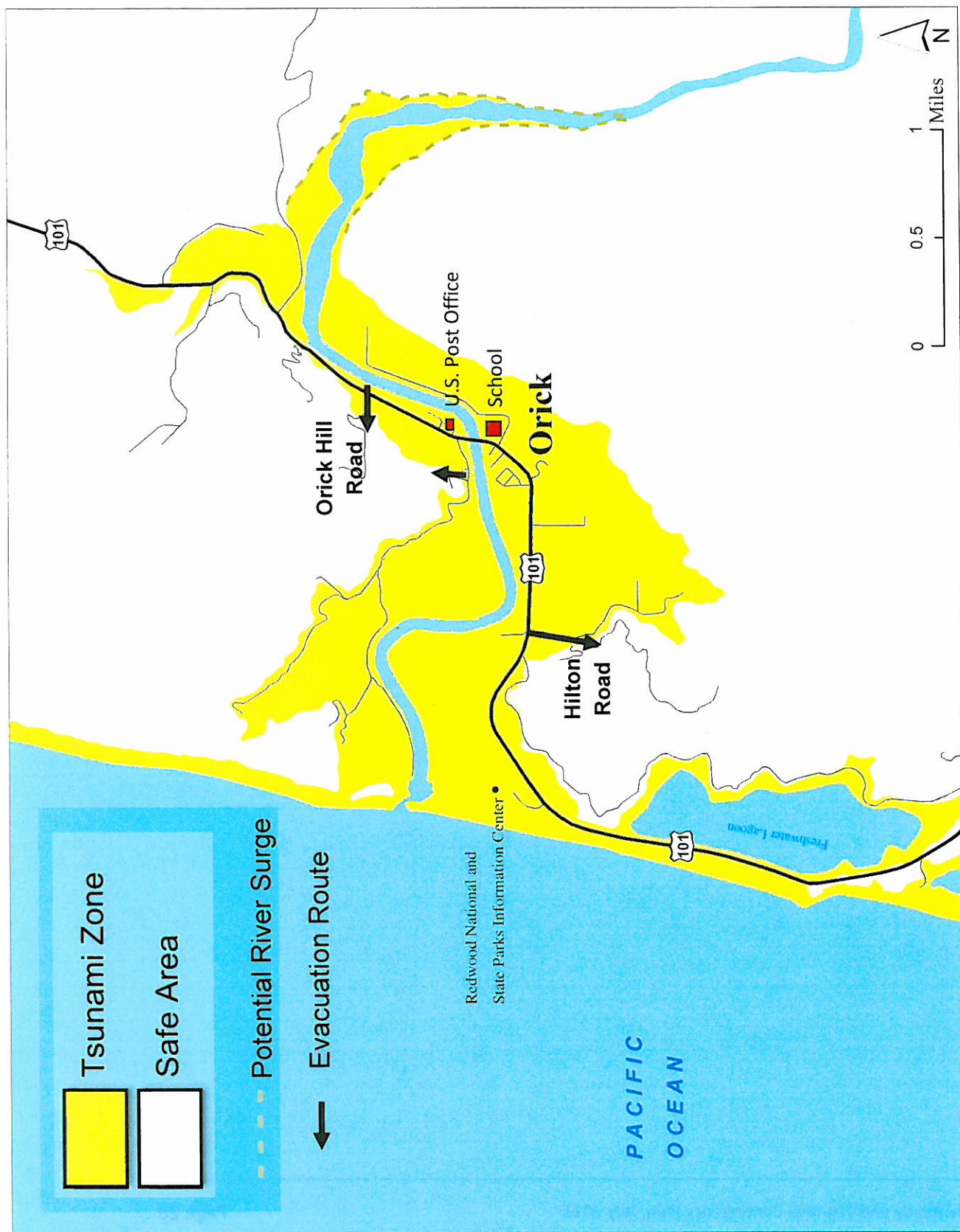
In the event of a Tsunami Advisory, Watch, or Warning RNSP staff monitoring NOAA Weather Radios should make an announcement over the intercom at the facilities with the appropriate message below.

	What to tell people
General Information	• A tsunami is a series of waves or surges. • The first wave is almost never the largest. • Surges may arrive for at least 12 hours and in some cases much longer. • The time between surges may be at irregular intervals and there may be long periods of calm before the next surge hits.
Tsunami WARNING	• Tsunami Warning has been issued. • An inundating wave is possible • Stay off all beaches and low lying coastal areas • Estimated tsunami arrival time is at XXXX • Stay alert for more information
Tsunami WATCH	• Tsunami Watch has been issued • Danger level not yet known • Estimated tsunami arrival time is at XXXX • Stay alert for more information
Tsunami ADVISORY	• A tsunami capable of producing strong currents or waves dangerous to people in or very near the water is imminent or expected. • Stay away from the beach (including docks and harbors) and out of the water. • Significant widespread inundation is not expected. • Estimated tsunami arrival time is at XXXX • Currents may be hazardous for several hours after the initial wave

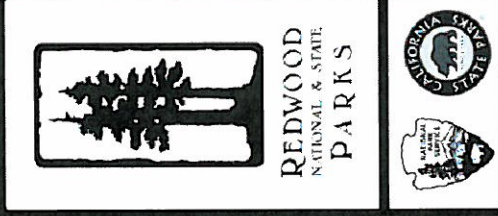
Appendix C: TSUNAMI EVACUATION MAPS



Note: This evacuation map is based on the State of California inundation projections and the best currently available scientific information. It is intended for emergency planning purposes only. This map may be revised as new information becomes available.



Appendix D: TSUNAMI HAZARD TRAIL CLOSURE SIGN



Trail Closed

Due to Tsunami Threat

A Tsunami Warning or Advisory has been issued.

Stay off beaches and low-lying coastal areas until further notice.

For more information contact 707 464-6101

Redwood National and State Parks

