

CARIBE WAVE 19 Exercise

By Christa von Hillebrandt-Andrade, Stephanie Soto, Josue Aceituno, Jazar Abuellouf, Karina Tañón, and Carolina Hincapié, NOAA NWS Caribbean Tsunami Warning Program

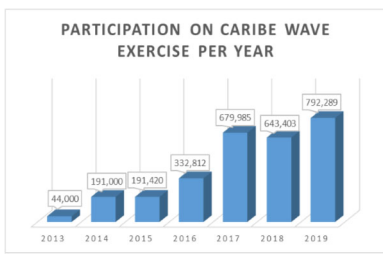
IN THIS ISSUE:

CARIBE WAVE 19 Exercise	1
NTHMP Releases New Tsunami Guide	2
Kodiak, Alaska Tsunami Operations Workshop	3
Christa Rabenold Leaving NWS Tsunami Program	3
NTWC Open House	4
Long Beach, California Tsunami Walk	5
High School Students Win Tsunami Preparedness PSA Contest	5
The Creation and Execution of LANTEX19	6
WA Tsunami Response Tabletop Exercise & 3rd Annual Tsunami Roadshow	6
Tsunami Evacuation Walk Time Maps for WA	8
NTHMP Events	8

According to preliminary information, almost 800,000 people from Bermuda thru Brazil and across the entire Caribbean basin participated in the CARIBE WAVE 19 tsunami exercise on March 14, 2019. The exercise was conducted within the framework of the UNESCO Intergovernmental Coordination Group for Tsunamis and other Coastal Hazards for the Caribbean and Adjacent Regions (CARIBE EWS). Forty-seven of its forty-eight Member States (MS) and Territories put their tsunami response plans to the test. The high participation rate reflects the importance the countries are giving to tsunami preparedness. This exercise was also the first opportunity to tryout the PTWC tsunami products for volcanic activity.



Participants included all officially designated CARIBE EWS Tsunami Warning Focal Points (TWFPs), National Tsunami Warning Centers (NTWCs), international, state, territorial and local emergency management organizations, schools, universities, governmental agencies, private organizations, health facilities, members of the media, businesses and tourism industry, as well as communities, individuals, and families. The education sector (K-12 Schools and Districts) had the highest participation rate, representing over 40% of the participants this year.



Each country participated with one of two CARIBE WAVE 2019 scenarios: Kick' em Jenny Volcano (KEJ) or Panama. Eighteen simulated international messages were issued by the Pacific Tsunami Warning Center (PTWC). Additionally, PTWC and the NTWC for Puerto Rico and USVI/BVI, issued six domestic products for the KEJ scenario. It was the decision of each MS and Territory to decide their level of participation and issue and disseminate national and local products. Sirens, emails, emergency alert systems, text messages, media outlets, and social media were reported to be used by various countries as the means of dissemination. In addition to the communication tests, exercises were conducted at various levels of magnitude and sophistication including seminars, tabletop exercises and drills.

Planning for CARIBE WAVE 19 took over 12 months and was coordinated by a task team led by Dr. Elizabeth Vanacore of the Puerto Rico Seismic Network and facilitated by the US NWS Caribbean Tsunami Warning Program. TsunamiZone.org was used for the registration of the participants.



TsuInfo Alert

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<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



NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:

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

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NTHMP Releases New Tsunami Guide

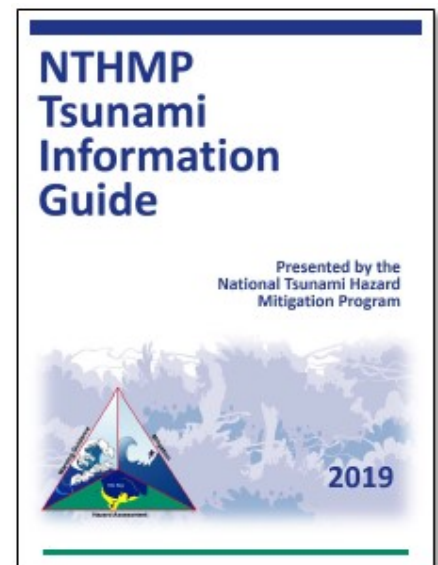
By Christa Rabenold, NOAA/National Weather Service Tsunami Service Program

The National Tsunami Hazard Mitigation Program (NTHMP) has released a new guide about tsunamis. The purpose of the 36-page guide is to serve as a general resource for information about tsunamis in the United States. It is written for anyone who wants to know more about tsunamis, the U.S. Tsunami Warning System, and how to prepare for tsunamis. Potential users include the general public, the media, educators, community officials, and public information officers in NTHMP partner agencies.

The guide is organized into five sections: Introduction, Tsunami Basics, Tsunamis in the United States, U.S. Tsunami Warning System, and Tsunami Safety. Appendices include historic tsunami information, key resources, and NTHMP partner contact information.

The NTHMP Tsunami Information Guide, which replaces the 2011 National Media Tsunami Guide, is available for download at:

<https://nws.weather.gov/nthmp/guide/>.



TSUNAMI PREPAREDNESS

Alaska Division of Homeland Security & Emergency Management Improves Tsunami Safety

By Daniel Belanger, Alaska Division of Homeland Security and Emergency Management

The Alaska Division of Homeland Security & Emergency Management and National Weather Service (NWS) officials hosted the annual NOAA/NWS-funded Tsunami Operations Workshop in Kodiak, Alaska from March 11th to 14th, 2019. Goals of the workshop included improving education, strengthening relationships, and developing tsunami event communications. The event brought together representatives from federal, state, local and tribal organizations including the National Weather Service, Alaska Division of Geological & Geophysical Survey, United States Coast Guard, the Kodiak Island Borough, Kodiak City, Kodiak Area Native Association, and many villages on the island that are inaccessible by road.



Attendees of the Tsunami Operations Workshop in Kodiak, Alaska



Presentation by Louise Fode of the NWS

The workshop focused on Kodiak Island, the second largest island in the United States, severely impacted by the 1964 Great Alaska Earthquake and Tsunami. Kodiak is one of 13 TsunamiReady® communities in Alaska. Presentations covered a wide variety of topics such as Earthquake and Tsunami basics, the National Tsunami Warning Center's warning process and the timeline and methods for communities to receive tsunami information, community post-event response including Search and Rescue, HAZMAT, medical concerns and sheltering, the Emergency Alert System and Wireless Emergency Alert functionality in Alaska, and the warning area challenges of recent events. Following the presentations, community officials worked through their specific response and recovery plans during multiple exercises. This session included an open discussion about local responses and media on message collaboration during tsunami events. In particular, NWS Weather Forecast Office staff helped strengthen communication between media and emergency managers for better messaging during tsunami events.

Christa Rabenold Leaving NWS Tsunami Program

Christa Rabenold, Mitigation Specialist, NWS Headquarters Tsunami Program, is leaving her position effective May 17, 2019. Christa has led the revision, updating, and implementation of the NTHMP Education Plan among many additional impactful products and activities during her 5-year-plus tenure with the Tsunami Program. Her work has touched all of us in many ways, and we will miss her. However, Christa is staying in the NOAA family (so her email will remain the same), moving to another building on the NOAA Silver Spring Maryland campus to provide contract support for the NOAA OAR Office for Ocean Exploration and Research. In her new role, she will lead communication activities regarding ocean exploration and expeditions. Please direct NTHMP-related questions that you may have sent to Christa to Rocky Lopes (Rocky.Lopes@noaa.gov).



TSUNAMI PREPAREDNESS

National Tsunami Warning Center Open House

By Daniel Belanger, Alaska Division of Homeland Security and Emergency Management

The Palmer, Alaska based National Tsunami Warning Center (NTWC) hosted a March 30th, 2019 open house where hundreds of visitors experienced an earthquake simulator and crowded around displays and equipment, absorbing the knowledge that staff at the center had to offer. The NTWC is responsible for providing tsunami warnings for all of North America, and has become the largest center of the two in the United States; the other is in Hawaii and is responsible for Hawaii, Guam and Samoa.

On March 27th, 1964, an earthquake and tsunami caused severe devastation to coastal Alaskan communities from Whittier to Kodiak. Wave heights reached up to 220 feet above tidal averages. Of the earthquake's 139 related deaths, 106 were attributed to the tsunami in Alaska, another five in Oregon, and 13 in California. Near the event's epicenter, a reported 15 died from the earthquake itself. This significant historic event along with the two recent events in 2018, the Kodiak M7.9 and the Anchorage M7.1, motivated many attendees to glean as much information about how the center works, and how it coordinates with other warning centers around the world.



NTWC Watchstander Summer Ohlendorf

NTWC Director James Gridley explained to visitors how the technology used in predicting earthquakes and tsunamis has gotten better and tsunami centers worldwide share and use each other's data. He also explained the science involved in forecasting tsunamis which consists of two-parts — the earthquake itself, and the wave phase. Seismic instruments register the earthquake's location, strength, and depth. The second phase involves forecasters pulling up hypothetical models of what could occur. They then match real-time observations with gathered data.

Here in Alaska, one of the greatest dangers to residents come from locally generated tsunamis. Timely tsunami information is imperative to the safety of those communities. Warnings need to be issued in five minutes or less to be effective. Technological improvements with round-the-clock staffing have allowed centers to cut down the time a warning is issued to an average of three minutes. The staff also communicates when an earthquake does not generate a tsunami.

ATTENTION — Full NTHMP Annual Meeting August 19 - 23, 2019

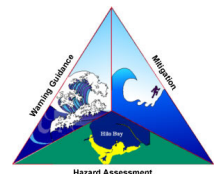
Salt Lake City, Utah

WHAT: Full NTHMP Annual Meeting has been rescheduled for August 19-23, 2019 in Salt Lake City, UT

INCLUDES: All NTHMP Subcommittees, Workshops, General Sessions

ACCOMMODATIONS: Government rate is \$125/night and will fill quickly. Reserve now

REGISTRATION: Open now—<https://nws.weather.gov/nthmp/meetings/2019annualmeeting/>



TSUNAMI PREPAREDNESS

Working in Your Own Backyard: the “LBSea” Holds 3rd Tsunami Walk

By Jason Ballmann, Communications Manager for the Southern California Earthquake Center

In the summer of 2014, I moved about 25 miles southward from Westchester, California to the southeast part of Long Beach, a quiet, beachside part of town. We affectionately call our city the “LBC” and some of us, with a little further play on words, spell it as the “LBSea.” I have always been interested in applying our work at the Southern California Earthquake Center to my own community. With the progression of the TsunamiZone.org project, I had what I needed to begin outreach to local elected and appointed officials.



Jason Ballman & Jack Cunningham

Long Beach is the 2nd biggest city in the entire greater Los Angeles area (of-course the #1 spot goes to the City of Los Angeles), with more than 500,000 residents. Aside from the massive Port of Long Beach, we have many bays and channels, and subsequently many people who use them for a variety of commercial and recreational activities. As a vulnerable coastal community, not so dissimilar to those that have been impacted by significant tsunami events in the recent past, no time like the present to further tsunami awareness and preparedness locally.

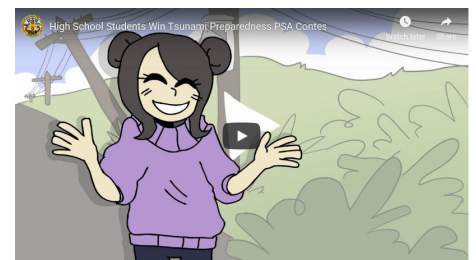
Since 2017, with this knowledge in mind, I have worked with Councilwoman Suzie Price of Long Beach’s Third District and Reggie Harrison, Director of Disaster Preparedness and Emergency Communications for Long Beach, to organize and conduct a tsunami walk during California’s Tsunami Preparedness Week which always takes place during the last week of March. We follow the tsunami walk template of starting in a tsunami danger zone and ending in a tsunami safe zone, and each year we try to do something different and interactive. We have included question and answer sessions, press conferences, demonstrations, and fairs/expos.

The community enjoys these tsunami walks, as they see the value in getting in a bit of exercise while having their questions answered and ultimately their worries put to rest once they know how to prepare to survive and recover from tsunamis. We are really proud of what we have accomplished in Long Beach and look forward to growing our tsunami preparedness and mitigation efforts with our community.

High School Students Win Tsunami Preparedness PSA Contest

By Yvette Urrea Moe, County of San Diego Communications Office

If you are ever in a situation where a Tsunami Advisory or Warning is issued, you’ll be glad to have watched a video created by three tenth graders for the County of San Diego’s Office of Emergency Services Tsunami Preparedness Week contest. It tells you what you need to do to survive.



County OES challenged high school age students earlier this month to create a public service announcement video with tsunami preparedness as a theme. Seven videos were submitted, all from a Digital Arts class at the Coronado School of the Arts. A panel of judges ultimately chose a PSA entitled “Surviving the Killer Waves“ by Lucy Greenberg , Ariane Ferrer and Tulasi Napolitani.

See full article: <https://www.countynewscenter.com/high-school-student-wins-tsunami-preparedness-psa-contest/>

TSUNAMI PREPAREDNESS

The Creation and Execution of LANTEX19

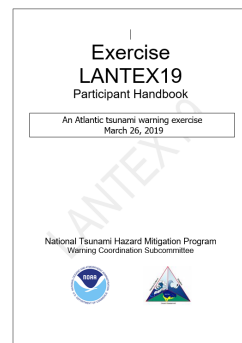
By NTWC Staff

LANTEX19 (Atlantic Tsunami Exercise 2019) was a national exercise that took place on March 26, 2019 at 1200 UTC, and simulated an 8.5 magnitude earthquake located 125 miles northwest of Mayaguez, Puerto Rico at 19.2oN, 68.7oW. The scenario began with a Tsunami Information Statement (TIS) being issued for an 8.0 magnitude earthquake, and quickly changed to an east-coast Watch as the earthquake increased in magnitude to an 8.5. The entire east coast was placed in an Advisory within four hours of the event, and maintained that status until it was canceled 15 hours after the event began.

Each year, the National Tsunami Warning Center (NTWC) develops and initiates an east-coast (LANTEX) and a west-coast (PACIFEX) national exercise which allows participation from all interested parties. Each exercise is posted to the tsunami.gov website approximately three months in advance of the exercise and is discussed in depth with state and local representatives during National Tsunami Hazard Mitigation Program (NTHMP) meetings. It is through the NTHMP that possible scenarios are discussed for the next year's exercise. Participating in an exercise not only highlights the effectiveness of a local tsunami emergency plan but also those aspects that need further refinement or development. Historic exercises back to 2006 are available on the tsunami.gov website, and can be used by anyone to simulate various events.

The exercise booklet that is downloaded from the tsunami.gov website is divided into distinct sections. These sections include a background about seismic events in the region; the exercise concept; a general outline noting a master schedule, resources, and media arrangements; post-exercise evaluation; Tabletop Exercise instructions; and the event messages as issued by NTWC.

The NTWC also creates scenarios for isolated regions upon request. In 2017 and 2018, NTWC created short exercises for the State of Washington to initiate hypothetical events. These shorter playbooks allowed Washington State Emergency Managers to refine evacuation policies and exercise equipment. Contact NTWC for more information.



Washington Tsunami Response Tabletop Exercise and 3rd Annual Tsunami Roadshow

By Keily Yemm, Washington State Emergency Management Division

Washington Emergency Management Division (WA EMD), and federal, local, and tribal partners joined together at Camp Murray on March 20, 2019 for a tabletop exercise and joint discussion on tsunami response strategies. The event was a precursor to a tsunami communications drill slated for May 23, 2019.

Washington Emergency Management Division's tsunami program helped organize the tabletop at Camp Murray along with officials from the U.S. Coast Guard, the National



(Continues on page 7)

TSUNAMI PREPAREDNESS

Washington Tsunami Response Tabletop Exercise and 3rd Annual Tsunami Roadshow

By Keily Yemm, Washington State Emergency Management Division

(Continued from page 6)

Weather Service, the state Department of Natural Resources, and others. Emergency managers from tribal nations, cities and counties from both the outer coast and within the Puget Sound participated. The exercise focused on developing response activities based on the Pacifex19 distant-source tsunami scenario developed by the National Tsunami Warning Center (NTWC). The cross-jurisdiction discussions focused on identifying response actions at each tsunami alert level such as Emergency Operations Center activation, public messaging, and siren activation and evacuation procedures. The exercise also informed emergency managers on response plan development and familiarization with state standard operating procedures. This was the second largest strategy session held in Washington since a Tsunami Watch issued in January 2018 prompted local, state, and federal officials to re-examine how tsunami communications are handled in Washington State.



Community members in Ocean Shores pick up outreach materials for additional hazard information and preparedness tips.

Meanwhile, Officials from WA EMD, joined by the Washington Geological Survey, the National Weather Service, and Washington Sea Grant hit the road in April for public presentations and discussions focused on the history of tsunamis in Washington, mapping and modeling of tsunami hazards, tsunami alerts, vertical evacuation structures, and survival strategies. This is the third year for what's been nicknamed the "tsunami roadshow." This year, the roadshow conducted seven presentations, reaching over four hundred coastal residents, in the communities of Long Beach, Raymond, Aberdeen, Ocean Shores, Neah Bay (Makah Tribe), Port Angeles, and at the Lower Elwha Klallam Tribe.

Invited speakers for the presentations included:

- Carrie Garrison-Laney — WA Sea Grant — Tsunamis: how they form, and the prehistory of tsunamis in Washington State
- Corina Forson and Daniel Eungard — WA Geological Survey — Mapping and Modeling Tsunami Hazards
- Tyree Wilde and Reid Wolcott — National Weather Service (Portland/Seattle) and also Keily Yemm — WA Emergency Management Division — Tsunami Warning systems
- Maximilian Dixon — WA Emergency Management Division — You CAN survive if you get prepared



Presentation and support team in Ocean Shores (top left) Colby Neuman, Courtney Obergfell, Reid Wolcott, Maximilian Dixon, Carrie Garrison-Laney, Hannah Cleverly, (bottom left) Tyree Wilde, Keily Yemm, Kiana Kabanje, Corina Forson.

After the presentations, audience members were asked to fill out a survey describing additional preparedness activities they would like after hearing from the roadshow experts. Participants pledged to pursue over 1300 activities including purchasing NOAA Weather radios, walking evacuation routes, sharing hazard information with loved ones, visiting online resources and creating/adding items to preparedness kits. The events also provide an opportunity for community members to connect with their local emergency managers, discussing local concerns, and strategies to address them. Overall these events help build stronger relationships which lay the foundation for more resilient coastal communities.

TSUNAMI MAPS & NTHMP EVENTS

Tsunami Evacuation Walk Time Maps Published in Washington State

By Daniel Eungard, Washington Geological Survey

The Washington Geological Survey published tsunami evacuation walk time maps for the communities of Port Angeles, Bellingham, Anacortes, Aberdeen, Hoquiam, and Cosmopolis on April 5th, 2019. The maps show the amount of time it would take to evacuate from within the modeled inundation zone of a 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 utilizing 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.

Following the public release of these maps we have received a number of favorable comments from community members as well as coverage on local, state, and national print and radio news services.

The walk time maps can be downloaded using the following links:

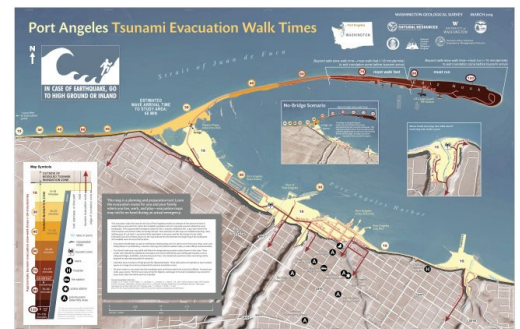
- [Port Angeles](#)
- [Bellingham](#)
- [Anacortes](#)
- [Aberdeen, Hoquiam, and Cosmopolis](#)

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

<https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/tsunamis/evacuation>

The interactive map also provides access to tsunami evacuation brochures for areas that do not have walk time maps yet. To learn more about the walk time maps, watch this video:

<https://youtu.be/XbIPDcv5960>



UPCOMING NTHMP & RELATED EVENTS

- ◆ June 16–21, 2019—8th Tsunami and Safety Symposium ISOPE-2019 (Honolulu, Hawaii)
<https://goo.gl/pA972R>
- ◆ July 8–18, 2019—IUGG 27th General Assembly (With Joint Tsunami Symposium) (Montreal, Canada) <http://iugg2019montreal.com/>
- ◆ August 19–August 23, 2019—NTHMP Annual Meeting (Salt Lake City, Utah)
<https://nws.weather.gov/nthmp/>
- ◆ September 16–20, 2019—OceanOBS'19 (Honolulu, Hawaii)
<http://www.oceanobs19.net/>

