## Guidelines and Best Practices to Establish Areas of Tsunami Inundation for Non-modeled or Low-hazard Regions

DRAFT Developed by the NTHMP Mapping & Modeling Subcommittee

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**Task 1.5**  Develop guidelines to establish areas of inundation for non-mapped and low hazard areas by 2010

This supports an upcoming task “Determine the potential inundation zones for non-mapped coastal regions using the established guidelines by 2012”.

Purpose

This document specifies a set of guidelines and recommended practices to guide the determination of tsunami inundation zones in areas where there is a low hazard – based on historical occurrence of tsunami, a low risk – due to a low population and infrastructure vulnerability, or that may not have modeled inundation and evacuation maps in the near future and wish to initiate planning and prepared efforts.

Guiding Principles

The National Tsunami Hazard Mitigation Program (NTHMP) is the nation’s community-focused program to improve tsunami mitigation and preparedness of at-risk areas within the United States and its territories. The NTHMP strives to reduce loss of life and property damage from tsunamis by developing resilient coastal communities that are highly informed and prepared for all tsunami hazards. It is the responsibility of the NTHMP, through its Mapping and Modeling Subcommittee, to provide direction and guidance to enable communities in preparing appropriately to address their tsunami risk. Tsunami inundation maps provide information necessary to support informed decision making and it may be appropriate to develop an estimation of tsunami inundation in the absence of modeling resources. The technical accuracy of the map of the areas that will be inundated by a tsunami can be improved later when resources become available.

Recommended Guidelines

First and foremost, whenever possible, consult with your NTHMP Scientist or Emergency Manager (see the NTHMP web site <http://nthmp.tsunami.gov/> for a current list of contacts). Then, following the general guidelines below, the most hazardous areas can be estimated. We recommend considering separate evacuation procedures for local (felt events with minutes to evacuate) versus distant (non-felt events with time to evacuate) scenarios. Many of the recommendations below are based on and can be further researched in the *Preparing Your Community for Tsunamis – A Guidebook for Local Advocates*, Version 2.1, February 1, 2008, Laura Dwelley Samant, L. Thomas Tobin, Brian Tucker.

1. Base on historical inundation information
   1. Where historical events exist, take the maximum runup and add safety buffer. This can be based on historical events in the area or on geological evidence for past tsunami inundation (see <http://www.ngdc.noaa.gov/hazard/>).
   2. The safety buffer should take into consideration the historic event source, other known sources of local tsunamis, and local topography.
   3. In situations where similar source, tectonic, and coastal regimes exist, interpolating between regional historical events to determine local inundation is reasonable.
2. Pick a “reasonable” elevation for the area keeping in mind:
   1. The local topography –For most tsunamis, coastal areas, areas along bays, inlets and rivers that connect to the ocean that are below 10 meters (~33 feet) are at risk. It is possible for very large tsunamis to be destructive even above this elevation, but these are rare.
   2. The tectonic setting – Local sources of tsunami have additional challenges in the limited time to evacuate as well as potential damage to roads and bridges or debris. Distant sources provide time to drive from the area without the local earthquake or landslide damage to consider. Know if you have local, distant, or both local and distant potential sources of tsunami.
   3. Base on distance from local shoreline – Most tsunamis will no longer be destructive by 3 kilometers (~ 2 miles) inland. Low-lying areas along rivers that connect to the ocean should be designated as tsunami hazard areas for at least three kilometers inland and as far as ten kilometers inland for large, flat coastal rivers.
3. Interpolate inundation based on maximum modeled inundation on nearby / bounding areas
   1. In situations where similar source, tectonic, and coastal environments exist and modeled inundation has been done elsewhere, interpolate between modeled events.
4. Extrapolate lower-resolution model data on land to estimate inundation and add a buffer
   1. Current MMS guidelines for mapping and modeling specify a minimum grid resolution of 90-m. If regional modeling has been completed at a lower resolution, a first estimate of inundation is to extrapolate the inundation on shore and add a buffer since this method typically underestimates flooding.
   2. Dependent on topography
   3. Consider Dr. Kenji Satake’s method of projecting near-shore wave elevation onto coast with a simplified 2-D method (reference needed)
5. On the east coast of the US (Atlantic Ocean), use FEMA Hurricane Landfall