

NTHMP Review Committee Consensus Statement

The NTHMP has established a unique partnership among multiple states and federal agencies that has been developed over the past decade, has set challenging goals, and met many of them. This program has institutionalized a partnership between federal and state members that is unmatched by other hazard and risk management programs. The reviewers unanimously agree on the following points:

- NTHMP was established well before the Sumatra tsunami and its goals have been validated by the impacts of that event. Recognition of a broader regional vulnerability to tsunamis, coupled with the success of the NTHMP provided the foundation for the Tsunami Warning and Education Act.
- Despite modest budget allocations, the program has achieved much because the state and federal agency partners have made investments of time and effort that go beyond normal expectations.
- All state and federal NTHMP representatives were highly engaged in the activities of the program and committed to its success.
- The program has expanded beyond a narrow focus on mitigation to include community resiliency. The reviewers endorse this expanded interpretation of the program's goals
- The representatives recognize that the technology developed and used by the program must be tied to education and awareness in order to be effective.
- The program has allowed states to experiment with alternative methods of achieving tsunami safety. This has resulted in a variety of innovative approaches that now provide an opportunity to develop assessment tools for evaluating their relative effectiveness.
- Since products such as inundation maps have been implemented at the local level, NTHMP is in a unique position to establish performance standards and standardized assessment tools for evaluating its effectiveness.
- There is a strong need for the National Academy of Sciences' review of the forecast/warning system and an external review of the *TsunamiReady* community program.
- The expansion of the NTHMP from the five Pacific states to 29 coastal states, commonwealths, and territories and the passage of the Tsunami Warning and Education Act offers a unique opportunity to strengthen the organizational structure of the program and enhance tsunami resilience in the United States.
- The lessons learned from the existing program should now be transferred to the additional 24 members that have joined the expanded program.
- The overarching goal for all partners is to continue to demonstrate the program's value over the next five years and to achieve a sustainable program.

Jay Raskin's Assessment

I concur with the preceding NTHMP Review Committee Consensus Statement and offer the following additional comments on the NTHMP's achievement of its current goals:

Goal 1-2: NTHMP Assessment Goals.

This goal was the responsibility of the States. Significant progress has been made even though the goal was not achieved. There is a great deal of variability between states in the type of modeling, the accuracy of the mapping, and the number of inundation maps produced. Some of the variability reflected the real differences in the needs of the states with regards to tsunami risks, settlement patterns, and the geography. Evaluating the effectiveness of these different approaches should help in developing standards that can be applied to both the original 5 member states and the new member states.

The accuracy of the tsunami inundation maps is important as these maps will be used for planning and zoning purposes as well as for evacuation maps. Accurate information is needed for siting of essential facilities, schools, and assembly buildings. The community of Cannon Beach provides an example of the need for accurate and updated mapping. Cannon Beach had one of the first tsunami inundation maps on the Oregon coast and this map was used to relocate the fire station, it was thought, outside of any tsunami risk. Later modeling has shown that the fire station could still be at risk. The current mapping effort for Cannon Beach is probabilistic will show a range of inundation and likelihood levels to help in evaluating the tsunami risk of the fire station. This same information will also be used in the relocation of the elementary school.

There are has been substantial progress in creating evacuation maps, but there is variations in the maps between states. There is again a need for standards. The current variation can be seen as an advantage since it can allow for testing of the effectiveness of the graphics, symbols, and content.

Goal 3-7: NTHMP Warning Guidance Goals

In general the program seems to have met or is close to meeting these goals. The real time functioning of the system did have some serious problems in getting consistent warnings from the warning center down to the states and local communities. Recent events revealed these shortcomings and have helped the system evolve in response. In addition, NOAA has indicated that better graphical material is about to made available.

However, these goals seem to have been formulated with distant tsunamis in mind. It is not apparent that the warning guidance goals have taken into account the disruptions to the warning system caused the subduction zone earthquakes in the affected areas. In the subduction earthquake generated events, the loss of electricity and telecommunications over the large geographic areas will make telephone alerts, and other electronic alert systems problematic. The earthquake itself will be the warning in such situations (which is noted in most of the literature provided at the review). Getting accurate tsunami inundation information out to the public and emergency responders is an essential goal, but the details need to be reviewed in the differing circumstances of local and distant tsunami events.

It also should be noted that while NOAA Weather Radio alerts cover the program area, individual communities often have very poor or no reception due to the mountainous terrain in many areas.

The concept of false alarms did not appear to be a useful concept for many of the stakeholders that presented at the review. The original reason for this goal is tied to maintaining credibility of the system and reducing economic loss due to unnecessary evacuations. However, in the context of the local subduction earthquake/tsunami event, a change in thinking is warranted. An earthquake of any size should be considered as a warning and an opportunity for an evacuation drill, especially in areas where landslide generated tsunamis are possible. Given the very short reaction time needed for such local events, evacuations serve public safety. Education of the public of the specific tsunami risks in their communities will reduce the “credibility” problem.

The Humbolt County literature listed a range of warnings starting with natural causes and then shifting to man made warnings. This helps prevent the pattern where people wait for the sirens to sound before reacting. Many brochures do state not to wait for the sirens in a local event, but so much attention is paid to sirens and loud speakers that this message is easily overlooked. Indeed, the emphasis of early warning systems seems to me to be approaching the points of diminishing returns. The difference between 2 and 5 minutes for a local event is not that meaningful since people should be responding to natural warnings. For distant events, the difference does not significantly affect public safety since the warning time is measured in hours. The main reason for reducing warning times may be to provide accurate information to the media. This will help prevent inaccurate information from being propagated that can confuse evacuation efforts.

Goals 8-13 NTHMP Mitigation Goals

NTHMP sees tsunami readiness as part of the National Response Plan and promotes mitigation through its Tsunami Readiness program. I have several areas of concerns. The first is that the structure of the NTHMP creates serious lacunae with respect to subduction zone events. In the tsunami literature there is rarely information (with some exceptions) on the damage the earthquake will cause, even when this damage may significantly delay or prevent evacuation to high ground. The size of the subduction zone event is sometimes mentioned, but the geographic range and the amount of damage are not often elaborated. This is particularly true for the Cascadia event. Any response that requires electricity, telephone, or radio will be seriously affected in the local event. Transportation links such as roads, airports, and port facilities will be impacted. The extent of the damage for both earthquake and tsunami will mean that relief efforts will overwhelm local, state and regional resources, as well as put a severe strain on national resources. This creates real differences between local and distant event responses for emergency, relief and reconstruction planning. NHTMP should consider closer ties with the Cascadia Regional Earthquake Workgroup (CREW).

Another concern is the stated length of time in the tsunami literature that people should prepare for being on their own. Many of the brochures give a standard 72-hour period. This time frame may significantly longer in the subduction earthquake/tsunami events. Efforts should be made to give realistic time periods (whether it is a few days, a week, or a couple of weeks). The length of needed preparation can be used as a benchmark for how well mitigation goals are being met.

In many of the coastal communities at risk, the tourist population can be many times the size of the local population. Most emergency planning is based on full time residents and this seriously underestimates the size of the populations that will be affected by the tsunamis (and subduction zone earthquakes). This presents serious challenges for all phases of emergency planning, from education through reconstruction. Certainly, the tourist population is the most difficult to reach for tsunami/earthquake education and warnings. However, this problem continues through with evacuation planning, and relief efforts, especially in local events. As one turns to questions of reconstruction and resiliency, tourism looms large since much of the major hospitality infrastructure in the inundation areas, and it is often the major industry for the affected communities. Bringing in the tourism/hospitality industry into the planning process is essential not only for the safety of their guests, but also for the business continuity and reestablishing the economies of coastal communities.

Resiliency should start from an analysis of the types of risk that a communities faces, tsunami risk being one of many. The main structure for emergency response, relief, and reconstruction is very similar. It is the details of the type of disaster that inform the type of response and mitigation needed. Tsunami readiness should be tied to the greater disaster readiness of the community. I agree with the suggestion made by other reviewers to provide incentives for communities to support TsunamiReady and all hazard mitigation. Reducing matching grant contributions required by TsunamiReady (or all hazards ready) communities following a disaster is one way. Reduction in flood insurance and other types of insurance is another. A “fast lane” for application of claims following a disaster and increased local participation in the decision making process following the disaster would also be attractive.

Final thoughts

I was struck throughout the review by the commitment and effort that all the participants had put into tsunami hazard mitigation. As a member of a coastal community that has experienced a distant tsunami and is actively preparing for the Cascadia earthquake and tsunami, seeing the extent and quality of the tsunami hazard mitigation effort thus far as been reassuring. That much needs to be accomplished is borne out by the comments above. I have one final suggestion, that the NHTMP have one of its meeting in a small coastal community subject to a the Cascadia event and go through an exercise of looking from the “ground up” to see how warnings, evacuation, relief, and reconstruction would work. It would be a great test of the system and would be a great way of focusing on the essentials. There is precedent for this, the Geological Society of America held their Penrose Conference “Great Cascadia Earthquake Tricentennial “ in 2000 in Seaside, Oregon.