

## NTHMP Partners Receive NOAA Silver Award

By Kelly Stroker, NOAA National Centers for Environmental Information (NCEI)

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From left to right: Mike Angove, Kelly Stroker, Chip Guard, and Mary Guard

On October 16, 2019, several of our NTHMP partners received Silver Medals in Scientific and Engineering Achievement at the Department of Commerce Gold and Silver Medal Awards Ceremony in Washington, DC. Chip Guard, NWS Guam Office, was part of a team that received an award for developing, refining, and implementing methods and tools to enable routine weekly drought monitoring in the US Affiliated Pacific Islands.

NWS Tsunami Program Manager, Mike Angove and Kelly Stroker, representing the NCEI Digital Elevation Model (DEM) team, received the award for significant and innovative scientific advancements in developing digital elevation models for the NOAA Tsunami Program as well as the COASTAL Act. The award was shared with NWS Project Manager for the COASTAL Act, Nicole Kurkowski. The NCEI DEM Team consists of University of Colorado/CIRES staff, Kelly Carignan, Mike Sutherland, Matt Love, and Chris Amante. The University will present a matching Silver Award to the team at the Spring Awards Ceremony.



From left to right: Deputy Secretary of Commerce Karen Kelley, Nicole Kurkowski, Mike Angove, Kelly Stroker, Secretary of Commerce Wilber Ross, Acting NOAA Administrator Neil Jacobs

# TsuInfo Alert

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

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

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## United Nations Decade of Ocean Science for Sustainable Development (2021-2030)

The United Nations has proclaimed a Decade of Ocean Science for Sustainable Development (2021-2030) to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean.

The marine realm is the largest component of the Earth's system that stabilizes climate and support life on Earth and human well-being. However, the First World Ocean Assessment released in 2016 found that much of the ocean is now seriously degraded, with changes and losses in the structure, function and benefits from marine systems.

In addition, the impact of multiple stressors on the ocean is projected to increase as the human population grows towards the expected 9 billion by 2050.

Adaptation strategies and science-informed policy responses to global change are urgently needed.



Scientific understanding of the ocean's responses to pressures and management action is fundamental for sustainable development. Ocean observations and research are also essential to predict the consequences of change, design mitigation and guide adaptation.

As mandated by the UN General Assembly, the [Intergovernmental Oceanographic Commission](#) (IOC) of UNESCO will coordinate the Decade's preparatory process, inviting the global ocean community to plan for the next ten years in ocean science and technology to deliver, together, the ocean we need for the future we want!

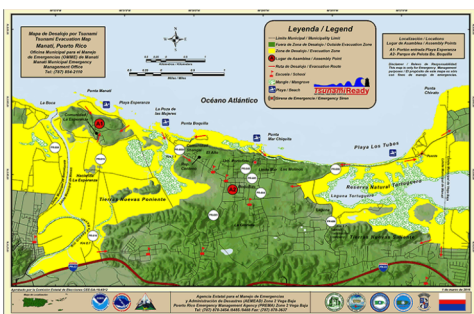
For more information visit: <http://www.oceandecade.org/>

# TSUNAMI PREPAREDNESS

## Tsunami Evacuation Signs for Public Beaches in Puerto Rico

By Alejandro Torres Padilla, Roy Ruiz Vélez, and Victor Huerfano, Puerto Rico Seismic Network (PRSN)

In the past years, due to the high number of tourists and residents from around the Island that visit the beaches and coastal areas, the Puerto Rico Seismic Network (PRSN) in collaboration with the National Parks Office and the Emergency Management Bureau have created tsunami evacuation signs specially designed to be installed in some public beaches and recreational sites on the coasts of Puerto Rico with the purpose to inform the citizens and tourists visiting the beach about where they should go in the event of a tsunami. Around a total of 21 tsunami evacuation signs were installed.



Most of the signs installed were heavily damaged or went missing as a result of Hurricane María. In response, PRSN created an inventory of tsunami evacuation sign status so missing or damaged signs could be replaced ([see previous TsuInfo article](#)). Municipalities involved with this project include Cabo Rojo, Dorado, Toa Baja, Ponce, and Aguadilla.

As a way to expand the project, a new sign was developed for Mar Chiquita Beach in Manatí. The front of the sign includes the tsunami evacuation map for the municipality and the map designed specifically for Mar Chiquita Beach. On the back of the sign it shows the various tsunami warning messages in case of a tsunami event: Warning, Advisory, Watch, and Information Statement.



Manatí, located on the northern coastal plain region of Puerto Rico, has a total population of close to 40,000. Around 2,500 of those residents live within the Tsunami Hazard Zone. Manatí draws some of the biggest crowds of tourists due to its beaches, historical sites, and gastronomy. This new type of sign was designed specifically with the tourists and residents living within the Tsunami Hazard Zone in mind.

## World Tsunami Awareness Day

In 2019, the World Tsunami Awareness Day will promote Target (d) of the "Sendai Seven Campaign" which focuses on reducing disaster damage to critical infrastructure and disruption of basic services.

Over 700 million people live in low-lying coastal areas and Small Island Developing States exposed to extreme sea-level events including tsunamis (IPCC).



Investing in resilient infrastructure, early warning systems, and education is critical to saving people and protecting their assets against tsunami risk in the future.

Find out more: <https://www.unisdr.org/tsunamiday>

# TSUNAMI PREPAREDNESS

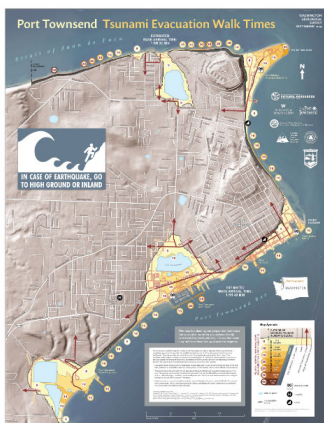
## Tsunami Evacuation Walk Time Maps Published in Washington State

By Alex Dolcimascolo, Washington Geological Survey

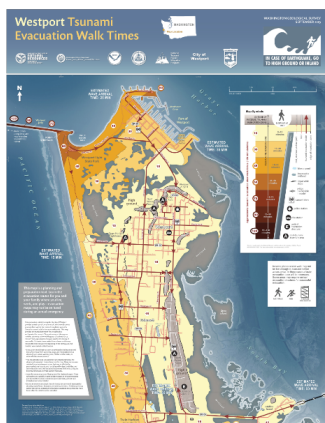
The Washington Geological Survey (WGS) published “Tsunami Evacuation Walk Time” maps for the communities of Port Townsend, Westport, Long Beach & Seaview, and Ilwaco & Cape Disappointment on October 10<sup>th</sup>, 2019. The maps show the amount of time it would take to evacuate from within the modeled tsunami inundation zone resulting from a magnitude 9.0 Cascadia-sourced subduction zone earthquake. The maps show the extent of the tsunami inundation zone and the paths of tsunami evacuation routes. Colors indicate how many minutes it would take to get to safety from any given location within the inundation zone.

These maps were developed using the U.S. Geological Survey’s Pedestrian Evacuation Analyst Tool (<https://www.usgs.gov/software/pedestrian-evacuation-analyst-tool>) for ArcGIS. Emergency managers, planners, and local elected officials were heavily involved in the project providing valuable local knowledge and decision making to best serve the communities represented. The walk time maps are available for download by clicking on images below:

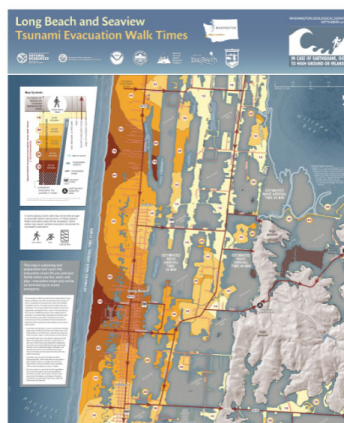
### PORT TOWNSEND



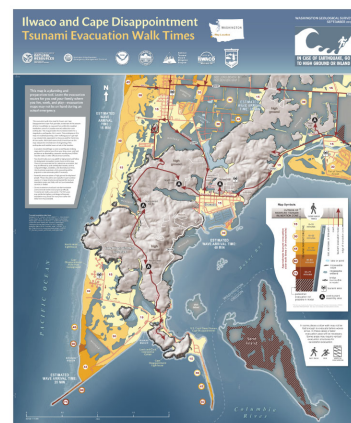
### WESTPORT



### LONG BEACH & SEAVIEW



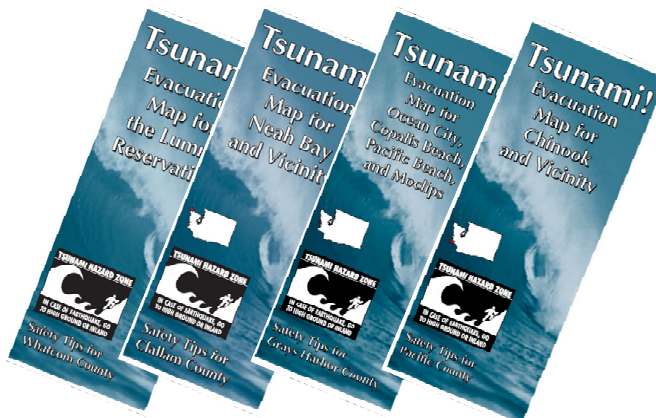
### ILWACO & CAPE DISAPPOINTMENT



The maps are also available through an interactive map on the WGS website:

<https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/Tsunamis#preparation-and-evacuation.6>

The interactive map also provides access to tsunami evacuation brochures for areas that do not have walk time maps yet.



# NTHMP UPDATES

## Farewell to Carolina Hincapié

By Christa von Hillebrandt-Andrade, NWS Caribbean Tsunami Warning Program

Carolina Hincapié joined the Caribbean Tsunami Warning Program (CTWP) in 2015. During her four plus years with CTWP, she worked as a contractor, student intern and student trainee (Pathways). Independent of her position, she provided critical support to many different activities and helped advance the tsunami warning system for the Caribbean and adjacent regions.

Rocky Lopes, Deputy Tsunami Program Manager at National Weather Service Headquarters said, “I could always rely on Carolina for knowledgeable, informative, and prompt responses to a number of questions that she responded to for us, especially when Christa von Hillebrandt was on official travel, but answers could not wait. Her commitment and dedication to the mission was always outstanding.”

A native of Colombia, she was key to the roll out of the International Tsunami Information Center’s Tsunami Evacuation Mapping and Planning Project and its pilot in Honduras. Her work helped lay the foundation for what has become a global program being implemented around the world. As the UNESCO IOC Tsunami Ready program gained traction, she put her previously acquired experience supporting the NWS TsunamiReady® Program in Puerto Rico to work. Thanks in large part to her dedication and guidance, communities in over 15 countries and territories in the Caribbean and along the Pacific coast of Central America have received or are in the process of being recognized as Tsunami Ready by UNESCO.



From left to right: Karina Tañón, Jazar Abuellouf, Marcos González, Carolina Hincapié, Christa von Hillebrandt-Andrade, Josué Aceituno and Stephanie Soto.

In addition to supporting improved readiness and preparedness of communities throughout the region, Carolina also monitored the status of seismic and sea level station data for the Caribbean and adjacent regions collected and distributed by the U.S. Pacific Tsunami Warning Center and National Tsunami Warning Center.

In September of 2019, Ms. Hincapié decided not to continue as a Pathways student so she could focus completely on her PhD studies in Physical Oceanography at the University of Puerto Rico at Mayagüez. She will continue to support the advancement of tsunami science and readiness as a Research Assistant at the Puerto Rico Seismic Network where she began her work in tsunami science in 2006.

She will be remembered by students and staff of the CTWP and the communities and agencies she served as a committed and responsible scientist with a keen attention to detail, perseverance and sense of empowerment. She will be missed, but we wish her all the best on her PhD venture.

# NTHMP UPDATES

## Remembering George W. Carte of the National Tsunami Warning Center

By Paul Whitmore, Retired Director of the National Tsunami Warning Center (NTWC)

June 28, 2019 was a sad day for the tsunami community as one of its longtime members passed away peacefully at home. George W. Carte, one of the original five staff of what is now the NOAA National Tsunami Warning Center, ended a fight with age-related illnesses. George was remembered at a Memorial Service in Palmer, Alaska on October 10th where his legacy as former mayor of the city, initiator of a long-running sister city program with Saroma, Japan, and his important work in the early years of the tsunami warning service were honored.

George's contributions to the early development of the warning system were many. His dedication to mission and his ability to communicate with customers were some of his strongest attributes. One of his main contributions was the development of the Alaska Tsunami Community Preparedness program in the 1970s. He conducted this program for decades before his retirement in the 1990s. The program was the forerunner and foundation of what would later be known as TsunamiReady.



George spent many nights visiting small coastal communities along the Alaska coast with the single purpose of helping those communities prepare for the inevitable tsunami impact. Long before high-resolution inundation maps were available, George worked out methods for communities to identify tsunami safe and not-safe regions. With this information, communities knew how to respond and often did not wait for warnings to be issued to take action. When the NWS StormReady program expanded to TsunamiReady in the 1990s, the program benefitted by George's groundwork in preparedness. That groundwork quickly expanded from Alaska to the U.S. West Coast, and now internationally.

George is survived by his wife, children, and grandchildren, who can all be proud of his many impacts and achievements in life, as well as the manner in which he achieved them.

## New Tsunami Program Coordinators at the Washington State Emergency Management Division

Elyssa Tappero has taken over for Keily Yemm as Tsunami Program Coordinator at the Washington Emergency Management Division (EMD). Her work focuses on mitigating the impact of Washington's tsunami hazards through public education, community response planning, accurate hazard assessment, and an informed warning process. Through an annual NOAA/NWS Tsunami Activity grant, Elyssa coordinates a wide variety of projects that include AHAB siren maintenance, tsunami inundation and evacuation modeling and mapping, support for TsunamiReady community status, and development of vertical evacuation structure best practices. Prior to her time with EMD, Elyssa provided disaster preparedness training through The American Red Cross and other forms of public education through the King County Housing Authority, as well as federal grant management with The Geneva Foundation. She has a bachelor's degree in Geoscience from Pacific Lutheran University.



*(Continues on page 7)*

# NTHMP UPDATES & RESEARCH

## New Tsunami Program Coordinators at the Washington State Emergency Management Division

(Continued from page 6)

Jacob Witcraft is filling a new Tsunami Program Coordinator position made possible through FY19 grant funding from NOAA's National Weather Service. His work will focus on the mitigation of tsunami impacts along the inner coast of Washington State in the Puget Sound region. Jacob will also be working on developing a Maritime Response and Mitigation Strategy for the Port of Bellingham, as well as assisting in public education of tsunami hazards. Before joining EMD, Jacob spent 14 years on the Big Island of Hawaii working for the Division of Forestry and Wildlife. As a forester for the State of Hawaii, Jacob ran the State Tree Nursery growing native Hawaiian trees for restoration, and assisting landowners and project managers with planting and restoration projects. He also was a first responder on wildfire incidents and served on the Incident Management Team during the 2018 Kilauea volcanic eruption. He earned a bachelor's degree in the Human Dimensions of Natural Resources from Oregon State University.



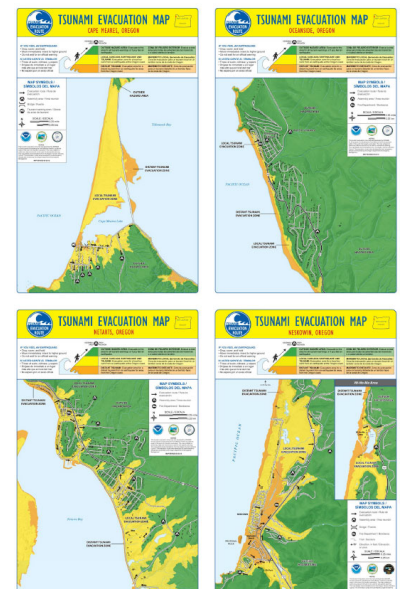
## Tsunami Evacuation Analysis of Some Unincorporated Tillamook County Communities: Building Community Resilience on the Oregon Coast

By Laura L. S. Gabel, Fletcher E. O'Brien, John M. Bauer, and Jonathan C. Allan  
(DOGAMI Open-File Report O-19-08)

**ABSTRACT:** Pedestrian evacuation routes were evaluated for a local tsunami generated by an earthquake on the Cascadia Subduction Zone (CSZ) in the Tillamook County communities of Cape Meares, Bayocean Spit, Oceanside, Netarts, Cape Lookout State Park, and Neskowin. Our analyses focused on a maximum-considered CSZ tsunami event covering 100% of potential variability, termed XXL and generated by a magnitude 9.1 earthquake. Evacuation paths were limited to established roads, trails, and pedestrian pathways designated by local government reviewers as the most likely routes.

To assist in pedestrian tsunami evacuation, we produced maps and digital data that include the following:

- Tsunami wave advance for an XXL event,
- Detailed “Beat the Wave” (BTW) results for the XXL scenario, including evacuation routes and minimum walking speeds,
- Detailed BTW results for the LI scenario in select locations,
- BTW results for multiple hypothetical scenarios, and
- Socioeconomic analysis that provides insights into the unique preparation, response, and recovery challenges that communities may face due to vulnerable populations.



See full report: <https://www.oregongeology.org/pubs/ofr/p-O-19-08.htm>

# TSUNAMI RESEARCH & NTHMP EVENTS

## NEW TSUNAMI RESEARCH

Ishimura, Daisuke; Yamada, Keitaro, 2019, Palaeo-tsunami inundation distances deduced from roundness of gravel particles in tsunami deposits: *Scientific Reports*, v. 9, no. 10251, 8p.

<https://www.nature.com/articles/s41598-019-46584-z>



Larsen, B. E.; Fuhrman, D. R., 2019, Full-scale CFD simulation of tsunamis. Part 1: Model validation and run-up: *Coastal Engineering*, v. 151, p. 22-41, <https://doi.org/10.1016/j.coastaleng.2019.04.012>.



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Williamson, A.; Melgar, D.; Rim, D., 2019, The effect of earthquake kinematics on tsunami propagation: *Journal of Geophysical Research Solid Earth*, <https://doi.org/10.1029/2019JB017522>.



## UPCOMING NTHMP & RELATED EVENTS

- ◆ November 5, 2019—World Tsunami Awareness Day  
<https://www.unisdr.org/tsunamiday>
- ◆ December 9-13, 2019—AGU Fall Meeting (San Francisco, California)  
<https://fallmeeting.agu.org>
- ◆ January 28-31—NTHMP Winter Meeting (Portland, Oregon)  
<https://nws.weather.gov/nthmp/2020wintermeeting/index.html>
- ◆ March 19, 2020—CARIBE WAVE 20 Tsunami Exercise  
<https://www.weather.gov/ctwp/>
- ◆ March 24, 2020—Lantex Tsunami Exercise  
<https://nws.weather.gov/nthmp/tsunamiexercises.html>
- ◆ March 26, 2020—Pacifex Tsunami Exercise  
<https://nws.weather.gov/nthmp/tsunamiexercises.html>

