

## Preparing for “the Big One” Cascadia TsunamiCon Held in Blue Lake [Humboldt County, California]

Press Release by Humboldt County, California Sheriff’s Office—September 23, 2022

### IN THIS ISSUE:

Cascadia TsunamiCon in Blue Lake, California	1
COAST GUARD—Improved Tsunami Planning in PNW Needed	3
Great Washington ShakeOut	4
What To Do When The Ground Stops Shaking	5
WA Tsunami Evacuation Route Wayfinding Project	5
Tsunami Ready Mapping Workshop in Barbados	7
UNESCO-IOC Tsunami Ready Recognition Programme	8
National Tsunami Warning Center Visits California’s Bay Area	9
NTHMP Mitigation and Recovery Planning Work Group Activities	11
Marine Scientist Hired as New OR Sea Grant Extension Coastal Hazards Specialist	12
Tsunami Research	13
NTHMP Related Events	13

As emergency management agencies across the country observe National Preparedness Month, emergency responders from near and far gathered in Blue Lake [Humboldt County, California] this week to talk about a threat that has long loomed over the North Coast: the Cascadia subduction zone.

Nearly 70 individuals representing local, state, tribal and federal agencies took part in the Cascadia TsunamiCon, a two-day preparedness training focused on the impacts Humboldt County would see resulting from a significant rupture of the 600-mile-long Cascadia fault, and the tsunami that would follow. The training, which was hosted by the Blue Lake Rancheria and the Humboldt County Sheriff’s Office of Emergency Services (OES), featured speakers from the California Governor’s Office of Emergency Services (Cal OES), the Redwood Coast Tsunami Workgroup, the National Tribal Emergency Management Council, FEMA and Cal Poly Humboldt.



“Education and awareness are fundamental to saving lives,” said Yvette LaDuke, program manager with Cal OES. LaDuke, who works for the state’s Earthquake, Tsunami and Volcano Program, presented at Cascadia TsunamiCon about the ways in which individuals, families, neighborhoods, businesses and government officials can work together to prepare and reduce the devastating effects of tsunamis.

Following a day of instruction, participants were able to put the knowledge to action by undergoing a half-day drill simulating a series of scenarios intended to mimic some of the catastrophic impacts of a Cascadia event.

# TsuInfo Alert

Prepared and published bimonthly by the Washington State Department of Natural Resources, Washington Geological Survey, on behalf of the National Tsunami Hazard Mitigation Program (NTHMP), a state/federal partnership led by the National Oceanic and Atmospheric Administration (NOAA).

This publication is free upon request and is available in print by mail and online at:

<http://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/tsunamis/tsuinfo-alert>

**Assembled and edited by Stephanie Earls,  
Librarian, Washington Geological Survey  
Washington Dept. of Natural Resources**

1111 Washington St. SE, MS 47007

Olympia, WA 98504-7007

360-902-1473 (p) 360-902-1785 (f)

[stephanie.earls@dnr.wa.gov](mailto:stephanie.earls@dnr.wa.gov)



**NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:**

<http://d92019.eos-intl.net/D92019/OPAC/Index.aspx>

The views expressed herein are those of the authors and not necessarily those of NOAA, the Washington Department of Natural Resources, or other sponsors of TsuInfo Alert.

## Preparing for “the Big One”

### Cascadia TsunamiCon Held in Blue Lake [Humboldt County, California]

Press Release by Humboldt County, California Sheriff's Office—September 23, 2022

*(Continued from page 1)*

“A big component of emergency management is getting to know our partners prior to an incident through joint trainings and exercises in order to better understand each other’s response capabilities and gaps,” Humboldt County OES Emergency Manager Ryan Derby said. “While a Cascadia event is inevitable, local measures taken to prepare and collaborate with our public safety partners ahead of time helps create a safer and more resilient community.”

This year’s Cascadia TsunamiCon comes after a four-year hiatus and is the result of extensive collaboration between Cal OES and partner agencies, as well as the generosity of the Blue Lake Rancheria to host and fund this important training through their Resiliency Training & Innovation Center.



“Preparedness training for any community is critically important, even for our emergency responders,” said Anita Huff, director of the Blue Lake Rancheria’s Office of Emergency Services. “Holding events like Cascadia TsunamiCon provides opportunities for education, networking, and partnership among the many responders and jurisdictions that will need to come together for an effective disaster response.”

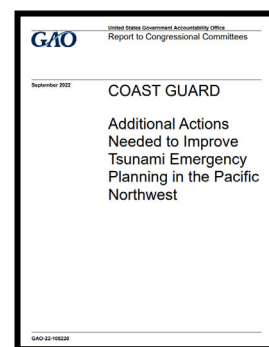
# TSUNAMI PREPAREDNESS

## COAST GUARD: Additional Actions Needed to Improve Tsunami Emergency Planning in the Pacific Northwest

By U.S. Government Accountability Office (GAO), Report GAO-22-105220

As the principal federal agency responsible for maritime search and rescue, the U.S. Coast Guard deploys personnel across the United States. This includes deployments of approximately 3,000 active duty, reserve members, and civilian employees to units in the Pacific Northwest—a seismically active region known to produce large earthquakes and tsunamis. Coast Guard District 13, which is responsible for managing operations in the region, oversees 42 units—including 39 located on the Washington and Oregon coasts. These units range in size from small search and rescue boat stations in remote coastal locations to larger cutter and aerial units based in more densely populated communities. However, among the 39 units located along the coast, GAO found that Coast Guard personnel—and their dependents—may be ill prepared for a tsunami event.<sup>1</sup> Specifically, GAO found:

- 19 of the 39 Coast Guard units at risk have a written tsunami evacuation plan for personnel and their dependents as the Coast Guard requires, but it does not ensure that units develop them.
- There is no guidance for developing these plans—resulting in wide variations in their content. For example, only four plans included a map with evacuation routes.
- The 19 units with plans had not exercised them, so the leadership at these units was unsure if the plans are feasible or need adjustments.
- Coast Guard District 13 has written protocols for responding to various natural hazards, including a major tsunami event. However, according to Coast Guard officials, since personnel in the Pacific Northwest would likely be among the victims and survivors, tsunami response efforts would likely extend beyond District 13 and include Coast Guard personnel from other regions of the U.S.
- District 13 and other Coast Guard commands on the West Coast participated in national-level exercises to test response and recovery capabilities following a major tsunami event. Following each exercise, Coast Guard developed reports detailing recommended actions and lessons learned. However, Coast Guard has not addressed these recommended actions in a timely manner, potentially leaving its personnel and coastal communities in the Pacific Northwest at increased risk.



GAO recommended that Coast Guard ensure its coastal units in the Pacific Northwest develop and exercise tsunami evacuation plans for personnel and dependents, and provide guidance to assist units with planning efforts. The Department of Homeland Security and Coast Guard concurred with these recommendations and identified steps and timelines for addressing them. However, Coast Guard does not anticipate developing written tsunami evacuation plans and providing guidance to units for plan development until December 2025. It also does not anticipate that units will exercise their plans until December 2026. Given the potential risks to Coast Guard personnel and dependents at these units, more timely completion of plans, guidance, and exercises may be warranted.

Link to GAO's full report:

[https://www.gao.gov/products/gao-22-105220?utm\\_source=onepager&utm\\_medium=email&utm\\_campaign=email\\_hsj](https://www.gao.gov/products/gao-22-105220?utm_source=onepager&utm_medium=email&utm_campaign=email_hsj)

<sup>1</sup>The National Defense Authorization Act for Fiscal Year 2021 provides for GAO to study Coast Guard efforts to plan for the evacuation of its personnel and dependents during a major Cascadia Subduction Zone event. GAO's report addresses the extent to which Coast Guard developed tsunami evacuation plans and procedures for its personnel and dependents in the Pacific Northwest. GAO reviewed Coast Guard guidance and policies; reviewed tsunami evacuation plans for 39 coastal units; interviewed Coast Guard officials from headquarters and 10 field units; and interviewed other federal, state, and local officials.

# TSUNAMI PREPAREDNESS

## Great Washington ShakeOut

By Washington Emergency Management Division

Another earthquake will hit Washington state. It's not if, but when.

In what has become an annual tradition, International ShakeOut Day helps prepare millions for the potential of a large earthquake. This year's annual event returns at 10:20 a.m. on Oct. 20, 2022.

Residents are encouraged to register their participation at <https://shakeout.org/Washington>. Then, during the drill, practice Drop, Cover and Hold On. The drill only takes about five minutes, but you and your family are encouraged to take additional steps like crafting a communications plan, making an out-of-state contact list or storing jugs of water – prepare at least one gallon of water per person per day.

In addition, coastal communities will test their tsunami alert sirens at the same date and time using the real sound of the siren, not the Westminster Chimes that typically sound during the monthly tests. Some schools will be practicing evacuation drills as well.

The Pacific Coast of Washington is at risk from tsunamis. Often generated by large, rapid movements in the sea floor that displace the water column above, tsunamis can be truly devastating to coastal communities.

NOAA weather radios set to receive tsunami alerts will also activate during this test.

Those who download the MyShake App will also get a test warning on their phones. The test alert should include test audio telling people that this is a system test and no action is required. The MyShake App is powered the USGS ShakeAlert™ Earthquake Early Warning system and should provide a few seconds of warning before an actual earthquake hits.

ShakeOut becomes a “teachable moment” on par with having an actual earthquake - it's a reminder that we do live in earthquake country and we need to be prepared. The actual behavior of dropping to the ground hopefully under something sturdy, protecting your head and holding on to something becomes part of your muscle memory and you're more likely to repeat the actions when an earthquake actually happens.

While the earthquake threat in Washington is not new, the threat of large scale quakes could cause massive damage to our region. The Pacific Northwest sits in the Cascadia subduction convergent zone which is the collision area between the North America and the Juan de Fuca tectonic plates. The two plates are converging at a rate of about two inches per year. In addition, the northward-moving Pacific plate pushes the Juan de Fuca plate north, causing complex seismic strain to accumulate. The abrupt release of this slowly accumulated strain causes earthquakes, which can be felt frequently throughout the year.

**ARE YOU IN THE ZONE?**  
Prepare for and survive an earthquake and tsunami with these simple steps:

- Know the tsunami inundation zones in your area.
- Create a go-bag and be “2 Weeks Ready” at home.
- Know your tsunami evacuation routes and practice walking them.
- Sign up for local alerts and purchase a NOAA Weather Radio.
- Identify your out-of-area contact and talk to friends & family about your disaster plan.
- Register for the Great Washington ShakeOut at [ShakeOut.org/Washington](https://ShakeOut.org/Washington) and practice drop, cover, and hold at 10:20 AM on 10/20.

**DON'T FORGET!**  
Tsunami sirens will be tested at 10:20 AM on 10/20 with the actual tsunami warning wail sound. This is only a test.

Want to learn more about tsunami hazards in your area? Visit [mil.wa.gov/tsunami](https://mil.wa.gov/tsunami).  
Paid for by the NOAA/National Weather Service tsunami activities grant

# TSUNAMI PREPAREDNESS

## What To Do When The Ground Stops Shaking

By Kenneth Ufkin, Shoalwater Bay Tribe Director of Emergency Management

The State of Washington has been participating in the Great Shakeout for many years now. This year, the Shoalwater Bay Indian Tribe is embracing this opportunity to introduce Tribal members and nearby Tokeland residents to the “Auntie Lee” tsunami tower, which was completed August 5th, 2022.

The tower stands at just 50 feet above sea level and is located about 1.2 miles from the tip of the Tokeland peninsula. Approximately 150 residents of Tokeland and the Shoalwater Bay Indian Tribe live within 30 minutes walking distance of the tower. In an effort to educate the residents of this area to the tower’s presence and intended use, Pacific County Emergency Management, Washington State Hazard Mitigation, and the Shoalwater Bay Tribe’s Emergency Management division have teamed up to carry out a live evacuation exercise with nearby residents.

The focus is simple. When the AHAB sirens go off at 10:20 a.m. on 10/20/2022, those who have chosen to participate will walk to the tower and ascend it. Once locals have made it to the tower, emergency management officials will provide a tour of the tower and explain what to expect during an actual event. The Shoalwater Bay Tribe has equipped the tower with emergency communications radios, food, water, medical supplies, and basic sanitation.



One of the notable communication pieces of this exercise is the evacuation component once the shaking has stopped. Typically, emergency management informs people to drop, take cover, and hold on. However, in the Pacific Northwest a coastal earthquake means when the shaking has stopped, a tsunami could follow, and you have a few precious minutes to make it to high ground.

This year the messaging for Tokeland residents will have a two part evacuation strategy. Either head to high ground or to the evacuation tower. Prior to construction of the tsunami tower, Tokeland residents were instructed to immediately seek high ground after the shaking has stopped. For some nearer the end of the peninsula, walking to high ground was an unachievable goal in a post-earthquake scenario. Now that the tower is complete, residents on the Tokeland peninsula have a place of refuge they can reasonably make it to within the expected arrival times of the initial tsunami surge.

## WA State Kicks Off First Phase of Tsunami Evacuation Route Wayfinding Project

By Elyssa Tappero, Washington Emergency Management Division



Figure 1. Maximilian Dixon (WA EMD) consults a pedestrian evacuation walk map.

**During the last week of August, Washington Emergency Management Division (WA EMD) and the University of Washington (UW) kicked off the first phase of the much-anticipated wayfinding project.** This project, which will take place over several phases across the summer months of 2022 and 2023, involves UW graduate and undergraduate students physically walking mapped tsunami evacuation routes on Washington’s outer and inner coasts (see figure 1). Since Washington’s tsunami evacuation routes have primarily been identified through the Washington Geological Survey’s modeling and mapping efforts, most of these routes have never been traversed by foot; they therefore have little to no signage and some may not be easily accessible to pedestrians. A project of this magnitude is necessary to ensure identified routes are safe and navigable in the event of a local tsunami.

During the kickoff visit to the coast, the WA EMD tsunami team and selected UW students visited the high-risk communities of Westport, Tokeland, and Aberdeen. The WA EMD

*(Continues on page 6)*

# TSUNAMI PREPAREDNESS

## WA State Kicks Off First Phase of Tsunami Evacuation Route Wayfinding Project

By Elyssa Tappero, Washington Emergency Management Division

(Continued from page 5)

tsunami team used this time to educate the UW students about Washington's unique tsunami hazard and risk, train them on how to properly collect the data needed for the wayfinding project, and tweak the project methodology in the field to ensure data collection could be completed as efficiently and thoroughly as possible.

**The students used GPS, photography, and detailed field notes to identify the following information along each mapped evacuation route:**

- Route viability and accessibility (grade, material, potential obstacles like locked gates, overgrown foliage, etc)
- Locations, types, and conditions of current tsunami signage
- Locations, directions, and types of new tsunami signage needed
- Locations of identified assembly areas which are not accessible or otherwise may need to be reconsidered
- Other relevant notes and suggestions

**This first phase of the wayfinding project highlighted many of the issues Washington and other coastal regions face regarding tsunami evacuation routes.** The team

encountered confusing tsunami signage that sometimes pointed in the wrong direction, multiple directions, or no clear direction at all (figure 2 far left); mapped routes that lead to or through private property, locked gates, and other barriers (figure 2 top right); damaged signs (figure 2 middle bottom); and other confusing signage which may mislead pedestrians trying to evacuate (figure 2 far right bottom). There was also a distinct lack of signage in many areas, including campgrounds and beach parking areas where tourists and other visitors congregate.

Clearly marked and accessible evacuation routes are essential to safe tsunami evacuation, especially in areas like the Washington outer coast where high ground is often far away and hard to reach on foot due to wetlands, dense vegetation, cliffs, and other natural features. **Modeling alone isn't enough to identify adequate evacuation routes – the routes must also be assessed in person to ensure someone unfamiliar with the area and the hazard could easily follow them to high ground.** Washington is excited to finally undertake this project and looks forward to sharing the results over time. Until then, please connect with the team by contacting [Elyssa.Tappero@mil.wa.gov](mailto:Elyssa.Tappero@mil.wa.gov) if you're interested in learning more about the methodology used to apply it to your own jurisdiction.



Figure 2. Far left, a tsunami sign pointing toward high ground in two directions with no indication of which high ground is closer in Tokeland, WA. Upper right, a locked gate barring the way through a mapped tsunami evacuation route in Tokeland, WA. Bottom middle, the wayfinding team records the location and condition of a bent tsunami evacuation route sign in Aberdeen, WA. Bottom right, two UW graduate students note the location of a confusing directional sign which seemingly points with one arrow directly into the ocean.

# TSUNAMI PREPAREDNESS

## In Barbados, UNESCO Renews Focus on Capacity Building to Prepare Caribbean Communities for Tsunamis and Other Coastal Hazards

News Release 2 September 2022 by UNESCO Intergovernmental Oceanographic Commission

Rolling out its Tsunami Ready Recognition Programme (IOC-UNESCO TRRP), UNESCO's Intergovernmental Oceanographic Commission hosted a [Tsunami Ready Mapping Workshop in Bridgetown, Barbados 8-12 August 2022](#), and co-organized a series of community, national and partner engagement activities.

The week of activities (8-13 August 2022) was organized via the IOC-UNESCO Caribbean Tsunami Information Centre (CTIC), in association with key regional partners, including the Caribbean Office of the International Information Center (ITIC), led by the U.S. National Oceanic and Atmospheric Administration, the National University of Costa Rica, and the Government of Barbados.

The Hon. Wilfred Abrahams M.P., Minister of Home Affairs and Information, Barbados, in his feature address at the Workshop's Opening Ceremony traced the long history of partnership between Barbados and the IOC-UNESCO, including Barbados' hosting of the inaugural Intergovernmental Coordination Group (ICG) meeting of the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (CARIBE EWS) in 2005, as well as for hosting the CTIC throughout various phases since 2006.



Workshop Opening Ceremony Group Photo. See more photos here: <https://flic.kr/s/aHBqjA5xR8>

*“For us in this region, I expect that the CTIC will continue to positively impact our preparedness, mitigation, response and recovery efforts for the tsunami hazard. I submit that we must utilise our energy and our talent to uplift this organization and the region in order to bring change to the lives of those who require assistance. The challenges which disasters present, as a consequence of hazards such as tsunamis, are enormous but not insurmountable. Through cooperation and concrete action we can persevere and in so doing, build capacity and develop more resilient, safe communities,”* said the Hon. Wilfred Abrahams M.P.

The Minister further highlighted the importance of capacity building initiatives such as the workshop and side events in contributing to the IOC-led [UN Decade of Ocean Science for Sustainable Development 2021-2030](#), and the fulfillment of its goal that 100% of communities at risk to be prepared for and resilient to tsunamis by 2030 through programmes like Tsunami Ready.

The workshop included a study tour, focused on the community of Christ Church West, which is being nominated for Tsunami Ready Recognition. The tour was led by Dr. Leo Brewster, Director, CZMU and members of the Christ Church West District Emergency Organisation (DEO), who presented a draft tsunami evacuation map developed by the community, and showcased the integration of multi-hazard approach to coastal risk management.

Other activities included an evening community engagement session, two training sessions for the Barbados Meteorological Services on the effective receipt and analysis of tsunami warning messages.

Last stop of the week, IOC-UNESCO and national authorities headed to the west coast community of Porters to Holders Hill St. James for a whistle stop tour of a UNESCO project supported by the Norwegian Agency for Development Cooperation (NORAD), which included a demonstration of potential evacuation routes and assembly points at the southern Holetown Boardwalk.

The week's workshop and other activities sought to enhance capacity building in the nine communities currently implementing the IOC-UNESCO Tsunami Ready Programme in the region, across eight countries. The work is financially supported by NORAD, the Government of Australia, and the U.S. Agency for International Development (USAID).

# TSUNAMI PREPAREDNESS

## UN Ocean Decade Tsunami Programme and the Establishment of the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)

UNESCO Intergovernmental Oceanographic Commission (IOC) Circular Letter No. 2896

In June 2021, the IOC Assembly approved, through IOC Decision [A-31/3.4.1\(III\)](#) (Warning Mitigation Systems for Ocean Hazards), the development of an IOC Ocean Decade Tsunami Programme (ODTP) in the framework of the United Nations Decade of Ocean Science for Sustainable Development (2021–2030). A Scientific Committee has been established (cf. [Circular Letter 2876](#) of January 2022) and is working on a draft 10-Year Research, Development and Implementation Plan for the ODTP to be presented to the Working Group on Tsunamis and Other Hazards related to Sea Level Warning and Mitigation Systems (TOWS-WG) for review at its 16th meeting in February 2023. Once finalized, the plan will be submitted to the IOC Assembly for approval at its next meeting in June 2023.



Last June, the IOC Executive Council at its 55th session, took a major step towards one of the major objectives of ODTP to “make 100% of communities at risk of tsunami prepared for and resilient to tsunamis by 2030” by approving the implementation of the UNESCO-IOC Tsunami Ready Recognition Programme (UNESCO-IOC TRRP) and similar initiatives (Decision [EC-55/3.5.1\(IV\)](#)).

The UNESCO-IOC TRRP is a key contribution to achieving the societal outcome of the ‘Ocean Decade: ‘A Safe Ocean where life and livelihoods are protected from ocean-related hazards’. The UNESCO-IOC TRRP is an international, voluntary, community-based recognition programme developed by UNESCO-IOC. It aims to build resilient communities through the promotion and assessment of awareness, preparedness and response strategies that will help to protect life, livelihoods, and property from tsunamis across different regions. For more information I refer you to the [UNESCO-IOC TRRP endorsed proposal](#) that was prepared by the TOWS-WG Task Team on Disaster Management and Preparedness.

The full Standard Guidelines for TRRP are described in [IOC Manuals and Guides No 74](#) on the UNESCO-IOC website with additional information also available on the Tsunami Ready [website](#).

In a very brief summary, UNESCO-IOC TRRP promotes the concept of readiness through community actions to meet [12 key indicators](#) that serve as the standard for reducing tsunami risk and impact at the community level. For a community to be recognized by UNESCO-IOC as Tsunami Ready, all 12 indicators must be met.

The UNESCO-IOC Tsunami Unit oversees the administration of the TRRP, the implementation of which is coordinated by the IOC’s Intergovernmental Coordination Groups (ICGs) of the four regional tsunami warning systems that are in place for: the Caribbean and Adjacent Region (ICG/CARIBEEWS); Indian Ocean (ICG/IOTWMS); North-eastern Atlantic, the Mediterranean and connected seas (ICG/NEAMTWS); and the Pacific Ocean (ICG/PTWS). The respective Tsunami Information Centres (TICs) in each region serve as focal point to help advise Member States on the implementation of Tsunami Ready in their countries.

Through this Circular Letter, Tsunami National Contacts (TNCs) and Tsunami Warning Focal Points in Member States of the ICG/CARIBE-EWS, ICG/IOTWMS, ICG/NEAMTWS, and ICG/PTWS are invited to support the implementation of the UNESCO-IOC TRRP as described above. Countries that wish to join the UNESCO-IOC TRRP are invited to initiate the recognition process through their Tsunami National Contact (TNC). This includes the establishment of a National Tsunami Ready Board (NTRB) (cf. Section 5 of Manuals and Guides, 74 ‘Implementation workflow for the recognition process’). The UNESCO-IOC Tsunami Unit ([TsunamiReady@unesco.org](mailto:TsunamiReady@unesco.org)) and Tsunami Information Centres are available to technically support Member States in the process and provide more information as required.



## ***Tsunami Warning Coordinator Corner*** **National Tsunami Warning Center Visits California's Bay Area**

By Dave Snider, Tsunami Warning Coordinator, National Tsunami Warning Center

I've told this story 100 times-this makes it 101: one of the best informative experiences I've had occurred when I was a TV broadcaster starting up a news station in North Carolina. We weren't on-air yet, we had completed all the corporate training, the computer systems weren't online yet, and the boss saw an opportunity for the weather team to learn. The instructions were: section off our viewing area map and visit as many towns as you can in one day. Come back with the pictures from the town square, see where people are gathering, drive past the high school football field, and make sure you have lunch somewhere local. By the end of that week, we knew Central Carolina like we'd lived there for years. I've never known my local audience's home turf like I did when I worked in Raleigh. The result was considerable local audience understanding, which led to considerable early viewership growth from a startup TV station.



USCG Sector SF (Bay Bridge in background), learning local needs for rapid tsunami information

Reprising that feeling and requirement, the National Tsunami Warning Center Director Dr. James Gridley and I (with Ian Sears-NWS HQ, Scott Carpenter-NWS Western Region, Yvette LaDuke-CalOES, Rick Wilson and Nick Graehl-CalGS) set out to the Bay Area to learn from the locals and those who serve them: the U. S. Coast Guard (USCG), California Office of Emergency Services, staff from Berkeley Marina and Santa Cruz Harbor, Monterey County Emergency Services, and the National Weather Service Weather Forecast Office (WFO) in Monterey.

WFO Monterey Warning Coordination Meteorologist Brian Garcia led the way as we visited USCG Sector San Francisco and District II/PacArea command. The USCG requested routine tsunami training for their rotational staff to maintain readiness. They shared that amplitude forecasts are useful, but a better tsunami forecast would feature the peak and trough which could better inform decision makers guiding vessels in and out of the Bay. The USCG could recommend ships tie off with more lines in-port if drawdown levels meant the keel would be in the mud. The National Weather Service is focusing efforts to improve service to the USCG with tsunami in mind and is working to re-establish an NTHMP presence by a USCG service member in the future.

At the Berkeley Marina, we heard about the struggles of informing the right people through the federal Emergency Alert System and Wireless Emergency Alert systems. Overwarning adds a burden to emergency managers who only need to alert the coast in an "advisory". The challenge of an increasing population of liveaboards is also front-of-mind for our local managers.

*(Continues on page 10)*

## ***Tsunami Warning Coordinator Corner*** **National Tsunami Warning Center Visits California's Bay Area**

By Dave Snider, Tsunami Warning Coordinator, National Tsunami Warning Center

*(Continued from page 9)*

Yvette welcomed us to CalOES in Sacramento the following day. Again, we heard about a regular requirement of tsunami awareness training and a need for better familiarity with NTWC's event response timeline. CalOES processes a multitude of events that could require response-level decisions and actions. For CalOES, maintaining readiness for tsunami means they have a clear understanding of any current tsunami situation and what comes next. NTWC will be working with Yvette and her team to shore up those concerns this next fiscal year.

The next day, we toured the Santa Cruz marina where we saw damage from the January Hunga Tonga-Hunga Ha'apai tsunami. Damage in surrounding small harbors is still being tallied, but the harbormaster reported about \$18 Million in harbor infrastructure damage and about \$60 Million in personal property damage (Tsunami Advisories are warning-level events for a harbor). We heard that if there's enough time and notice, vessel owners can move craft to the muster point about one mile offshore-but it's a challenge to get people to their craft, get underway, move carefully out of harbor at the same time, and travel that far off shore to deep water. And again, reaching liveaboards is a challenge in a Tsunami Advisory-level alert. Harbormaster John Haynes also described how canceling a tsunami alert isn't the end of the story for his customers. He said there is still a considerable local impact that may not match the message when an advisory ends. Strong currents remain an issue but public messaging becomes more difficult with national-level messages ending support for a local harbor before his marina and coast is truly "all clear".



Discussion of concerns about event information and decision making gaps, requirements for future tsunami I01 training, and associated challenges at CalOES.

Our last stop was WFO Monterey where the travel team met with Monterey County Emergency Services Planner Kelsey Scanlon who discussed local impacts of tsunami alerting. NTWC heard that by not addressing the full scale of tsunami hazard - from wave to currents - we make local safety more difficult to manage. Another challenge occurs when the public and responders receive an alert notice at the same time, putting emergency management and responders behind the 8-ball to meet immediate information and safety demands of the public they serve.

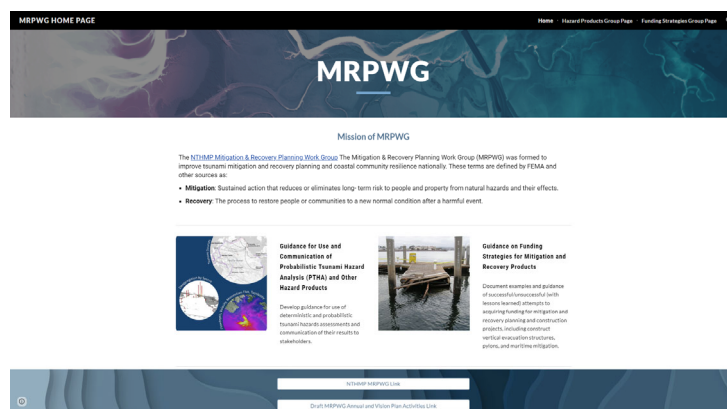
By now, many of you are probably nodding your head or shaking your fist, thinking much of this information has already been said at different times, in different ways, from different mouths. And I agree. Understanding your challenges and concerns at the ground-level is the only way we, as a total tsunami safety team, can move our efforts forward. And I believe the change we have now is that the National Tsunami Warning Center is finally poised to take action on this information with your help. Let's go.

## Update on NTHMP Mitigation and Recovery Planning Work Group Activities

By Rick Wilson, Manager of Tsunami Unit at California Geological Survey

In 2019, the U.S. National Tsunami Hazard Mitigation Program (NTHMP) formed a Mitigation and Recovery Planning Work Group (MRPWG) to improve tsunami mitigation and recovery planning and coastal community resilience nationally. The purpose of the MRPWG is to: 1) address NTHMP Strategic Plan goals and strategies with regard to tsunami mitigation and recovery planning; 2) leverage the work of outside experts and organizations, such as FEMA, the American Society of Civil Engineers, land-use planners, and recovery specialists; 3) create planning guidance and provide example products; and 4) facilitate review of and provide feedback on partner tsunami mitigation and recovery products to ensure the production methods and the products themselves are accurate, consistent, and cost-effective.

During the July 2022 NTHMP Meeting in Palm Springs, members of the MRPWG met to discuss ongoing work and their annual work plan activities. MRPWG has assisted in the development of the NTHMP maritime guidance website and initiated writing guidance to address tsunami debris, communication of probabilistic tsunami map products, and funding opportunities for tsunami mitigation and recovery. In the 2022-23 time period, the MRPWG will continue to develop guidance and work on a number of related tasks, including:



Screen capture of the NTHMP MRPWG project-tasks collaboration website.

- Evaluating harbors where engineering improvements and other tsunami mitigation measures prevented or reduced damage during the January 15, 2022 tsunami from the volcanic eruption in the Tonga region.
- Continuing engagement of experts who have experience with discussing “probabilities” such as NOAA-NWS hurricane modelers and Cascadia CoPes Research Hub researchers.
- Continuing to support Oregon’s tsunami debris guidance work and the NTHMP debris and sediment modeling workshops.
- Collecting examples of successful mitigation and recovery funding grants, especially where the “local funding match” was reduced, and continuing engagement with the “blue economy” such as port captains, harbor masters, and related associations to help with tsunami mitigation funding.
- Engaging engineering organizations to develop guidance for using/improving existing structures as tsunami vertical evacuation “refuges of last resort.”

In many cases, completion of this work will depend on leveraging the work from other funding sources and collaborations with partner organizations. MRPWG members will continue to work with partners to improve tsunami mitigation and recovery planning efforts at the state and local levels.

# TSUNAMI RESEARCH

## Marine Scientist Hired as New Oregon Sea Grant Extension Coastal Hazards Specialist

By Chris Burnham, Oregon State University News

Felicia Olmeta-Schult, a marine and social scientist, is the new coastal hazards specialist with Oregon Sea Grant and the Oregon State University Extension Service.

Olmeta-Schult succeeds Patrick Corcoran, who retired in 2020 after 32 years with Sea Grant Extension.

Olmeta-Schult previously served as an Oregon Sea Grant-funded Resilience Fellow. In that role, she created the [Oregon Coastal Hazards Ready Library and Mapper](#), an online collection of case studies of how Oregon's coastal communities are dealing with the impacts of climate change and coastal natural hazards such as erosion, landslides, flooding and the threat of a tsunami.

“What truly interested me in this position was that I’m always looking for ways to make science accessible to the general public,” Olmeta-Schult said. “Public service is meaningful and useful and highly rewarding. In this position I will serve as a liaison between scientists and the public, and get information to people who need it the most.”

Olmeta-Schult, an assistant professor of practice, will help educate and prepare coastal residents and visitors for the predicted Cascadia Earthquake and resulting tsunami, a devastating natural disaster that could occur in the next 50 years.



Olmeta-Schult’s responsibilities include:

- Increasing collaboration among coastal decision makers and researchers on the development of data and tools for monitoring and adapting to coastal natural hazards.
- Assessing people's needs for education on climate change and coastal hazards.
- Educating people on the impacts of climate change and coastal hazards and assessing their vulnerability to such impacts.
- Increasing coastal decision-makers' awareness of data observation systems and other tools to protect lives and infrastructure.

Olmeta-Schult earned a bachelor's degree in oceanography from Hawaii Pacific University, a master's in marine affairs from the University of Rhode Island, and a doctorate in environmental and natural resource sciences from Washington State University. She was a 2018-19 Washington Sea Grant Hershman Fellow.

She hosts the [Rising Sea Voices podcast](#) on the American Shoreline Podcast Network. She is a member of the Association for Women in Science, Women’s Aquatic Network and Women in Environment.

Link to news story:

<https://today.oregonstate.edu/news/marine-scientist-hired-new-oregon-sea-grant-extension-coastal-hazards-specialist>

# TSUNAMI RESEARCH & EVENTS

## RESEARCH

- Bull, Suzanne; et al, 2022, “Landslide Graveyard” Holds Clues to Long-Term Tsunami Trends: EOS, v. 103, no. 10, p. 28-33, <https://eos.org/wp-content/uploads/2022/09/Oct22.pdf>.
- Lynett, P., et al, 2022, Diverse tsunamigenesis triggered by the Hunga Tonga-Hunga Ha’apai eruption: Nature, v. 609, p. 728-733, <https://doi.org/10.1038/s41586-022-05170-6>.
- Pakoksung, Kwanchai; et al, 2022, The near-field tsunami generated by the 15 January 2022 eruption of the Hunga Tonga-Hunga Ha’apai volcano and its impact on Tongatapu, Tonga: Scientific Reports, no 12, article 15187, <https://doi.org/10.1038/s41598-022-19486-w>.
- Ramos, M. D.; et al, 2022, Upper-plate structure and tsunamigenic faults near the Kodiak Islands, Alaska, USA: Geosphere, v. 18, no. 5, p. 1474–1491, <https://doi.org/10.1130/GES02486.1>.
- Range, M. M., et al, 2022, The Chicxulub Impact Produced a Powerful Global Tsunami: AGU Advances, v. 3, no. 5, article e2021AV000627, <https://doi.org/10.1029/2021AV000627>.
- Sarlin, W., et al, 2022, From granular collapses to shallow water waves: A predictive model for tsunami generation: Physical Review Fluids, v. 7, no. 9, article 094801, <https://doi.org/10.1103/PhysRevFluids.7.094801>.
- van Zelst, I.; et al, 2022, Earthquake Rupture on Multiple Splay Faults and Its Effect on Tsunamis: JGR Solid Earth, v. 127, no. 8, article e2022JB024300, <https://doi.org/10.1029/2022JB024300>.
- Witter, Rob; et al, 2022, Seismic Sources in the Aleutian Cradle of Tsunamis: EOS, v. 103, no. 10, p. 20-26, <https://eos.org/wp-content/uploads/2022/09/Oct22.pdf>.



## UPCOMING NTHMP & RELATED EVENTS

- ◆ November 5, 2022—World Tsunami Awareness Day <https://tsunamiday.undrr.org/>
- ◆ December 12-16, 2022—AGU Fall Meeting (Chicago, IL) <https://www.agu.org/fall-meeting>
- ◆ January 23-27, 2023—NTHMP Winter Meeting (Location TBD) <https://nws.weather.gov/nthmp/index.html>
- ◆ March 23, 2023—CARIBE WAVE 23 Tsunami Exercise <https://www.weather.gov/itic-car/caribewave23>
- ◆ April 17-20, 2023—Seismological Society of America Meeting (San Juan, Puerto Rico) <https://meetings.seismosoc.org/>
- ◆ July 11-20, 2023—IUGG General Assembly/Joint Tsunami Commission Meeting and Session (Berlin, Germany) <https://www.iugg2023berlin.org/>

