

## NTHMP “should do” – activities, sources of recommendations, disposition/outcomes

These documents were reviewed to compile a comprehensive listing of what has been suggested that the “NTHMP should do”:

- *Tsunami Warning, Education, and Research Act of 2017* (TWERA)
- *2017 NTHMP Review* (Review)
- *2018-2023 NTHMP Strategic Plan* (SP)
- Annual Work Plans from MES (2018, 2019) and MMS (2018, 2019) (AWP-MES or AWP-MMS)
- MES meeting notes (MES)
- NTHMP Coordinating Committee minutes from January 2018 to July 2019 (CCMIN)
- *2014 NTHMP National Education Plan* (EdPlan)

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Recommendation or Activity	Source	Purview of	Disposition or Action
<b>MODELING-RELATED ACTIVITIES</b>			
Develop standards and guidelines for mapping and modeling	TWERA	MMS	Guidance discussed, developed, and posted on NTHMP website. MMS AWP indicates 2019 update needed/expected.
Dissemination of guidelines and standards for ... mapping products and inundation models			
Finalize an update to existing tsunami mapping and modeling guidance	MMS AWP		
Develop evacuation modeling guidance	Ed Plan		
Develop criteria for modeling current velocities for use in maritime products	MMS AWP	MMS	Progress report needed.
Develop guidelines for consistent modeling of landslide-triggered tsunamis	MMS AWP	MMS	Progress report needed.
Summarize meteotsunami modeling results	MMS AWP	MMS	Progress report needed.
NOAA and the USGS should establish guidelines for models and mapping and lead workshops that can enable comparing notes and discussion of partners' differing needs.	Review	MMS	Discussed at MMS meetings. No further action (yet).
Form a work group to discuss sediment transport modeling research, review existing approaches, and discuss a potential workshop on incorporation sediment transport into the tsunami inundation modeling.	MMS AWP	MMS	No action (as of July, 2019).
Joint workshops between geologists and modelers	Review	MMS	Discussed at MMS meetings. No workshops held (yet). Funding issues.
<b>MAPPING-RELATED ACTIVITIES</b>			
Recommendation or Activity	Source	Purview of	Disposition or Action
Complete inundation and evacuation maps for all unmapped U.S. coastal communities	SP	MMS	In progress by state/territory partners
Activities to support development of ... Maps of evacuation areas and evacuation routes, including, when appropriate, traffic studies that evaluate the viability of evacuation routes	TWERA	MMS	Traffic studies component – isn't this addressed in USGS Pedestrian Evacuation tool?
Edit existing high resolution DEMs be include the local built environment.	Review	MMS	No action (yet).
Prioritize and develop four DEMs for the partner use	MMS AWP	MMS	August 2019 MMS meeting

Because of the critical importance of evacuation maps during short-fuse events, research should determine whether the two types of maps (evacuation maps and probabilistic maps) cause confusion so that local officials can be sure that outreach efforts are not impeded.	Review	MMS	No action (yet).
Develop uniform color scheme for partner state maps.	Review	MMS	No action (yet).
Activities to promote the adoption of tsunami resilience, preparedness, warning, and mitigation measures ... including educational and risk communication programs to discourage development in high-risk areas	TWERA	CC	Work Group on M&R formed under MES in July, 2018. Two meetings held. Report / update to be provided.
Identify and address tsunami hazard assessment and product requirements	SP	MMS	On 2019 MMS AWP, California Lead Progress report / update needed.
Develop initial hazard assessment guidance in web-based format and link example products from NTHMP partners.	MMS AWP		
Activities to support development of ... the sources, sizes, and other relevant historical data of tsunami in the region, including paleotsunami data	TWERA	MMS	Powell Center workshops  Tsunami source database (on MMS 2019 AWP)
Identify and address gaps in tsunami source characterization and modeling	SP		
Recommend models and maps include non-seismic sources of concern to partners.	Review		
A database of tsunami sources (seismic and non-seismic) would provide uniform, consistent sources for modeling and mapping.	Review MMS AWP		
Guidance on Pedestrian Evac/Beat the Wave/Time to Safety mapping	MES notes	MES	Discussed for adding to the 2019 MES AWP (but didn't make it.)
Development of new local evacuation/warning tools was suggested. These are promising, and would include smartphone based evacuation maps and map pop-ups for visitors to specific coastal locations.	Review	WCS	Smartphone apps have been created by some localities and states.  NOAA decision: app development may not be funded with tsunami grants.

<b>MARITIME-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Complete development of Maritime Guidance Document	MES AWP	MES	Has been on the MES AWP since 2018. Progress report required.
Engage representatives from the maritime community, such as harbor masters, and land-use planners especially for the high hazard states.	Review	MMS / MES	This engagement has worked at the state level. While NTHMP meetings are open, local representatives of these communities have not participated.
Development of guidance for maritime safety and pedestrian evacuation products among all states in order for products to be more consistent	Review	CC	Maritime Guidance under development – assigned to California as a grant deliverable.  Pedestrian Evacuation Guidance discussed by both MES and MMS; no Guidance developed or distributed.
Activities to support development of ... Evaluation of at-risk ports and harbors	TWERA	MES	Grant funding to California. Not being done elsewhere (that we know of.)
Activities to support development of ... Evaluation of the effect of tsunami currents on the foundations of closely-spaced, coastal high-rise structures.	TWERA	MMS	Discussions and decisions on implementation of ASCE 7-16 <i>Minimum Design Loads and Associated Criteria for Buildings and Other Structures</i> model building code in certain states.
Activities to promote preparedness in at-risk ports and harbors, including evaluation & recommendation of procedures.	TWERA	MES	Some grant funds to California. Not aware of other ports & harbors work in other locations.
<b>SOCIAL SCIENCE-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Review the <i>National Tsunami Education and Outreach Plan Update</i> (2014) for consistency with the social science literature on community and household disaster preparedness	Review	MES	Not yet. National Education Plan should be updated.
NTHMP partners should assess support and opposition to tsunami hazard management activities such as hazard/vulnerability analysis, hazard notification, emergency preparedness, and hazard mitigation (land-use practices and building construction practices).	Review	MES, MMS	Not yet.
Collect response times from tsunami evacuation drills to validate evacuation analyses.	Review	MES	Not yet.
Assess coastal populations' knowledge of tsunami hazard and appropriate protective actions.	Review	MES	Is this included in Washington's social science project?
Evaluate evacuation products (and inundation products if feasible).	MES AWP	MES	Washington is leading this through a grant-funded social science project. Progress report needed.

Multidisciplinary vulnerability assessment research, education, and training to help integrate risk management and resilience objectives with community development planning and policies.	TWERA	MES	No action.
Conduct social science evaluation of tsunami outreach and incorporate findings into outreach efforts	SP	MES	No action.
The NTHMP could identify valuable principles of risk communication by using systematic evaluations to identify specific aspects of different hazard awareness programs that are most effective in promoting and maintaining household hazard awareness and preparedness.	Review	MES	No action.
Survey and catalogue where engagement of public schools and institutions of higher learning for tsunami preparedness has occurred.	MES AWP	MES	On 2018 MES AWP. No action.
Multidisciplinary vulnerability assessment research, education, and training to help integrate risk management and resilience objectives with community development planning and policies.	TWERA	MES	No action.
Recommend partner states and territories recruit social scientists as needed for program assessment.	Review	Partners	At partner state / territory discretion.
<b>GAP ANALYSIS-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Develop and refine list of hazard mitigation products, activities, infrastructures.	MMS AWP	MMS	Gap analysis in East Coast FY18 grant. No further information available.
Develop inventory of the status of hazard mitigation products, such as modeling/mapping activities (e.g., tsunami hazard maps, port maritime guidance, evacuation modeling) and education/outreach (e.g., sirens, guidance plans, etc.), across all NTHMP partners	MMS AWP	Gap Analysis Work Group	Work Group formed 2/1/19 and is meeting regularly.

<b>HAZUS-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Develop and implement a strategy for using HAZUS and create product guidance	SP	MES / MMS	To begin discussion August 2019 at MES meeting.
Review existing HAZUS tsunami module	MMS AWP		
Guidance / Training on HAZUS Tsunami Module	MES notes		
Efforts should be made to capture the economic results of each scenario generated and to share them with communities.	Review		
Activities to support development of ... Inundation models and maps of critical infrastructure and socioeconomic vulnerability in areas subject to tsunami inundation.	TWERA		
Activities to support development of ... Evaluations of the size of populations that will require evacuation, including populations with special evacuation needs	Review		
<b>EDUCATION/OUTREACH RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Develop, update, and disseminate consistent outreach materials	SP	MES	As done by state/territory partners
Development of evidence-based education guidelines.	TWERA	MES	Discussed, no action.
Develop uniform standards and guidelines for education and outreach activities			
Recommend identifying practices to overcome the resistance of coastal industries and tourism to the display of tsunami information.	Review	MES	Discussed, no action.
Recommend developing workable methods to get tsunami maps and products to emergency managers on the East Coast where tsunamis are considered low probability events.	Review	MES	Function of East Coast Region
Review the National Media Tsunami Guidebook by conducting an empirical assessment of its usefulness and the suitability of its content for the intended audience.	Review	MES	New replacement document "Tsunami Information Guide" developed and approved by NTHMP in May, 2019.
Create a hazard assessment summary/ fact sheet to support national-level "know your hazard" outreach	Ed Plan	MES	See 14-8 of <a href="#">NTHMP 2014 National Ed Plan</a> . This has not been done. Still wanted or needed?

Engage public schools and institutions of higher learning in tsunami preparedness	SP	MES	No action.
The NTHMP needs to develop a comprehensive strategy for mobilizing community support of tsunami hazard management, especially in the coastal communities of the Cascadia Subduction Zone (CSZ).	Review	CC	Addressed somewhat in <i>2018-2023 NTHMP Strategic Plan</i> .
Risk management training for local officials and community organizations to enhance understanding and preparedness.	TWERA	MES	Conducted by states/territories when developed.
Support TsunamiZone.org	MES AWP	MES	Used mostly as a self-reported method to record participation on CaribeWAVE exercise and California activities.
Review Oregon's Tsunami Safe education module.	Review	MES	Not addressed.
Develop a Fact Sheet regarding potential for East Coast megatsunami resulting from Cumbre Vieja flank collapse in the Canary Islands	CCMIN 07/16/19	Ed Fratto and some partners	Fact Sheet in development by Fratto.
<b>TSUNAMIREADY-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Recognize TsunamiReady communities	SP	NWS	NWS WFOs responsible for recognition and renewal; in 2019, lost 8 TR sites.
Increase number of recognized TsunamiReady Tier 2 communities	SP	NWS / MES	Anticipate first two TR Tier II recognitions in NorCal, September, 2019.
Develop brochure describing benefits of achieving "TR Tier 2" status	MES AWP	MES	Discussed 2018; no action.
Increase number of designated TsunamiReady Supporters	SP	NWS / MES	No action.
Develop brochure describing BENEFITS of becoming a "TR Supporter" and fully develop/define criteria, list of candidates, and provide examples of existing TR Supporter Case Studies	MES AWP	MES	Discussed 2018; no action.
<b>PLANNING-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Support and provide tools to enhance community-level response planning	TWERA	MES	Discussed ... decision that FEMA does this already; no sense to duplicate effort.
Plan workshop at large port to engage special/unique customer needs	MMS AWP	MMS	CA Lead. Workshop in 2020?

<b>EXERCISE-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Conduct exercises that include tsunami scenarios	TWERA	MES	At state / territory discretion.
Dissemination of guidelines and standards for ... effective emergency exercises	TWERA	MES	Discussed ... decision that FEMA does this already; no sense to duplicate effort.
interagency, Federal, State, tribal, and territorial intergovernmental tsunami response exercise planning and implementation in high risk areas	TWERA	MES	Discussed ... decision that FEMA does this already; no sense to duplicate effort.
Establish Calendar for PacifEX, LantEX, and CaribeWave for next three years. Establish desired scenarios for the above exercises	MES AWP	MES	List of actions on 2019 MES Annual Work Plan.
<b>RESPONSE-RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Dissemination of guidelines and standards for ... at-risk port and harbor response procedures coordinated with USCG and FEMA	TWERA	MMS	Discussion required: is it the domain of the NTHMP to write response procedures (for anything)? Many states do this already as part of emergency management procedures.
Develop NTHMP Vertical Evacuation Guidance -- Provide lessons learned from case studies of new construction implementation	MES notes	MES	Grant funding to California and Washington. FEMA funded update to P646 Tsunami Vertical Evacuation structure guide.
Activities to support development of ... Evaluations and technical assistance for vertical evacuation structure planning	TWERA MES AWP	MES	"Future work" on 2018 MES AWP. No action.
<b>MITIGATION/RECOVERY RELATED ACTIVITIES</b>			
<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Develop guidelines and model practices for mitigation and recovery for communities and critical infrastructure.	SP MES AWP	MES	Mitigation and Recovery group has begun to look at this.
Implement guidelines and model practices for mitigation and recovery.	SP	MES	Not yet.
As the NTHMP considers recovery as a program area, it should ensure that this is linked to FEMA's current National Disaster Recovery Framework	Review	CC	Recovery is not an NTHMP Program Area (as of July, 2019).
As tsunami hazard mitigation becomes more salient and increased demands are placed on the MES, there may be reason to add a subcommittee for mitigation as distinct from a subcommittee devoted to education and preparedness.	Review	CC	Trial with MES-led Work Group.  NTHMP Subcommittee Analysis Paper developed and scheduled for discussion with recommendations for the CC will follow.



Recommendation or Activity	Source	Purview of	Disposition or Action
Assess the extent of collaboration between local emergency managers and land-use planners in promoting tsunami hazard mitigation.	Review	MES, MMS	Not yet.
Work with MES and MMS members to meet several goals beneficial to providing NTHMP-wide guidance and information back to membership constituents.	MES AWP	MES	M&R Work Group working on.
<b>WARNING COORDINATION SUBCOMMITTEE-RELATED ACTIVITIES</b>			
Provide guidance to refine Tsunami Warning Center and related state products	SP	WCS	As needed, TWCs have engaged NTHMP partners to request input.
Encourage authorities to receive and respond to Tsunami Warning Center products	SP	WCS	
Support and implement post-tsunami event protocol for U.S. states and territories	SP	Not sure	Post-tsunami event protocol for the U.S. needs to be developed OR the NTHMP decides to take a pass.
<b>NTHMP GENERAL ACTIVITIES</b>			
Recommendation or Activity	Source	Purview of	Disposition or Action
Recommend increased interaction between and coordination among the three subcommittees.	Review	CC	Somewhat between MES & MMS with 2-hour sessions at annual meeting.
Consider evaluating the NTHMP's activities in terms of their immediate, near-term, and long-term contribution to reducing physical and social adverse tsunami impacts.	Review	CC	No action (yet).
Conduct an independent assessment of the program in terms of awareness, preparedness, and mitigation involving measures of changes at the community level	Review	CC	No action (yet).
Hold an annual NTHMP Program Review	CCMIN 5/21/19	NWS HQ and partners	To be held during the winter meeting upon vote of approval by the CC for RoP update.
Develop internal guidance to produce a more uniform product appearance across NTHMP partners.	Review	CC	Not yet (no implementation). Decision needed on where to assign this if developing such Guidance is an action to be done.
Recommend expanding NTHMP membership and participation to include the National Science Foundation, the U.S. Coast Guard, the U.S. Army Corps of Engineers, and others with shared interests, such as non-NTHMP state and territorial agencies and not-for-profit organizations.	Review	CC	NSF, USCG, USCoE: not interested at the national level. USCG works through Districts with states & territories.  Non-NTHMP state and territorial agencies and NGOs have always been welcome to participate. To date, few have attended or participated in NTHMP meetings. Funding has something to do with it.

<b>Recommendation or Activity</b>	<b>Source</b>	<b>Purview of</b>	<b>Disposition or Action</b>
Expand the NTHMP to include social scientists and practitioners in areas such as land-use planning and public health.	Review	CC	Social Scientists and other practitioners already can participate on subcommittees. Have subcommittees identified and invited them to participate?
The NTHMP should leverage its funding support by developing a program to engage social scientists in seeking NSF funding for research projects that have direct applications to tsunami hazard management.	Review	CC	The NTHMP is not funded; states and territories are funded through grants administered under TWERA authority by the NWS. NOAA is not aware of any way to leverage this funding support with NSF.
Seek input from appropriate regional trade organizations such as the Pacific NorthWest Economic Region.	Review	CC	Not yet (no implementation).
Develop NTHMP Subcommittee Analysis and Report	CCMIN 7/25/18	Work Group	Work Group met, prepared report, provided to CC, ready for further discussion.
Prepare NTHMP Annual Report	CCMIN 2015	NWS HQ and partners	As discussed by the CC in May, 2019, this report may be developed well into the following year, giving time for partners to provide information.