

# California Tsunami Maritime Safety Planning

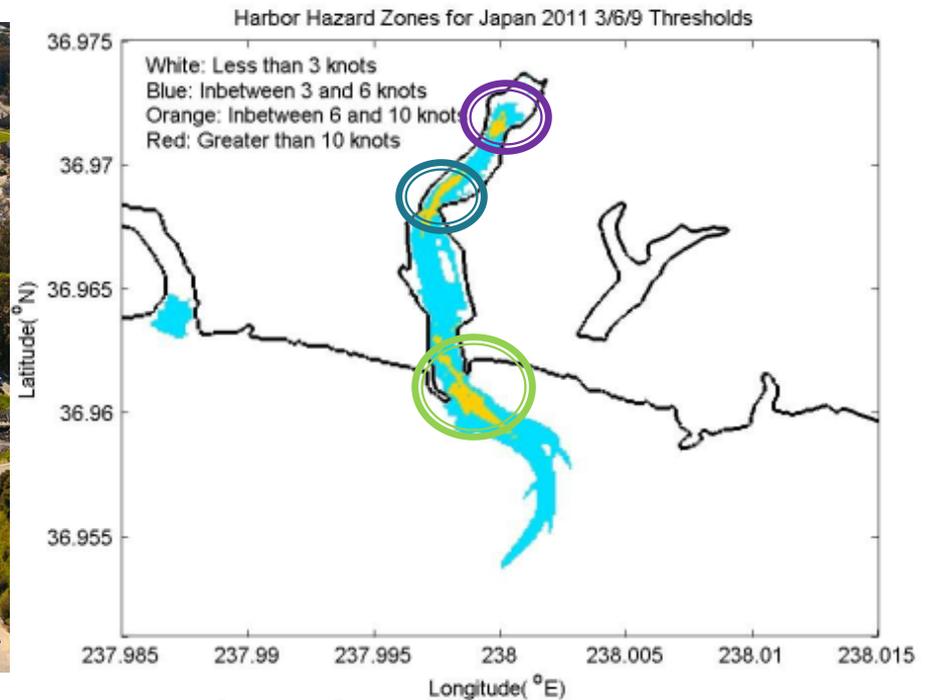
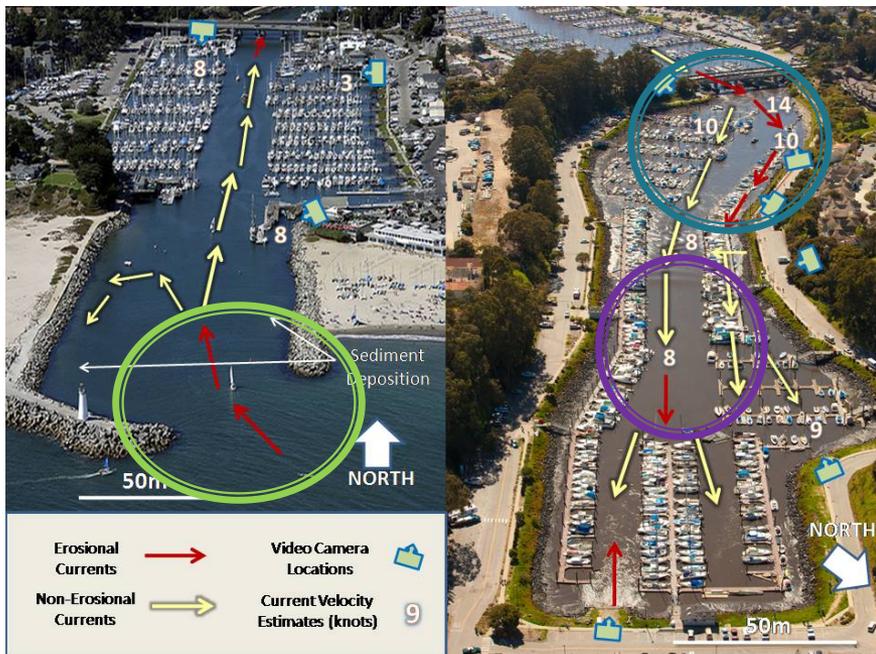
1. Create in-harbor hazard maps by modeling major harbors' tsunami hazards [damaging currents]
2. Create offshore safety zone maps for use by harbors that recommend if, when, and where vessels can be repositioned or sent to sea
3. Provide statewide guidance for response planning, harbor protection, and recovery/business continuity [based on above results]

# Maritime Safety Products

## Analysis of 2010 and 2011 tsunamis in pilot study harbors

Crescent City, Santa Cruz, Ventura, Ports of LA/Long Beach, and San Diego Bay

Video and other analyses of currents, sediment scour/deposition, areas of damage, safe areas

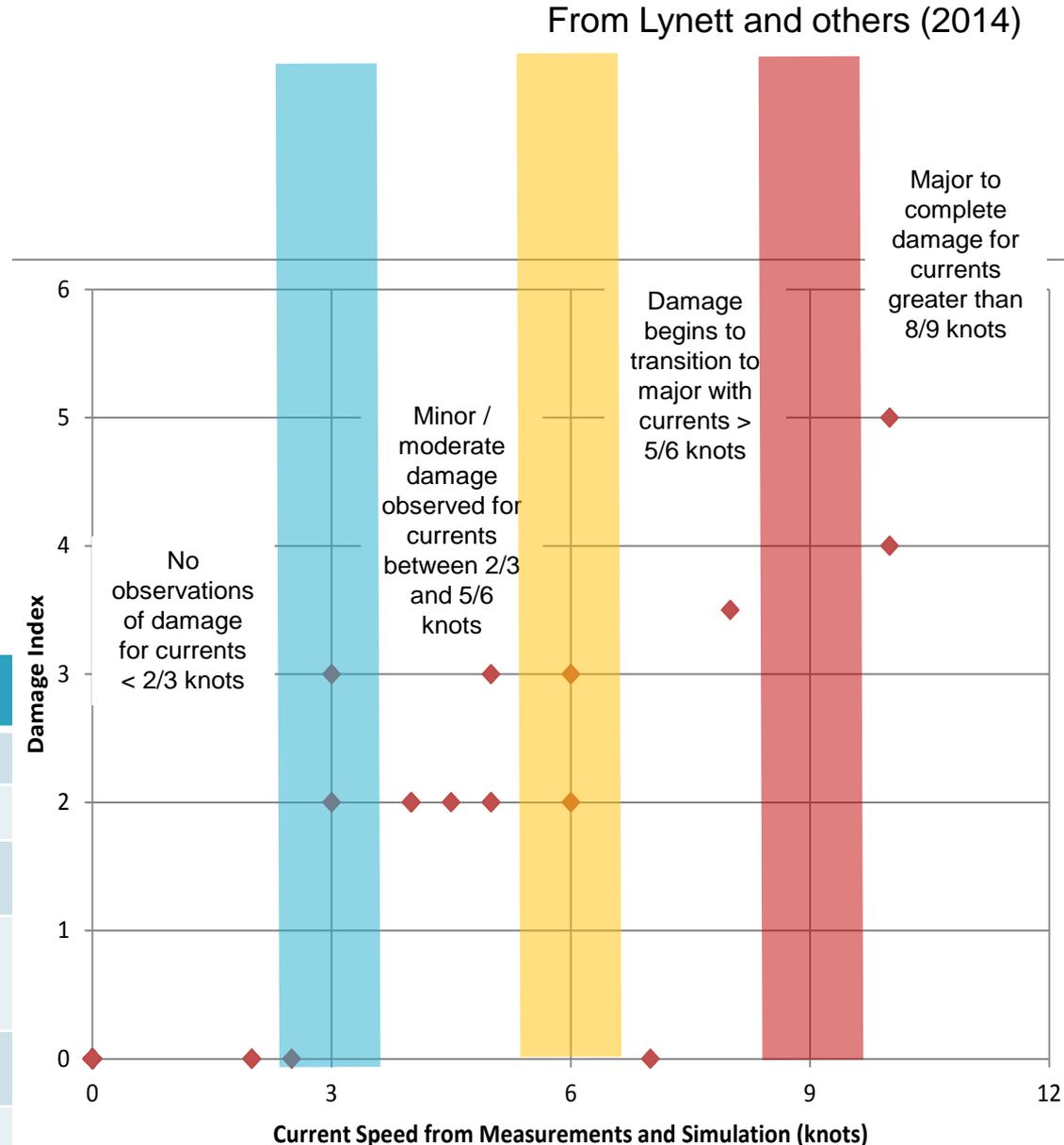


*March 11, 2011 tsunami in Santa Cruz – Observed versus modeled currents*

# Tsunami Current Hazard Maps

- Can we filter this information, create areas where certain levels of damage might be expected?
- Need to develop relationship between tsunami currents and damage
  - Based on previous observations of damage, and numerical hindcast & direct speed measurements at the damage location

Damage Index:	Damage Type:
0	no damage
1	small buoys moved
2	1-2 docks/small boats damaged, large buoys moved
3	Moderate dock/boat damage, mid-sized vessels off moorings
4	Major dock/boat damage, large vessels off moorings
5	Complete destruction



2011 M9 Japan scenario at  
10m resolution

**Current Thresholds for Potential Damage**



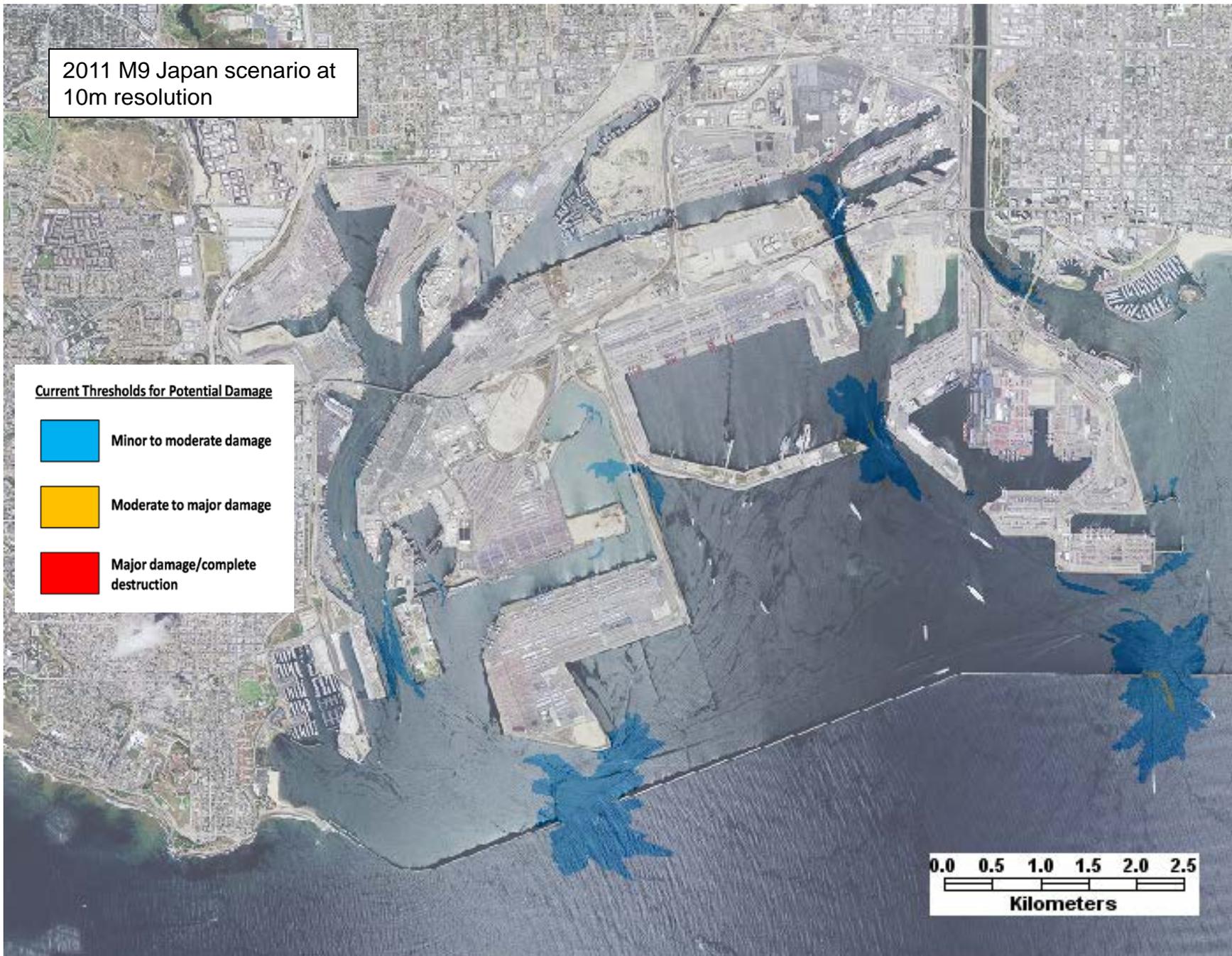
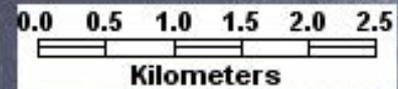
Minor to moderate damage



Moderate to major damage



Major damage/complete  
destruction



M9.2 Alaska-Aleutian  
scenario at 10m resolution

Current Thresholds for Potential Damage



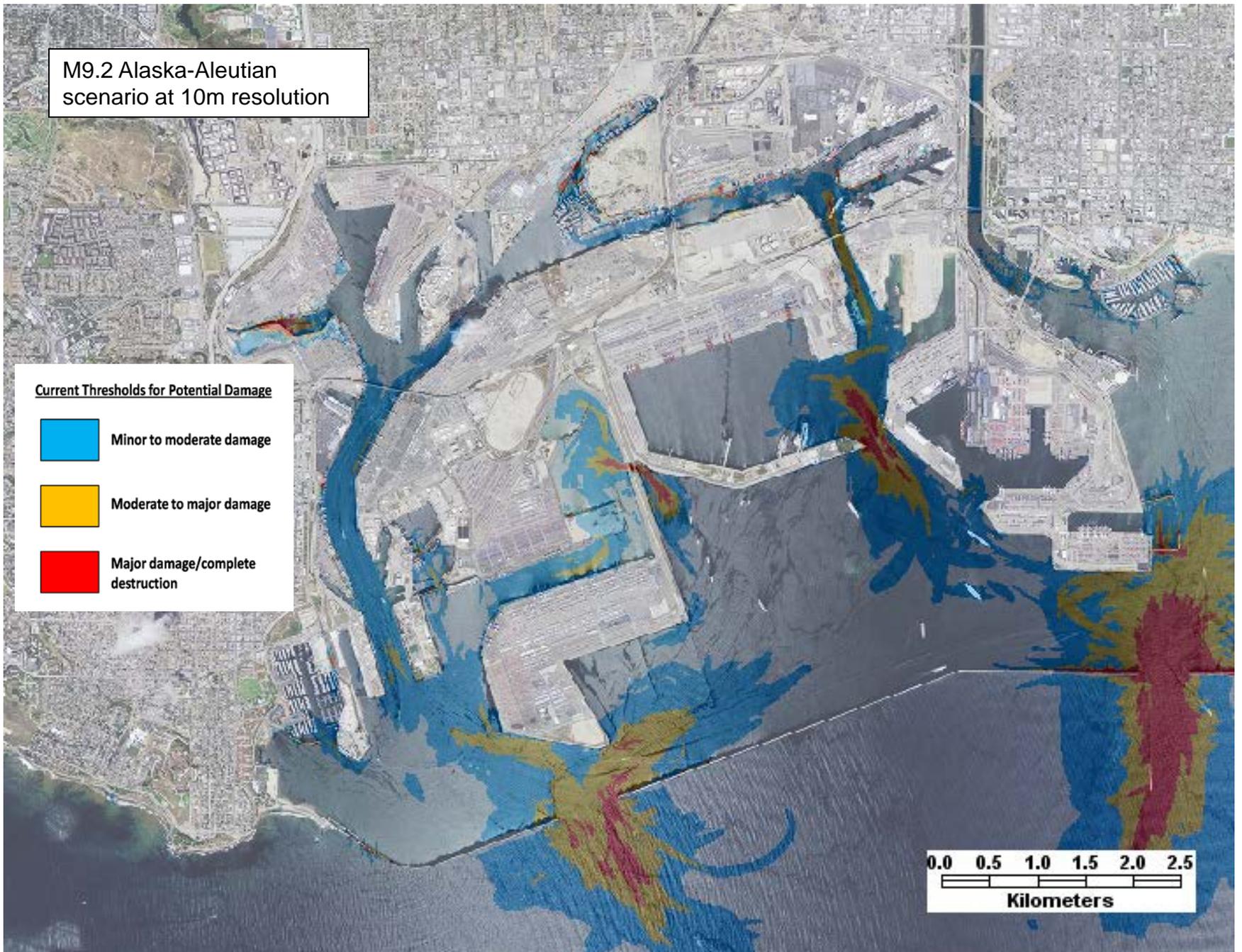
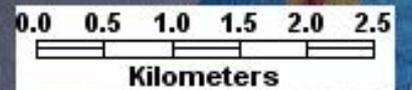
Minor to moderate damage



Moderate to major damage



Major damage/complete  
destruction



## APPENDIX

### Quick Reference Page for Determining Real-Time Maritime Tsunami Response Activities

**Step 1:** Obtain basic information about the earthquake and tsunami from National Tsunami Warning Center in Alaska, regional National Weather Service office, and/or county emergency manager. **NOTE: Tsunami Alert Level may change in first couple hours after the earthquake; WATCH may be upgraded to ADVISORY or WARNING.**

Earthquake location \_\_\_\_\_

Earthquake magnitude \_\_\_\_\_

Tsunami Alert level (circle one)    WATCH    ADVISORY    WARNING

**Closest forecasted tsunami amplitude/wave height** \_\_\_\_\_

Forecasted tsunami arrival time \_\_\_\_\_

**Step 2:** Tsunami evacuation and response will depend on the amount of time before the tsunami arrival. Four (4) hours is considered the threshold time needed for evacuation. As a quick reference, we offer the following guidance:

1) **If less than four hours before tsunami arrival, we recommend the following:**

- ADVISORY – evacuate beaches, harbor docks, and piers
- WARNING – evacuate entire maximum on-land evacuation zone, or follow guidance provided by local emergency manager

2) **If greater than four hours before tsunami arrival,** and your harbor has fully developed its tsunami response Playbook plans, the harbor can utilize the FORECAST AMPLITUDE from Step 1 on the table on the right to identify the appropriate response plan to use.

Reference Pages for Details in Maritime Playbook	Scenario Playbook Plan Letter	Peak Amplitude/wave height (in meters)
	(No action)	0.2
Page 8-9	A	0.5
Page 10-11	B	0.6
Page 12-13	C	0.8
Page 14-15	D	1.0
Page 16-17	E	1.2

Each of the over 70 communities in California will get a tsunami forecast value for their location and a recommendation on which associated “phase Playbook” could be followed for the response activities in real time.

The maritime community can refer to the playbook guidance document for the specific instructions to follow.

## Playbook Plan D (based on M9.4 North Chile Scenario)

### Background Information:

Alert level = Warning

Peak Amplitude = 1.5 meters (modeled)

Peak Velocity = 9+ knots

Projected duration of strong currents (see location map below):

3-6 knots = 50 hrs; 6-9 knots = 10 hrs; >9 knots = 0 hrs

### Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and gold on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:
  - Vessels can be moved to non-blue areas of the port.
  - ..... (completed with maritime community input)

### Safe areas for repositioning vessels within POLA:

..... (completed with maritime community input)

