

Tsunami Warning, Education, and Research Act of 2017

By Dr. Rocky Lopes, NTHMP Administrator



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We are pleased to report that after several years of hard work by Members of Congress, most notably Representative Suzanne Bonamici of Oregon’s first district and Senator Maria Cantwell of Washington, along with other Co-Sponsors in both houses of Congress, and a number of NTHMP partners, updated legislation to replace the *Tsunami Warning and Education Act of 2006* (P.L. 109-479, Title VIII) with the *Tsunami Warning, Education, and Research Act of 2017* (TWERA) has been passed by Congress and was signed into law by the President on April 18.

What does this mean for the NTHMP? Short answer: we don’t know yet. Once the legislation is codified into law, the full determination of implications of TWERA for the NTHMP needs to be discussed by the NTHMP Coordinating Committee, its subcommittees, and appointed work groups.

Top-line overview of the NTHMP-specific section of this legislation includes:

- Formally establishes the NTHMP Coordinating Committee and subcommittees as we know them now.
- Codifies NTHMP state support program (aka “NTHMP grants.”)



Discussion within the NTHMP Coordinating Committee will be required to interpret these additional provisions of TWERA:

- Coordination with other Federal preparedness and mitigation programs to leverage Federal investments to avoid duplication and maximize effort.
- Activities to promote tsunami resilience, preparedness, warning, and mitigation measures, including educational and risk communication programs to discourage development in high-risk areas.
- A lengthy and expanded scope of allowable activities, some of which may be potential grant-funded work by NTHMP partners.
- Development of guidelines and standards for community planning, education, training products, mapping products, inundation models, exercises, and at-risk port and harbors.
- Conducting social science research on tsunami outreach and education effectiveness.
- Conducting risk management training for local officials and community organizations.
- ...and more. Lots and lots of detail to review and discuss.

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TsuInfo Alert

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NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM LIBRARY CATALOG:

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Tsunami Sessions at the 2017 Geological Society of America Annual Meeting Seattle, Washington

By Corina Forson, Washington Geological Survey

Hello Tsunami modelers, outreach specialists, emergency managers, and everyone who wears all or many of these caps. The 2017 Geological Society of America Annual Meeting is in Seattle this year from October 22-25. The Washington Geological Survey is hosting a number of sessions that might be right up your alley. Please see the list of sessions we are advocating below and if you are interested please submit an abstract by August 1st. Please email corina.forson@dnr.wa.gov with any questions.

GSA Sessions:

- T251. Tsunami Hazards: Innovations in Mapping, Modeling, and Outreach
- T72. Geology, Resilience, Policy, and Preparedness: How Are Government and Private Industry Preparing for Geologic Disasters (such as Cascadia Rising)
- T74. Integrating Geohazards Data into Planning and Land-use Management Decisions
- T175. Earthquakes, Faults, and Fault Systems in the Pacific Northwest



Abstract submission link: <http://community.geosociety.org/gsa2017/science-careers/sessions/topical>

PROJECT UPDATES

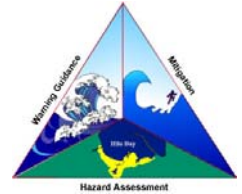
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NTHMP review is required to determine recommendations for implementation and incorporation of these additional activities in the 2018 – 2023 NTHMP Strategic Plan and FY18 NTHMP Grant Guidance. Because updating these foundation documents is required to reflect TWERA, these additional allowable activities will not take effect for the FY17 NTHMP grant round due in May.

One important thing to note is that the *authorizations of funding* in Section 512 of the legislation is not the same thing as an appropriation. An authorization is *not* an appropriation. Congress must take separate action to allocate funding for specific programs. That is called an appropriation. TWERA did not do that.



While there are NTHMP funding authorizations in TWERA retroactive to FY16, there were *not* retroactive adjustments to appropriations. That could only happen if Congress passes a Supplemental Appropriation. So TWERA 2017 does not mean a change in the level of funding for the current round of NTHMP grants.

At this time, NOAA is operating under a Continuing Resolution to fund ongoing operations, including NTHMP support, at the FY16 funding levels. This is why the NOAA/NWS Chief Financial Officer (CFO) has granted permission to proceed with the current round of NTHMP support through grants and intraNOAA transfers to NCEI and PMEL to meet NTHMP and its members' objectives and priorities.

There are other provisions of this legislation that are NOAA-specific and will be considered as appropriate by NOAA entities.

A conference call on TWERA will be scheduled for the NTHMP Coordinating Committee, and undoubtedly, there will be more meetings and discussion as recommendations and decisions are made regarding implementation of the legislation and the Intent of Congress.

As more information becomes available, check the NTHMP website for updates: <http://nws.weather.gov/nthmp/twera/>

TsunamiReady® Recognition Milestones

By Dr. Rocky Lopes, NOAA/NWS Tsunami Program

As of March 31, 2017, there are 197 sites recognized as TsunamiReady. During the period from October 1, 2016, to March 31, 2017, the following sites received the first TsunamiReady recognition:

- Aina Haina, Hawaii



The following communities renewed their TsunamiReady recognition between September 1, 2016, and March 31, 2017:

- Andersen Air Force Base, Guam
- Arecibo, Puerto Rico
- Guaynabo, Puerto Rico
- Hatillo, Puerto Rico
- Horry County, South Carolina
- Indian Harbor Beach, Florida
- Manzanita, Oregon
- Naguabo, Puerto Rico
- Naval Station Mayport, Florida
- Naval Support Activity Monterey, CA
- Nehalem, Oregon
- Orick, California
- Raymond, Washington
- Samoa, California
- Santa Barbara County, California
- South Bend, Washington
- Surfside Beach, South Carolina
- Vega Alta, Puerto Rico
- Vega Baja, Puerto Rico
- Wheeler, Oregon

PROJECT UPDATES

New Tsunami.gov Website Represents Major Advance in Tsunami Warning Center Product Dissemination

By Mike Angove and Christa Rabenold, National Weather Service Tsunami Service Program

The National Oceanic and Atmospheric Administration's (NOAA) tsunami warning capabilities have greatly improved since the 2004 Indian Ocean tsunami, and efforts continue to further enhance tsunami warning center operations to better meet the needs of our domestic and international partners. As part of this ongoing work, the National Weather Service's (NWS) National Tsunami Warning Center (NTWC) and Pacific Tsunami Warning Center (PTWC), in collaboration with the NWS's Tsunami Service Program, have made a fundamental change in how they provide information.

In March, the centers completed the transition of all warning center products to Tsunami.gov, which is now the official website for both warning centers. This consolidated portal eliminates potential confusion by using a single GIS-enabled map to display all warning center products. The site is intended as a one-stop shop for NWS operational tsunami products and related information and represents one of the most significant steps toward consistent operations and messaging taken by the NWS to date. The design of the new site is based largely on the previous NTWC site, which has been updated and modified to include PTWC products and information. Tsunami.gov introduces a new cross-center level of sophistication that allows for tsunami products to be consistently coded and more easily rendered.



Tsunami.gov enhances the consistency of NWS operational tsunami products and consolidates them on one site.

In conjunction with this change in information delivery, responsibility for issuing U.S. domestic tsunami products for Puerto Rico and the Virgin Islands has been shifted from NTWC to PTWC. This change in designated service areas improves the consistency of services for the Caribbean, consolidating Caribbean responsibilities under one warning center. Since 2005, PTWC has served as the primary international forecast center for countries in the Caribbean.

U.S. tsunami warning center product users are encouraged to change all links and bookmarks to <http://tsunami.gov/> to maintain functionality and ensure continuity of product delivery. This website is also the NWS's primary source for tsunami information and provides links to other NOAA partners and programs. The original PTWC site will continue to operate in parallel for six months to ensure the new site is operating as anticipated. The warning centers and the service program will continue to work together to update the site over time to enhance usability and accessibility to information and respond to user feedback.

PROJECT UPDATES

CARIBE WAVE 2017 Regional Tsunami Exercise Summary

By Christa von Hillebrandt (CTWP), Carolina Hincapie (CTWP),
and Patrick Tyburn (EMIZA French Antilles)

Close to half a million people from Bermuda thru Brazil and across the entire Caribbean basin participated in the CARIBE WAVE 17 tsunami exercise held on March 21, 2017. This represents an increase of 35% from 2016 (342,000 participants). This level of participation makes CARIBE WAVE exercise once again the largest international tsunami drill in the world. The participants in the sixth annual regional exercise hailed from 32 nations and 15 territories* of the UNESCO Intergovernmental Coordination Group for Tsunamis and other Coastal Hazards for the Caribbean and Adjacent Regions (CARIBE EWS).

Registered participants included designated CARIBE EWS Tsunami Warning Focal Points (TWFPs) and National Tsunami Warning Centers (NTWCs), as well as emergency and preparedness organizations, K-12 Schools, government agencies, colleges and universities, healthcare and hotels, critical facilities, among others.



Venezuela

Each country chose one of the three CARIBE WAVE 2017 scenarios: Costa Rica, Cuba, or Northern Lesser Antilles. Over 65 simulated international and domestic messages were disseminated by the Pacific Tsunami Warning Center (PTWC).

Sirens, emails, emergency alert systems, text messages, media outlets, NOAA weather radio, and social media were used for local dissemination. In addition to the communication tests, exercises were conducted at various levels of magnitudes and sophistication including seminars, table top exercises, video/web conferencing, and drills. This included a full scale exercise for the French Antilles which involved mobilization of aid forces from Europe.



St. Kitts-Nevis

Thru the exercise it has been possible to validate the issuance of tsunami products from the PTWC, the receipt and dissemination of tsunami products within the countries, familiarization with the PTWC messages and the readiness of the Caribbean and Adjacent Regions to respond to a tsunami.

Planning for CARIBE WAVE 17 has taken over a year and was coordinated by a task team led by Lt. Col. Patrick Tyburn of France and facilitated by the US NWS Caribbean Tsunami Warning Program. TsunamiZone.org was used for the registration of the participants. Information and supporting documents will also remain posted on <http://caribewave.info>. The exercise was conducted under the framework of the CARIBE EWS which was established by UNESCO in 2006 after the devastating Indian Ocean Tsunami and the recognition of the high tsunami threat in the Caribbean.

* Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Cuba, Curacao, Dominica, Dominican Republic, France (Martinique, Guadeloupe, St. Barthelemy, St. Martin), Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands (Bonaire, Saba and Sint Eustatius), Nicaragua, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sint Maarten, Suriname, Trinidad and Tobago, United Kingdom (Anguilla, British Virgin Islands, Bermuda, Cayman Islands, Montserrat and Turks and Caicos), United States (Puerto Rico and the US Virgin Islands) and Venezuela (Bolivarian Republic of).

PROJECT UPDATES

Hazus Tsunami Module Release

By Gala Gulacsik, Mitigation Division, FEMA Region X

On March 20, 2017, the Hazus Team deployed the Hazus Tsunami Module as part of the Hazus 4.0 release. The software can be downloaded for free on the FEMA Flood Map Service Center (MSC) Hazus Download page: <http://msc.fema.gov/portal/resources/hazus> .

The Tsunami Module represents the first new disaster module for the Hazus software in almost 15 years and is the culmination of work completed on the Hazus Tsunami Methodology Development (FEMA, 2013) by a team of tsunami experts, engineers, modelers, emergency planners, economists, social scientists, geographic information system (GIS) analysts, and software developers. A Tsunami Oversight Committee provided technical direction and review of the methodology development.



The release includes several key highlights:

- **Territory Analysis:** This release represents the first time that analysis will be available for U.S. territories (Guam, American Samoa, Commonwealth of Northern Mariana Islands, and U.S. Virgin Islands).
- **New Point Format:** The Hazus General Building Stock (GBS) for the Tsunami release will use a new National Structure Inventory (NSI) point format (details in User Release Notes available with download).
- **Case Studies:** The Tsunami Module will require user-provided data, so the Hazus Team has provided five case study datasets for users, which will be available on the MSC download site. Inundation data testing case studies included: Homer, AK; Westport, WA; Garibaldi, OR; Crescent City, CA; and Kahului, HI.
- **Two Types of Damage Analysis:** Users will be able to run both near-source (Earthquake + Tsunami) and distant-source (Tsunami only) damage analysis.

The Hazus development team partnered with members of the National Tsunami Hazard Mitigation Program (NTHMP) and others to leverage hazard inundation data and identify sites for case study. Contributors included:

- Kevin Miller, CA Office of Emergency Services
- Rick Wilson, CA Geological Survey
- Tim Walsh, WA Dept. of Natural Resources
- Dimitry Nicolsky, University of Alaska Fairbanks
- John Bauer, DOGAMI
- Mona Barnes, U.S. VI Emergency Mgmt. Agency
- Cynthia McCoy, FEMA Region X
- Kelly Stone, FEMA Region X
- Jeanne Jones, U.S. Geological Survey
- Nate Wood, U.S. Geological Survey
- Donovan Mathias, NASA
- Vasily Titov, NOAA PMEL
- Diego Arcas, NOAA PMEL
- Chris Moore, NOAA PMEL
- Roy Ruiz Vélez, University of PR at Mayagüez
- Randall LeVeque, University of Washington

For more information, follow the Hazus program on Twitter (<https://twitter.com/HazusCommunity>) or LinkedIn (https://www.linkedin.com/groups/HAZUS-822417?home=&gid=822417&trk=groups_most_popular-h-logo&goback=%2Egna_822417), subscribe to receive Hazus program updates (http://service.govdelivery.com/service/subscribe.html?code=USDHSFEMA_121), or check back on the Hazus Modernization page (<http://www.fema.gov/hazus-modernization>) frequently for updates. For technical assistance, please reach out to the Hazus Help Desk at hazus-support@riskmapcds.com.

The 1992 Mendocino Earthquake and the Formation of the National Tsunami Hazard Mitigation Program

By Lori Dengler, Humboldt State University

April 25th marks 25 years since the M 7.2 Cape Mendocino earthquake in Northern California, a pivotal event in the National Tsunami Hazard Mitigation Program. The '92 quake was centered on a thrust fault close to the inferred location of the Cascadia megathrust interface and caused a 20-km long stretch of the coast near the mouth of the Mattole River to rise as much as 1.5 meters, killing the intertidal marine life and producing a modest tsunami.

The nearest tide gauge inside Humboldt Bay recorded a 0.2 m surge and the Crescent City tide gauge, about 150 km away, detected a 0.55 m peak. Eyewitnesses on beaches suggested the peak water height was about a meter. The tsunami was recorded as far away as Monterey, Port Orford and Hawaii. The 1992 tsunami arrived in Humboldt Bay less than a half hour after the earthquake. On the beaches in Southern Humboldt County, the time was even less. It was the first near-source tsunami ever recorded on Crescent City's tide gauge (installed in 1933).

At the time, the focus of the tsunami warning system for the US West Coast was distant source events. A relatively small group of geologists and seismologists were becoming aware of the hazards posed by the Cascadia Subduction Zone. Paleotsunami deposits, Native American oral history, written records from Japan, and geophysical modeling all suggested earthquakes perhaps as large as magnitude 9 had occurred in the past. However, there was very little awareness in the larger earthquake preparedness community, and among legislators and decision makers.



Cape Mendocino, CA (Credit: Paul Hamilton)

The Cape Mendocino tsunami suddenly brought the Cascadia tsunami hazard to a larger audience. It was a mini-version of what researchers expected a bigger Cascadia quake to cause – thrust faulting, strong shaking, coastal deformation, and a tsunami. The ground had barely stopped shaking when ramifications began to emerge.

Don Hull, head of The Oregon Department of Geology and Mineral Industries, contacted Senator Mark Hatfield, the chair of the Senate Appropriations Committee, and used the 1992 earthquake to convince him that the US was woefully unprepared for a larger Cascadia tsunami. In 1994, Hatfield convened the first ever hearings to mention the Cascadia Subduction Zone to Congress. As a result, a series of workshops took place, and the National Tsunami Hazard Mitigation Program was established in 1996.

The California Division of Mines and Geology (now called the California Geological Survey) obtained FEMA funding to compile a study of a larger Cascadia earthquake in Humboldt and Del Norte County. It was the first and only earthquake in the scenario program to include a tsunami. The tsunami modeling was primitive by today's standards but it opened eyes to planners and managers that surges could arrive only minutes after an earthquake. It was the release of this scenario in 1995 that led to the creation of the Redwood Coast Tsunami Work Group (RCTWG), an organization of emergency and earthquake professionals from Del Norte, Humboldt, and Mendocino Counties to develop messages and programs to address the Cascadia threat that continues to this day.

NTHMP RESEARCH & EVENTS

CURRENT TSUNAMI RESEARCH

Atwater, B. F.; ten Brink, U. S.; Cescon, A. L.; Feuillet, N.; Fuentes, Z.; Halley, R. B.; Nuñez, C.; Reinhardt, E. G.; Roger, J. H.; Sawai, Y.; Spiske, M.; Tuttle, M. P.; Wei, Y.; Weil-Accardo, J., 2017, Extreme waves in the British Virgin Islands during the last centuries before 1500 CE: *Geosphere*, v. 13, no. 2, p. 1–68, doi:10.1130/GES01356.1.



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Lobkovsky, L.; Garagash, I.; Baranov, B.; Mazova, R.; Baranova, N., 2017, Modeling features of both the rupture process and the local tsunami wave field from the 2011 Tohoku earthquake: *Pure and Applied Geophysics*, 20 p., doi:10.1007/s00024-017-1539-5.

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Terry, J. P.; Winspear, Nigel; Goff, James; Tan, P. H. H., 2017, Past and potential tsunami sources in the South China Sea: A brief synthesis: *Earth-Science Reviews*, v. 167, p. 47-61, <http://doi.org/10.1016/j.earscirev.2017.02.007>.

UPCOMING NTHMP & RELATED EVENTS

◆ August 1-3, 2017—NTHMP Summer MES & MMS Subcommittee Meetings by invitation only (Salt Lake City, Utah) <http://nws.weather.gov/nthmp/2017mesmms/index.html>



◆ October 22-25, 2017—GSA Annual Meeting (Seattle, Washington) <http://community.geosociety.org/gsa2017/home>



◆ December 11-15, 2017—AGU Fall Meeting (New Orleans, Louisiana) <https://fallmeeting.agu.org/2017/>



◆ May 7-9, 2018—8th International Symposium on Submarine Mass Movements and Their Consequences (Victoria, British Columbia) <http://igcp640.oceannetworks.ca/>

