

# Hunga Tonga - Hunga Ha'apai Volcano Tsunami Event January 2022

A Victorian EM planning & operational context



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Emergency Management and Community  
Engagement  
Victoria State Emergency Service

# Our Values



We pride ourselves on our credibility



We are part of our community



Safety drives our decisions



Focused and adaptable



Together we are VICSES



*Safer Communities - Together*



# VICSES at a glance



## Who we are

### Control agency for:



Flood



Storm



Earthquake



Tsunami



Landslide



**154**

Units

**16**

Permanently  
staffed offices

**104**

Road rescue  
providers

## Our people in 2024-25



**5,040**  
Volunteers\*

Female 33%

Male 66%

Other 1%

**Volunteer leadership** (Controllers and Deputy Controllers)

Female 30%

Male 70%

\*active & non-active

**368**  
Staff

Female 57%

Male 42%

Other 1%

**Staff leadership** (Executive, Senior Managers, and other people leaders)

Female 40%

Male 60%



*Safer Communities - Together*

# Our agency in 2024-25



**342,374**  
Volunteer hours



**35,940**  
Incidents



**Flood**  
11,287 hours 2,165 incidents



**Storm**  
132,569 hours 24,188 incidents



**Road crash rescue**  
16,269 hours 2,532 incidents



**Tsunami, landslide or earthquake**  
2,619 hours 154 incidents



**Assist agency**  
45,430 hours 3,621 incidents



**Community engagement**  
122,382 hours 2,121 incidents



**Rescue (other/RAIR)**  
6,270 hours 1,007 incidents



**Other**  
5,548 hours 152 incidents



**2024-25 marks our busiest year on record for road crash rescue and assist agency response.**



*Safer Communities - Together*

# Joint Australian Tsunami Warning Centre - JATWC



**Australian Government**  
**Geoscience Australia**



**Australian Government**  
**Bureau of Meteorology**

Detect and analyze seismic signals

Estimate earthquake parameters of location, magnitude and depth etc

Provide the earthquake solution to BoM **within 15min** of an earthquake

Assess tsunami threat to Australia with MOST model tsunami wave prediction

Issue tsunami advice (No Threat/Watch /Warning) to Australia **within 15min** after receiving GA

Provide threat information to tsunami warning country authorities in the Indian Ocean



# Australian Tsunami Warning System

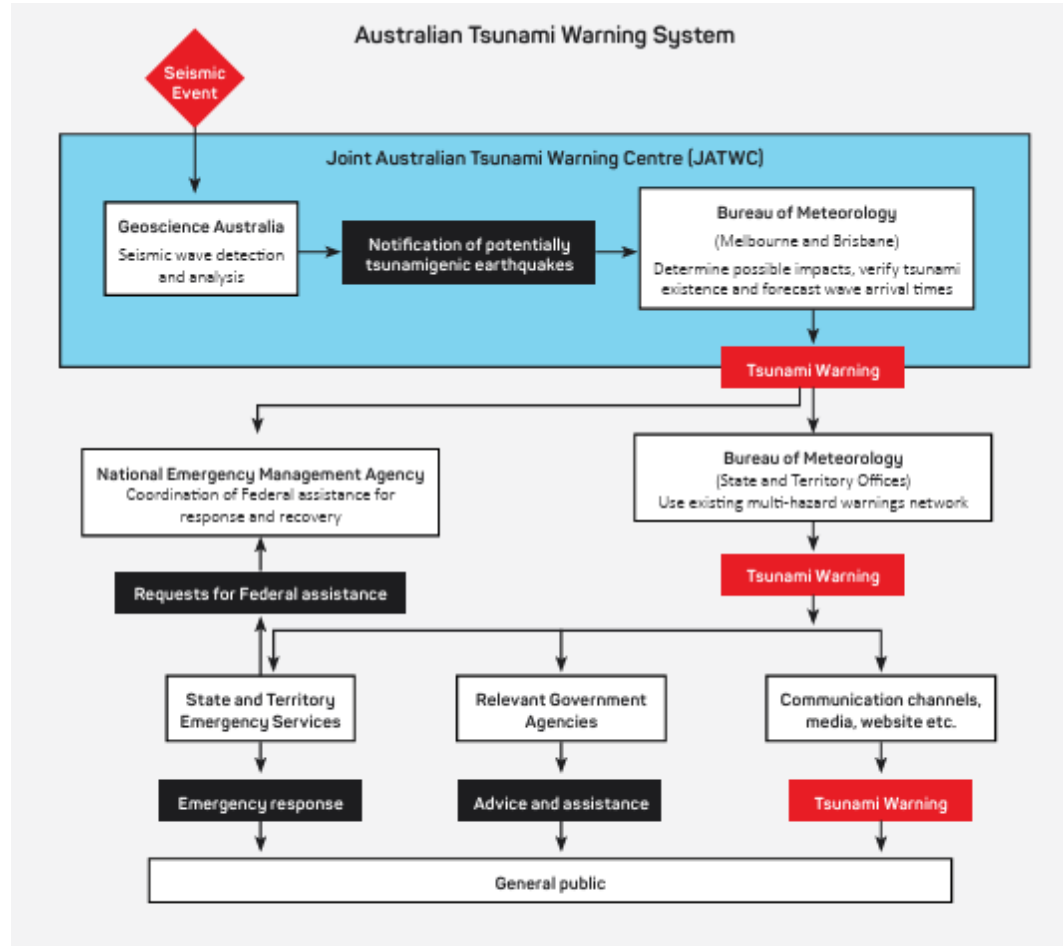
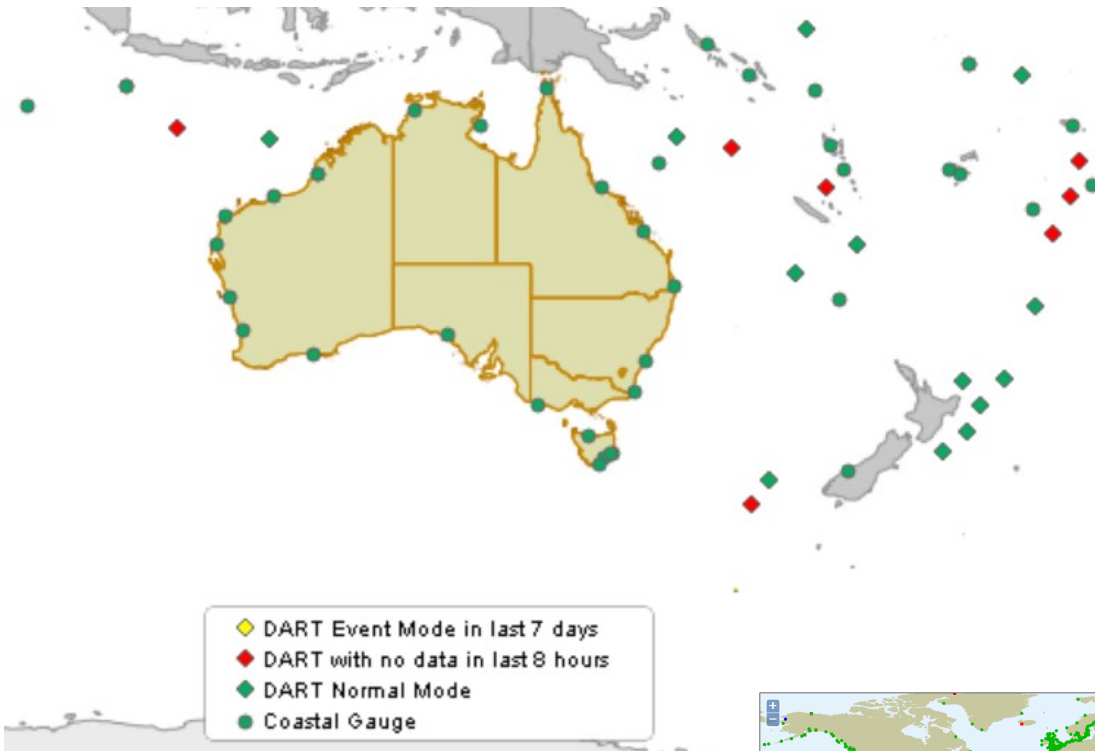


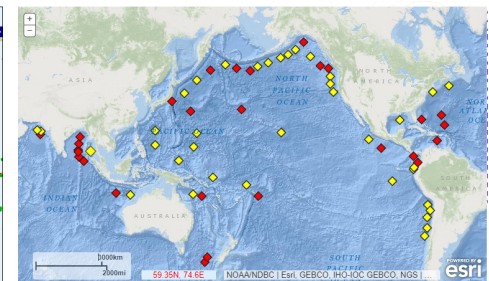
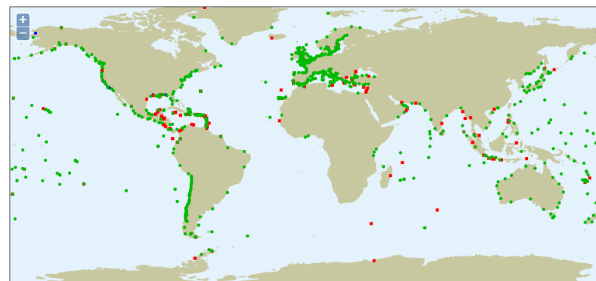
Figure 10: Schematic illustration of the Australian Tsunami Warning System (ATWS).

Source: Joint Australian Tsunami Warning Centre (JATWC). Image adapted from the Bureau of Meteorology [www.bom.gov.au/tsunami/about/atws.shtml](http://www.bom.gov.au/tsunami/about/atws.shtml)

## Sea Level Observations

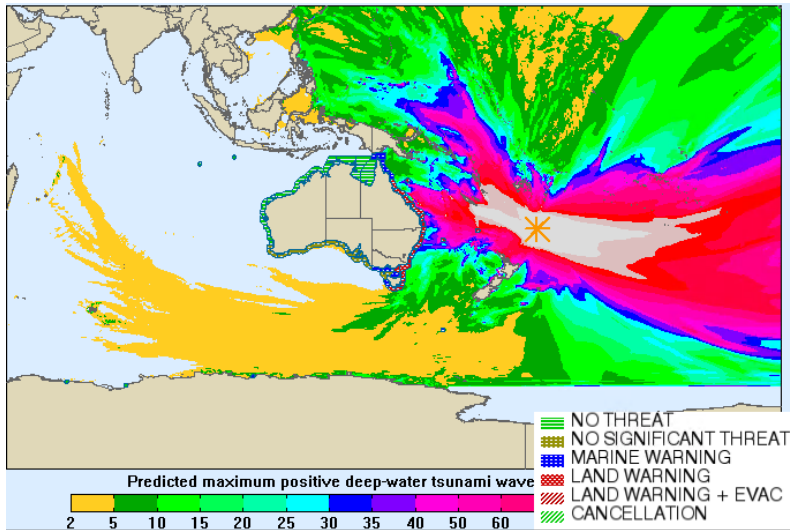


- 6 Australian operated DARTs are placed strategically in pairs in the Indian Ocean, Coral Sea, and Tasman Sea for early confirmation of a tsunami
- DART observations can be used to determine an “effective magnitude” and refine the threat assessment
- Tide Gauge measurements can be used to confirm that a tsunami has been generated and assess impacts
- DART observations can be externally accessed from NDBC at <https://www.ndbc.noaa.gov/obs.shtml>
- Tide Gauge observations can be externally accessed from the IOC at: <https://www.ioc-sealevelmonitoring.org/>



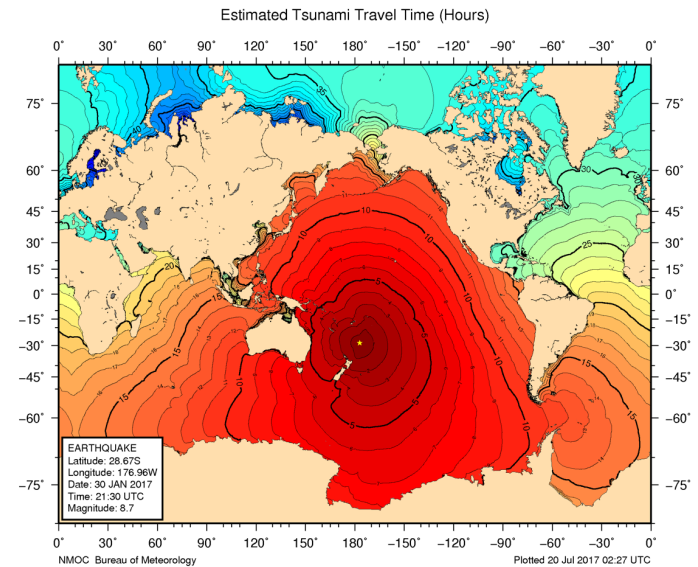
# Tsunami Threat Assessment

## Modeled scenarios



Tsunami Threat Tier (Classification)	95 <sup>th</sup> Percentile Deep Water Threshold Value
No Threat	<20cm (Australian continent, and Antarctica)
No Threat (low level effects)	<10cm (Offshore territories) 10 – 20cm (Australian continent, and Antarctica)
Marine Threat	5 – 10cm (Offshore territories) 20 – 55cm (Australian continent, and Antarctica)
Land Inundation Threat	10 – 50cm (Offshore territories) >55cm (Australian continent, and Antarctica)
	>50cm (Offshore territories)

## Tsunami Travel times



Mag	Action
6.5 to 7.5	The threat area is defined to be within the 1 hour travel time isochrone
7.6 to 7.8	The threat area is defined to be within the 3 hour travel time isochrone
7.9 and above	The threat area is defined to be within the 6 hour travel time isochrone

# Case Study:

## Hunga Tonga - Hunga Ha'apai Volcano and Tsunami 2022

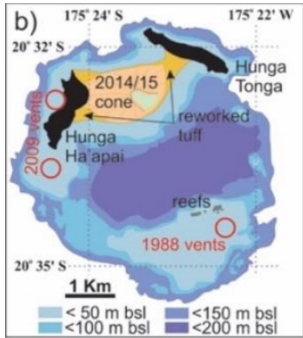
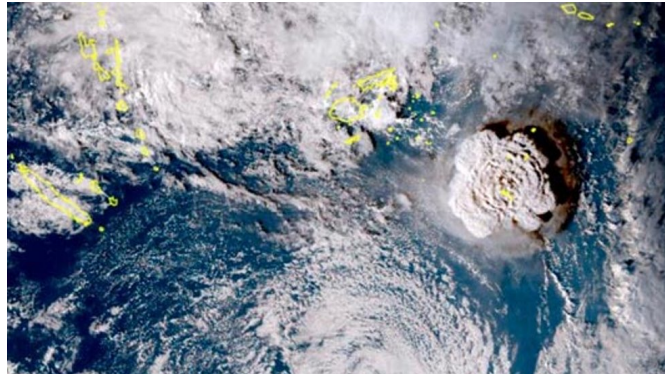
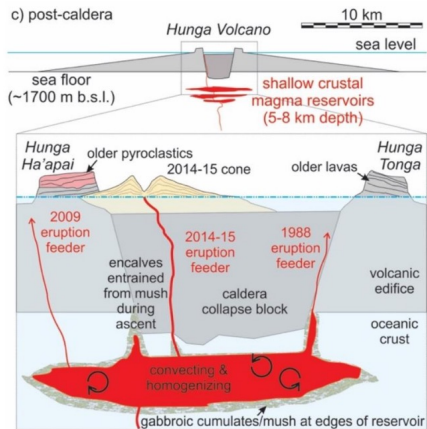


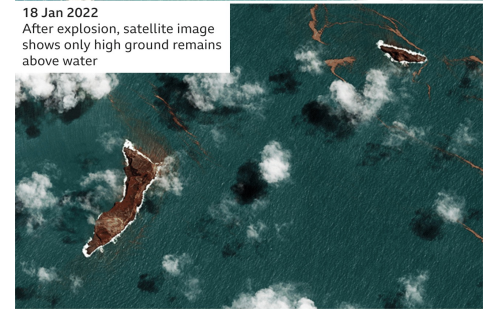
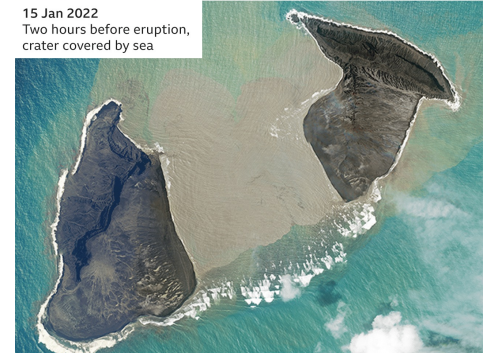
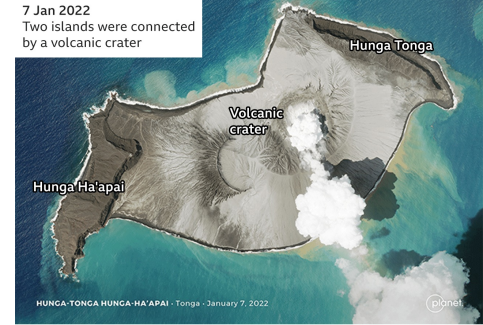
Image of volcanic eruption, the day before – January 14, 2022.



Satellite image of the volcanic eruption – January 15, 2022.



Eruption leaves little above water on Hunga-Tonga Hunga-Ha'apai



Source: Copernicus/ESA/Sentinel Hub, PlanetLabs, Maxar

# Case Study:

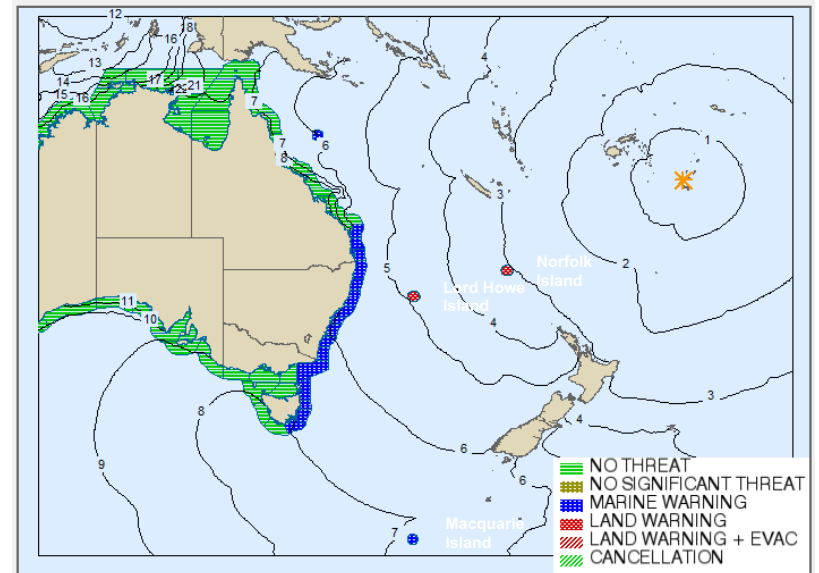
## JATWC WARNING TIMELINE

Time (AEDT)	Elapsed Time (hh:mm)	Key Event: 15 January 2022
15:10	00:00	Explosive volcanic eruption of the Hunga Tonga-Hunga Ha'apai volcano (Tonga)
15:30	00:20	Observations confirm a tsunami was generated at 3:30 PM AEDT at Nuku Alofa.
16:58	01:48	No Threat Bulletin issued with additional text to advise that a tsunami had been generated and that the JATWC would continue to monitor observations. Initial assessment based on 3 hours travel time.
19:36	04:26	Marine Warning for Norfolk Island issued after 50 cm wave observed at the tide gauge.
20:00	04:50	Marine Warning issued for Lord Howe Island based on tide gauge measurements increasing at Norfolk Island.
20:37	05:27	Significant observations in NSW and QLD: (40cm at Twofold Bay at 8:10 PM AEDT; 25 cm at Gold Coast at 7:40 PM AEDT) prompts the issuing of Marine Warnings.
20:58	05:48	Norfolk Island Warning upgraded to Land Threat after wave observations exceed 1.0 m at the tide gauge.
21:00	05:50	Marine Warnings extended to Victoria, Tasmania and Macquarie Island using a 7 hours travel time threat assessment.
21:18	06:08	Lord Howe Island Warning upgraded to Land Threat with evacuation order issued at 10:12 PM AEDT.
10:09 +1	18:59	Land warnings for Norfolk Island and Lord Howe Island downgraded to marine.
10:30 to 11:50 +1	19:20 to 20:40	QLD, Macquarie Island, Victoria and Tasmanian marine warnings cancelled.
19:56 to 21:59 +1	28:46 to 30:49	Lord Howe Island, Norfolk Island and NSW warnings cancelled.

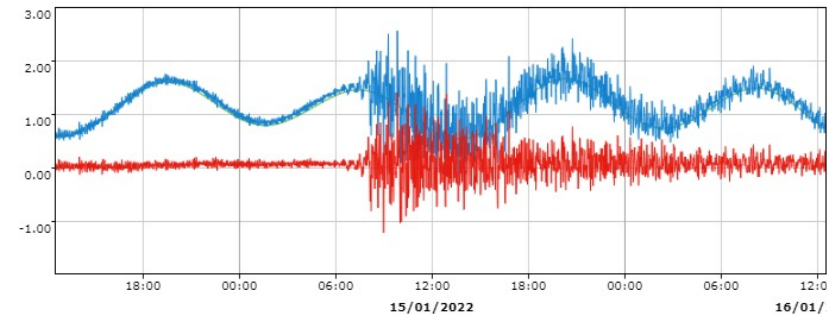
## Key Challenges

- Initial detection of the volcanic eruption / tsunami and scale of eruption.
- Lack of event-specific tsunami modelling.
- Lack of a unified sea-level observing tool.

## JATWC Tsunami Threat Assessment – Within 7 Hours Travel Time



## Norfolk Island –



# Australian EM Arrangements

Australian Disaster Resilience Handbook Collection | 2023

## Australian Emergency Management Arrangements

THE SECOND NATIONAL ACTION PLAN  
To implement the National Disaster Risk Reduction Framework

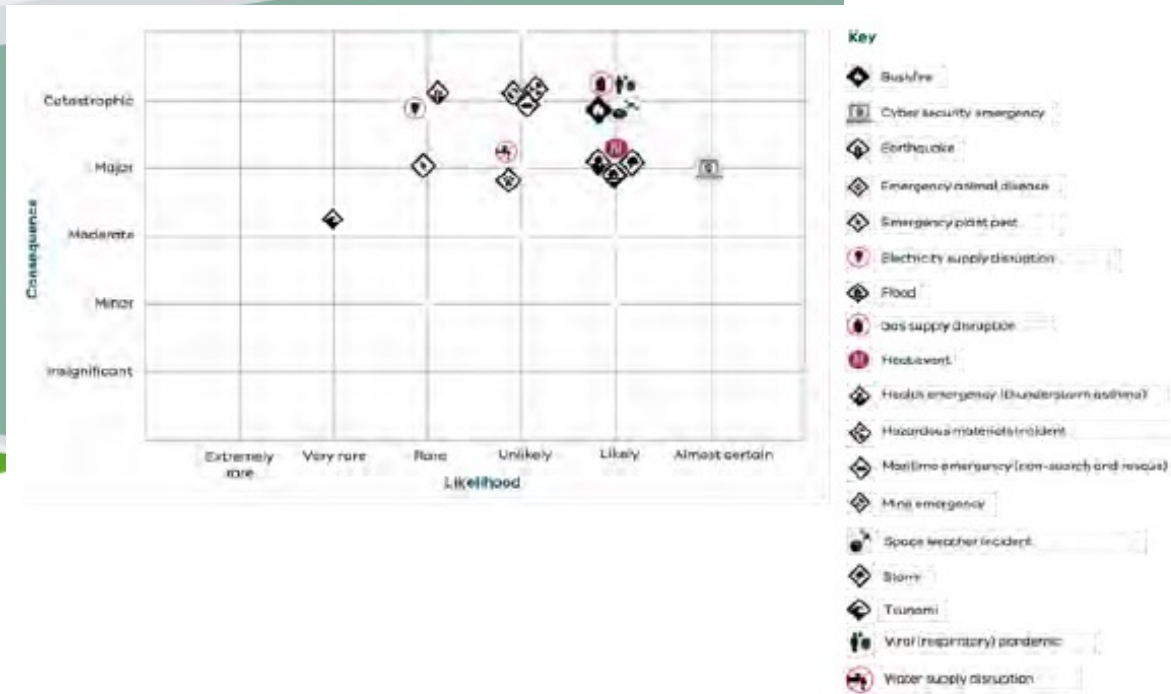
Sendai Framework  
for Disaster Risk Reduction  
2015 - 2030

NATIONAL STRATEGY  
FOR DISASTER RESILIENCE



# Victorian EM Arrangements

## Victorian State Emergency Management Plan

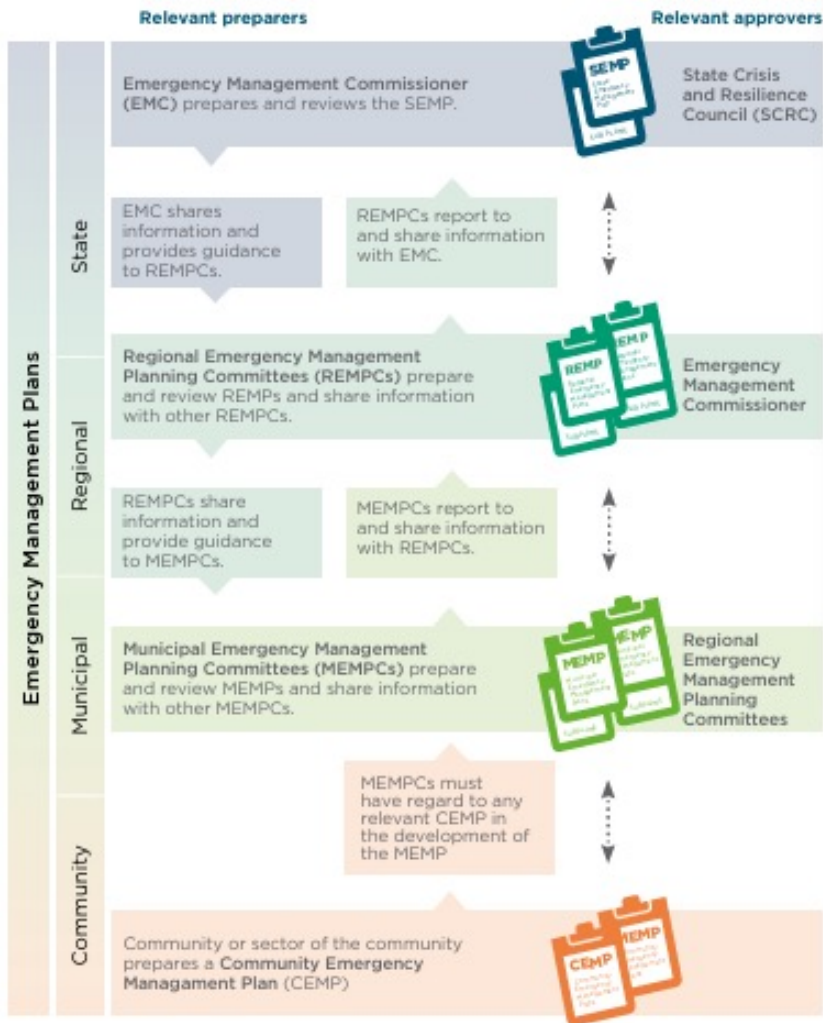


October 2024

Figure 3: Emergency Risk Results – credible worst-case scenario

# Victorian EM Planning Framework

Figure 2: Framework for Emergency Management Planning



**State Emergency Management Plan, Tsunami Sub-Plan 2023**  
Edition 3.0

**South West (Barwon) Region**  
Emergency Response Plan

**SES**

**SES** Tsunami Sub-plan

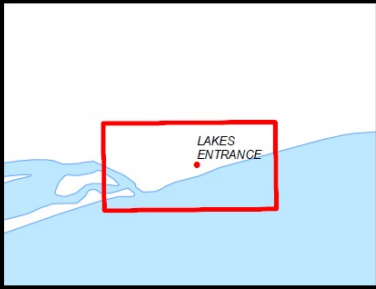
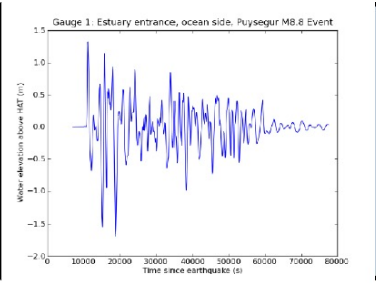
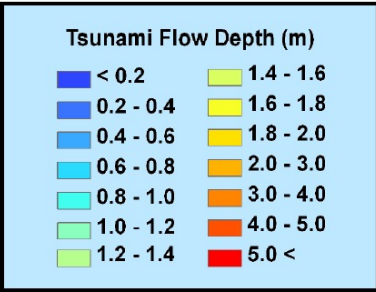
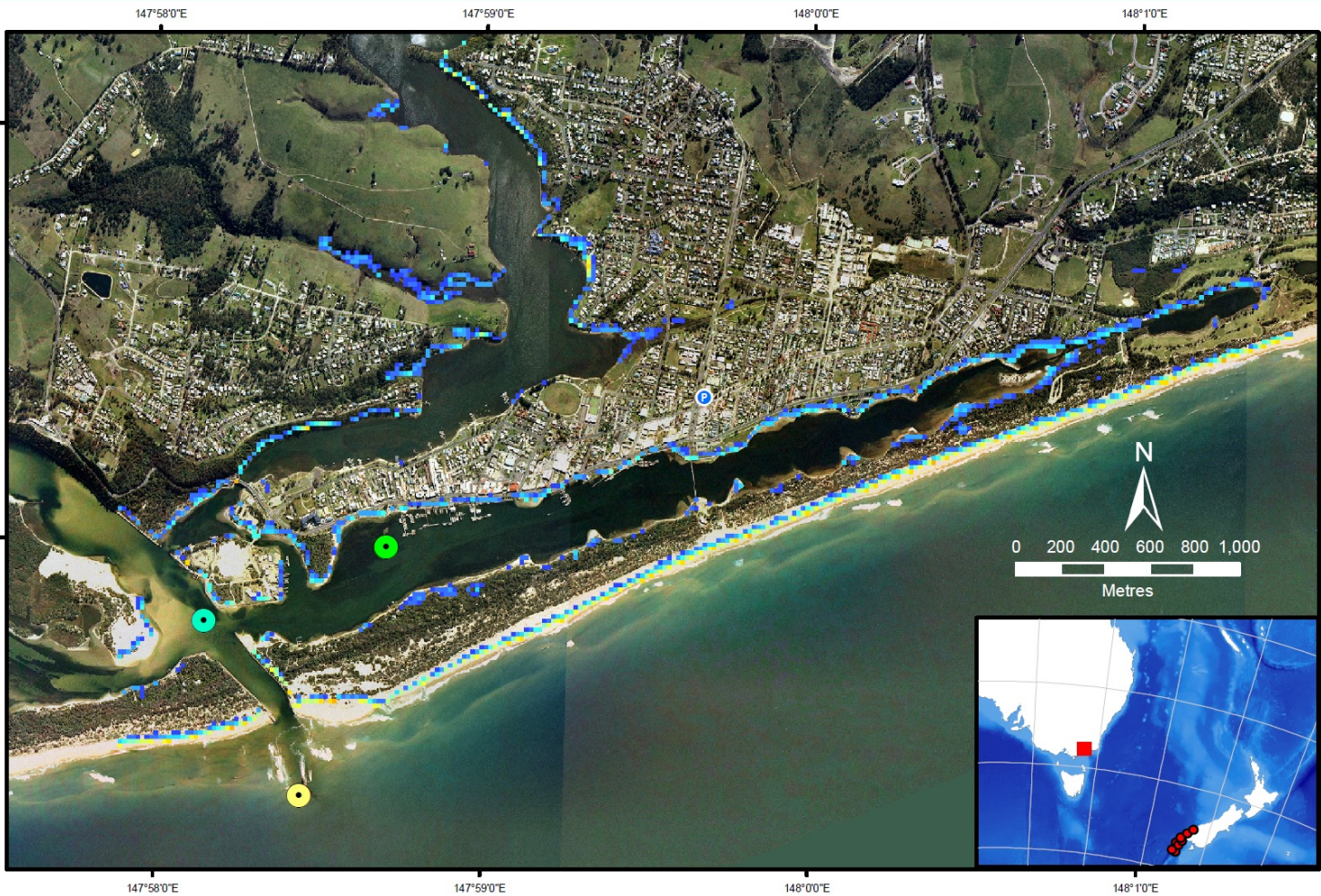
**Barwon South West Regional Emergency Management Plan 2023-2026**

**GREATER GEELONG MEMPC**  
MUNICIPAL EMERGENCY MANAGEMENT PLANNING COMMITTEE

**Municipal Emergency Management Plan (MEMP)**  
Version 2.0 - August 25



# Tsunami Inundation Model For Lakes Entrance: Puysegur M8.8



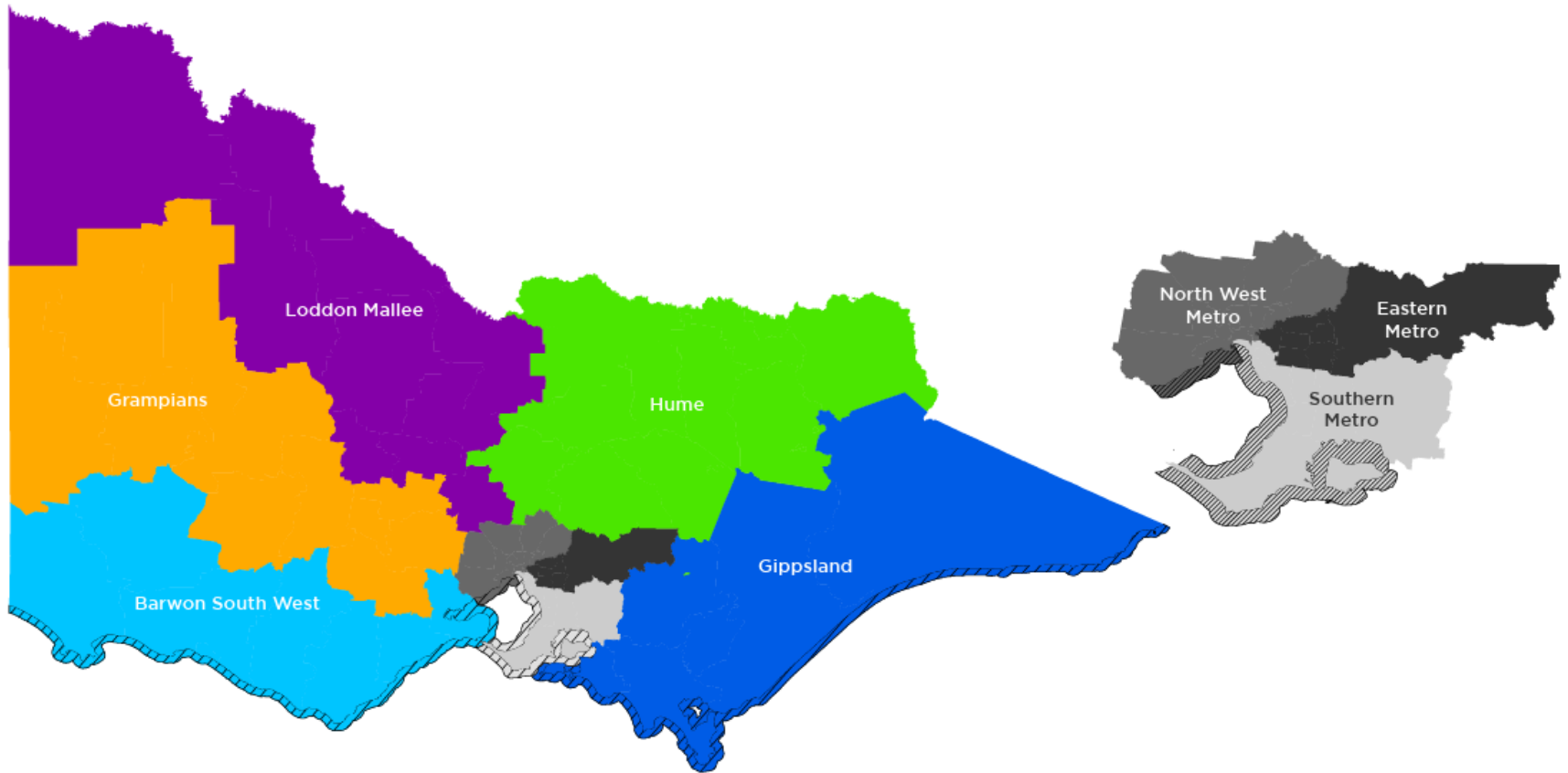
EVENT: 1 in 10000  
 EVENT SIZE: Magnitude 8.8  
 EVENT LOCATION: Puysegur  
 TIDE: HAT (0.6 m AHD)  
 HORIZONTAL DATUM: GDA94 MGA Zone 55  
 VERTICAL DATUM: Australian Height Datum

MODELLED BY: Geoscience Australia  
 DATA SUPPLIED BY: VIC DSE  
 DATE: April 2011

- |                         |          |
|-------------------------|----------|
| Police Station          | Hospital |
| Ambulance Station       | Gauge 1  |
| Fire Station            | Gauge 2  |
| State Emergency Service | Gauge 3  |



# Victorian EM Regions and Tiers



**Figure 1: Victoria's emergency management regions**

- *Relevant regions are responsible for planning to a distance of 3 nautical miles from their respective shores, including any unincorporated areas (except French Island which is declared as part of the Southern Metro region).*

# Case Study: Activation of arrangements in Victoria

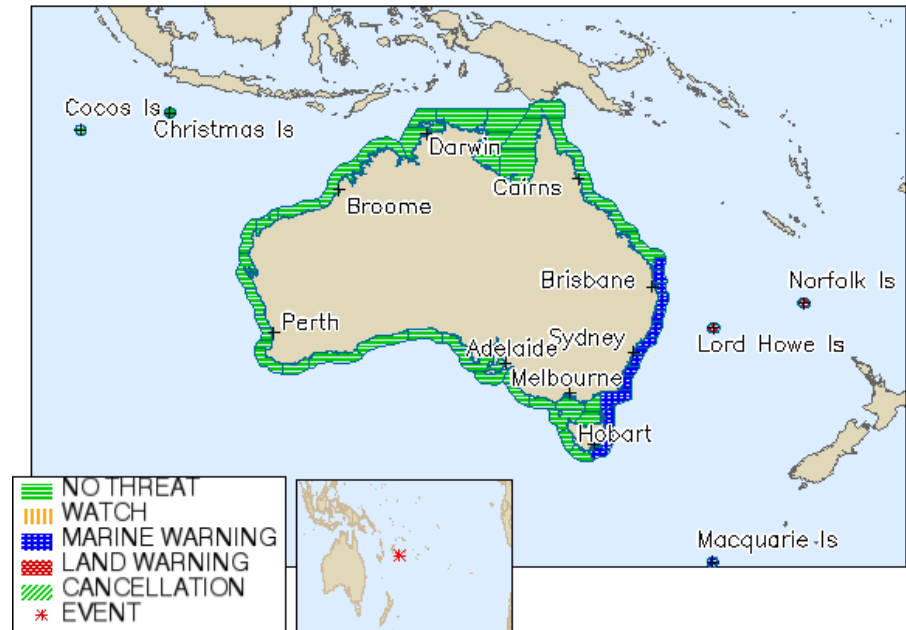


- State Control Centre (SCC) activation
- Engagement with multiple agencies, Victorian and interstate (but Tasmania was left off the group).

# Readiness and Response

## What went well

- ADTEC teleconference for situational awareness, agency intent and task allocation
- Engagement with Regional Duty Officer and RDO engagement with units
- Consideration for local impacts/ consequence
- Swift release of warnings
- Engagement with ESTA for identification of potential call escalation issues
- Planning considerations for land warning as well as marine



# Readiness and Response

## Opportunities for improvement

- Interpretation of initial warnings and influence on situational awareness
- Location of members of State and Regional duty teams, availability of staff to deploy
- **Further development and maintenance of skillset in non-standard event**
- Determination of infrastructure and software needs for potential wave monitoring in Victoria.
- **Consideration of other GIS layers that may support actions**

# Plans and Doctrine



## What went well

- **State and Regional Tsunami plans were considered and activated**

## Opportunities for improvement

- **Require greater understanding of the plans less regularly activated and greater awareness of activation triggers**
- SOP awareness and subsequent update
- Modelling for earthquake vs modelling for earthquake plus eruption
- Confidence in modelling due to erratic wave action
- References to supporting documentation in Tsunami Plans
- Regional modelling is based off earthquake activity at specific locations, limiting awareness of potential alternate consequence

# Interagency Communication



- What went well
- Sufficient support available at SCC, WADO in place
- Notifications through to SRC and other agencies
- **Teams meeting between VIC, NSW and QLD SES, prompted continual engagement through event**
- BOM proactive in maintaining contact

# Interagency Communication

## Opportunities for improvement

- **SOP047 to consider process for Victorian agency notifications**
- Currency of contact details for interstate agencies
- Inclusion of all appropriate agencies in teams meetings (e.g. Tasmania)
- **Cross border communication between states to ensure consistent messaging**
- Consideration for NEMA involvement where national coordination is required
- **Further engagement with JATWC and interstate partner agencies regarding warning structure and dissemination**
- **Limited knowledge amongst agency personnel regarding comms options on offshore/ maritime space**

# Warnings



PREPARE & GET READY

INCIDENTS & WARNINGS

RELIEF & RECOVERY



List Both Map

Filter

Search by address or your location



Locate Me

Warnings 5

Incidents 30

Type

Updated



**Advice - Structure Fire - Threat is Reduced**  
Corio, Norlane, North Shore

2 hours ago



**Advice - Dangerous Animal - Avoid the Area**  
Peterborough

2 days ago



**Community Information - Grass Fire - Stay Informed**  
Gunbower

16 minutes ago



**Community Information - Blue Green Algae - Stay Informed**  
Lake Charlegrark

13 days ago



**Community Information - Bushfire - Stay Informed**

15 days ago



<https://emergency.vic.gov.au/respond/>



# Warnings

**VIC EMERGENCY** PREPARE & GET READY

List **Both** Map

Warnings **3** Incidents **6**

Type Updated

- Advice - Structure Fire - Threat is Reduced** 2 hours ago  
Corio, Norlane, North Shore
- Advice - Avoid the Area** 2 days ago  
Peterborough
- Dangerous Animal**  
Crofts Bay, Peterborough
- Community Information - Bushfire - Stay Informed** 15 days ago  
between the townships of Irrewillipe, Kawarren, Lovat, Wimba, Charleys Creek, Carlisle River and covers the township of Gellibrand

There are **2 warnings** outside of your current map view and filters.  
[Zoom to State](#)

**Advice - Dangerous Animal - Avoid the Area**

Issued Last Tuesday at 5:12 PM.

This **Advice** message is being issued for Crofts Bay, Peterborough.

- Due to a whale carcass in the area there could be an increase in shark activity.
- A whale carcass can attract sharks to the area and mean they are closer to the shore than normal.
- While it is not uncommon for sharks to be present off the Victorian coast, you should exercise additional caution in the area.

**Surfers and swimmers should avoid the area. Stay informed and do not enter the water at closed beaches.**

**What you should do:**

- If you see sharks, report the sighting by calling Triple Zero (000) or notify lifesavers immediately if you are at a patrolled beach.
- Take extra caution in the Crofts Bay area by not swimming, surfing or diving in the area.

**Staying safe at nearby beaches:**

- Always swim, dive or surf with a friend.
- Swim between the red and yellow flags on patrolled beaches.
- Don't swim in places where human or animal waste enters the water.
- Keep away from large schools of fish, seals or other wildlife as these can attract sharks.

**Impacts in your area:**

- The Victorian Fisheries Authority is monitoring for shark sightings and providing




**SHOW ON MAP**

Updated 16/04/2026 09:43:04

<https://emergency.vic.gov.au/respond/>



# Warnings

Message Type	Trigger	Publish	Update	Expiry
<b>Advice</b> Tsunami Watch 	JATWC issues Tsunami Watch for potential or actual threat to Victoria	<30 minutes of notification	Update < 30 minutes of any update to JATWC watch	Set message to expire 30 minutes after the JATWC watch is due to expire
<b>Emergency Warning</b> Marine Warning 	JATWC issues Marine Threat Tsunami Warning for potential or actual threat to Victoria	<30 minutes of notification	Update < 30 minutes of any update to JATWC warning	Set message to expire 30 minutes after the JATWC warning is due to expire
<b>Emergency Warning</b> Land Warning 	JATWC issues Land Threat Tsunami Warning for potential or actual threat to Victoria	<30 minutes of notification	Update < 30 minutes of any update to JATWC warning	Set message to expire 30 minutes after the JATWC warning is due to expire

# Warnings



## What went well

- Knowledge of warnings polygons in place
- Determination of priority polygons
- **VIC messaging short and sharp – 1km inland or 10m ASL – allows for flexibility**
- Consideration for land threat warnings, 0.83m vs 1m
- Spokesperson allocation – Bureau for national, VICSES for Victorian consequence
- Hazard key message tiles available within 15 minutes
- Ongoing nature of warnings – extension of reauthorisation times

# Warnings

## Opportunities for improvement

- **Little consistency across states warning types and dissemination methods**
- **Border residents may receive both NSW and Vic messaging – consistency is key**
- **QLD messaging very wordy, 2 SMS for dissemination delaying message dissemination**
- **Pre-defined polygons available but not used – business rules state coastal poly**
- **First time business rules utilised since put in place 2018**
- **Nil template for Tsunami in Australian Warning System**



# Technology and Support Platforms



## What went well

- Victoria as owner of EA has capacity to support NSW and QLD
- Telstra engaged and available to support if required
- Opportunities for Improvement
- Awareness of limitations of EA platform – 5 campaigns
- Ensuring engagement of all states for prioritisation of warning polygon dissemination

# Opportunities for improvement

- Complete tsunami evacuation mapping for Lakes Entrance and schedule other communities
- Conduct community exercising as part of PACWAVE26 tsunami exercise
- Work with Community Connections team for consistent community engagement messaging
- Work with ATAG and EMV to apply for funding for updated tsunami modelling along the Victorian coast (current maps dated 2011)
- Apply for Tsunami Ready program recognition
-

# Questions?

