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# TSUNAMI WARNING ARRANGEMENTS

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*Supplementary Document to the NSW State Tsunami Plan*

**January 2024**

**Figure 1 - Aerial photo, tsunami, Natori, northeastern Japan, March 2011**



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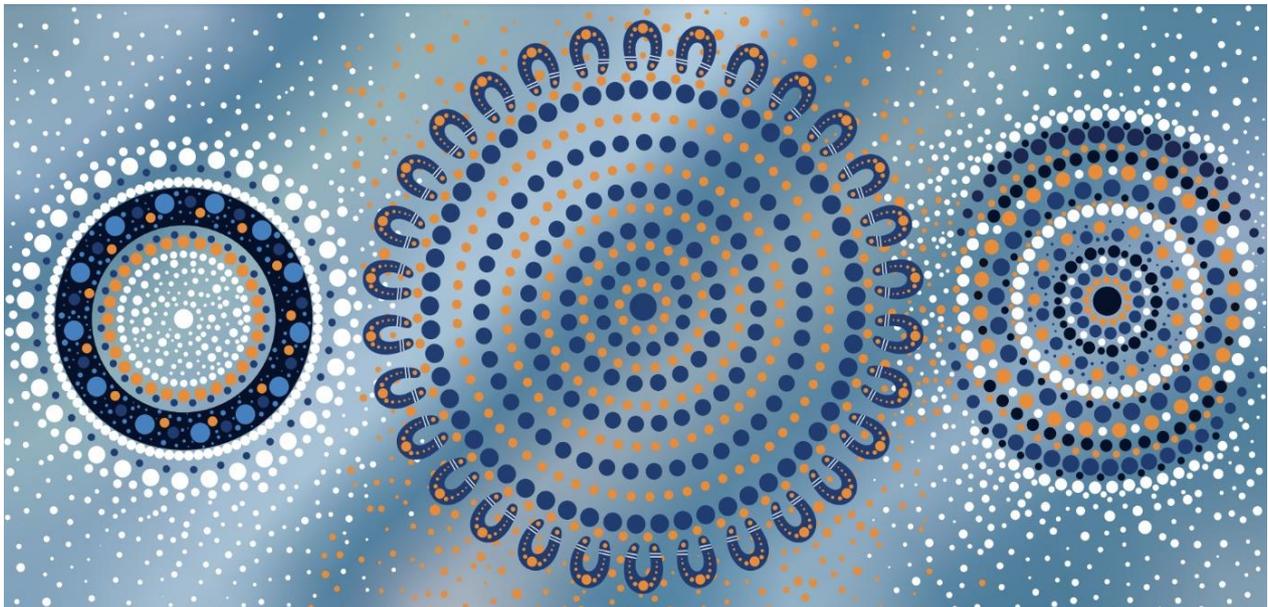
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# ACKNOWLEDGEMENTS

## ACKNOWLEDGEMENT OF COUNTRY

The New South Wales State Emergency Service (NSW SES) acknowledges and pays respect to the traditional owners and custodians of the land on which we work, volunteer and live. NSW SES recognises the diversity of Aboriginal and Torres Strait Islander peoples and their ongoing culture and continued connection to lands, waters, and the greater communities throughout Australia.

NSW SES appreciates the value of traditional knowledge held by Aboriginal and Torres Strait Islander peoples and its significance in understanding Australia's natural landscape to perform the emergency management procedures detailed in this supporting document.



*'Journey after the storm' by Lani Balzan*

## STATEMENT ON CLIMATE CHANGE

NSW SES understands that the effects of climate change will continue to increase the severity of disasters including storm, flood, and tsunami disasters and its impacts on life and property in NSW.

It is understood that the changes to natural climate processes, oceanic climate systems, temperatures, and weather pressure systems will affect the extremity of Australia's weather systems and ocean hazards. (1) The increased risk of severe thunderstorms and storm surges (1), flash flooding and large flood events (1), and the possibility of higher levels of tsunami inundation from sea level rise (2) have potential to have a higher impact on communities when they occur.

NSW SES in the management of flood, storm, and tsunami risk must consider the effects of climate change in all phases of Emergency Management. The NSW SES has an important role in planning, preparing for, responding to, and initiating recovery from the environmental impacts of severe weather-related incidents, emergencies, and disasters.

# 1 INTRODUCTION

## 1.1 PURPOSE

The purpose of this document is to inform the community of New South Wales (NSW) of:

- How the development of tsunami warning systems and the issuing of associated warning products occurs within NSW,
- Roles and responsibilities for operation and maintenance of warning systems and dissemination of associated warning products,
- The types of tsunami warning products issued,

This document is supplementary to the *NSW State Tsunami Plan*.

## 1.2 BACKGROUND

In this plan, a 'tsunami' is defined as a series of ocean waves with very long wavelengths (typically hundreds of kilometres) caused by large-scale disturbances of the ocean, such as earthquakes, landslide, volcanic eruptions, explosions, or meteorites (3).

Australia is bounded by approximately 8000 kilometres of active tectonic plates capable of generating a tsunami that could reach our coastlines within 2 to 4 hours. One third of earthquakes worldwide occur along these boundaries. These tectonic plate boundaries are displayed below in Figure 1. A tsunami could impact the entire NSW coast or only some parts of it. The impact of a tsunami hitting vulnerable, low-lying areas on the Australian coast could be significant (5). A large tsunami impacting the entire NSW coast would directly threaten between 250,000 and 1.5 million people (8), depending on tsunami magnitude, time of day and season.

A “Warning” is defined as point-in-time information about a hazard that is impacting or is expected to impact communities. Warnings describe the impact and expected consequences for communities and include advice on what people should do (4). As the combat agency for flood, storm and tsunami NSW SES has a statutory responsibility to issue warnings and public information to affected communities. Warnings include advice about options and likely impacts of an event.

Tsunami warning products provide vital information to the communities and individuals of NSW on the tsunami threat and how to respond appropriately to this threat.

The Joint Australian Tsunami Warning Centre (JATWC) forms part of the Australian Tsunami Warning System (ATWS), which is the mechanism responsible for providing timely tsunami warnings for Australia. The ATWS is a national collaboration between the Bureau of Meteorology (the Bureau), Geoscience Australia, National Emergency Management Agency, and relevant State and Territory Emergency Service Agencies.

Location of tectonic plate boundaries and subduction zones (supplied by GA)

Figure 2 - Location of Tectonic Boundaries



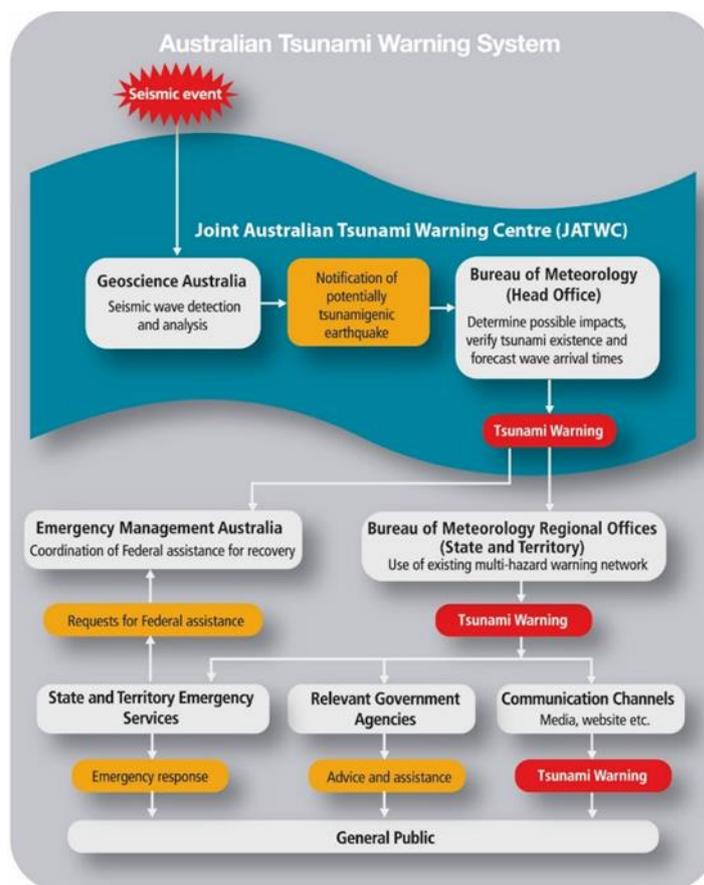
JATWC is operated by Geoscience Australia and the Bureau of Meteorology and provides 24-hour tsunami monitoring, assessment, and warnings. The centre examines real-time data from Australian and international seismic stations and, in the event of an oceanic earthquake, determines the likelihood of a tsunami occurring (6). If a tsunami does eventuate, JATWC estimates the tsunami arrival time, assesses the level of risk, and issues warnings to the coastal regions likely to be impacted. Figure 3 describes the Australian Tsunami Warning System structure.

The following table lists tsunami travel times for five modelled sites in NSW, comparing a possible event (200 Average Recurrence Interval or ARI) with an exceedingly rare event (10000 ARI).

Table 1 - Tsunami Travel Times

Average Recurrence Interval (ARI)	Tsunami Source	Tsunami Travel Time (hours:mins)				
		Site				
		Lake Macquarie	Manly	Botany Bay	Wollongong	Merimbula
200	New Hebrides	03:50	03:54	03:56	04:14	04:18
200	Puysegur	02:40	02:38	02:34	02:31	02:27
200	South Chile	14:04	14:02	14:00	13:57	13:41
10000	New Hebrides	03:40	03:43	03:46	03:52	04:09
10000	Puysegur	02:28	02:26	02:26	02:25	02:17

**Figure 3 - Australian Tsunami Warning System Structure**



Australia’s Tsunami Warning System defines the essential elements of delivering warnings effectively, with a lifecycle of action before, during and after emergency. It is made possible with commitment to a partnership approach across agencies and with communities.

The below organisations are responsible for the provision of tsunami warnings in Australia:

**Joint Australian Tsunami Warning Centre (JATWC)**

<http://www.bom.gov.au/tsunami>

The official tsunami warning centre for Australia is the Joint Australian Tsunami Warning Centre (JATWC) operated by the Bureau and Geoscience Australia. The JATWC forms part of the Australian Tsunami Warning System (ATWS) which is a national collaboration between the Bureau, Geoscience Australia, the National Emergency Management Agency and relevant State and Territory Emergency Service Agencies.

JATWC is also a key element of the Indian Ocean Tsunami Warning and Mitigation System, and contributes to the facilitation of tsunami warnings for the South West Pacific.

**Australian Tsunami Advisory Group (ATAG)**

<https://knowledge.aidr.org.au/resources/australian-tsunami-advisory-group/>

The Australian Tsunami Advisory Group (ATAG) is a reference group of the Australian-New Zealand Emergency Management Committee (ANZEMC), which deals with national tsunami issues, including the implementation of the ATWS, and coordination of programs relating to

tsunami capability development, promoting research, information knowledge management and education in Australia.

Membership is comprised of:

- Bureau of Meteorology
- Geoscience Australia
- Department of Fire and Emergency Services (WA)
- Emergency Management Norfolk Island
- Queensland Fire and Emergency Services
- South Australia State Emergency Service
- Northern Territory State Emergency Service
- ACT State Emergency Service
- NSW State Emergency Service
- Victoria State Emergency Service
- Tasmania Police
- Surf Life Saving Australia
- Australian Antarctic Division
- Indian Oceans Territory Administration, Department of Infrastructure and Regional Development
- New Zealand Ministry of Civil Defence and Emergency Management
- GNS Science

### **Warning Services**

All levels of government work in partnership to develop and maintain warning infrastructure.

The Bureau will provide warning services in line with the [Intergovernmental Agreement on the Provision of Bureau of Meteorology Hazard Services to the States and Territories](#).

NSW SES develops and maintains warning and information products by:

- Utilising intelligence data.
- Developing warning and information products.
- Providing warning and information products in line with the Australian Warning System (AWS).
- Continuously reviewing warning and tsunami information products.
- Consulting with affected communities, stakeholders, and other key states and territories to obtain feedback on existing and future warning products.
- Participating in the development of public information and warning systems.

## 2 THE AUSTRALIAN WARNING SYSTEM (AWS)

### 2.1 THE AUSTRALIAN WARNING SYSTEM

The Australian Warning System (AWS) is a new, nationally consistent multi hazard warning system for emergency services to use when warning communities of expected hazards and required actions. AWS has been designed based on feedback and research across the country and aims to deliver a more consistent approach to emergency warnings, no matter where you are (4).

There are three levels of warning within AWS: Advice (Yellow); Watch and Act (Orange); and Emergency Warning (Red). Each warning level has a set of Calls to Action (action statements) that give the community clear advice about what to do.

Hazard icons have been developed for various hazards, using a consistent shape and colour scheme, with hazard icons increase in size as the warning level increases.

Further information in relation to AWS can be found via their website at -

<https://www.australianwarningsystem.com.au/>

### 2.2 TSUNAMI WARNINGS

Due to the potential for very short warning times and large-scale impacts of a tsunami, there are only **two** AWS Warning levels generally applicable in the event of a tsunami – **Advice (Yellow)** and **Emergency Warning (Red)**. Each of these warning levels has a set of action statements.

**Table 2 - HazardWatch Alerts**

Warning Level		Action Statement
	Advice	Stay Informed Reduced Threat: Return with Caution Monitor Conditions
	Emergency Warning	Avoid The Area Evacuate Now/Before[time]

**Note:** Given the travel time of a tsunami, it is highly unlikely a “Watch and Act” warning would be issued by NSW SES in the event of a tsunami.

## 2.3 WARNING ELEMENTS

In accordance with AWS, NSW SES warnings have three core elements:



**Location + Hazard:** The location and the type of hazard impacting the community.

**Action Statement:** For each warning level there are a range of action statements to guide protective action by the community. These statements evolve as the warning level increases in severity. (E.g. “Stay informed” at the Advice level, to “Evacuate now” at the Emergency Warning level. As the threat is reduced, the level of warning will decrease accordingly.

**The Warning Level:** The severity of the natural hazard event based on the consequence to the community.

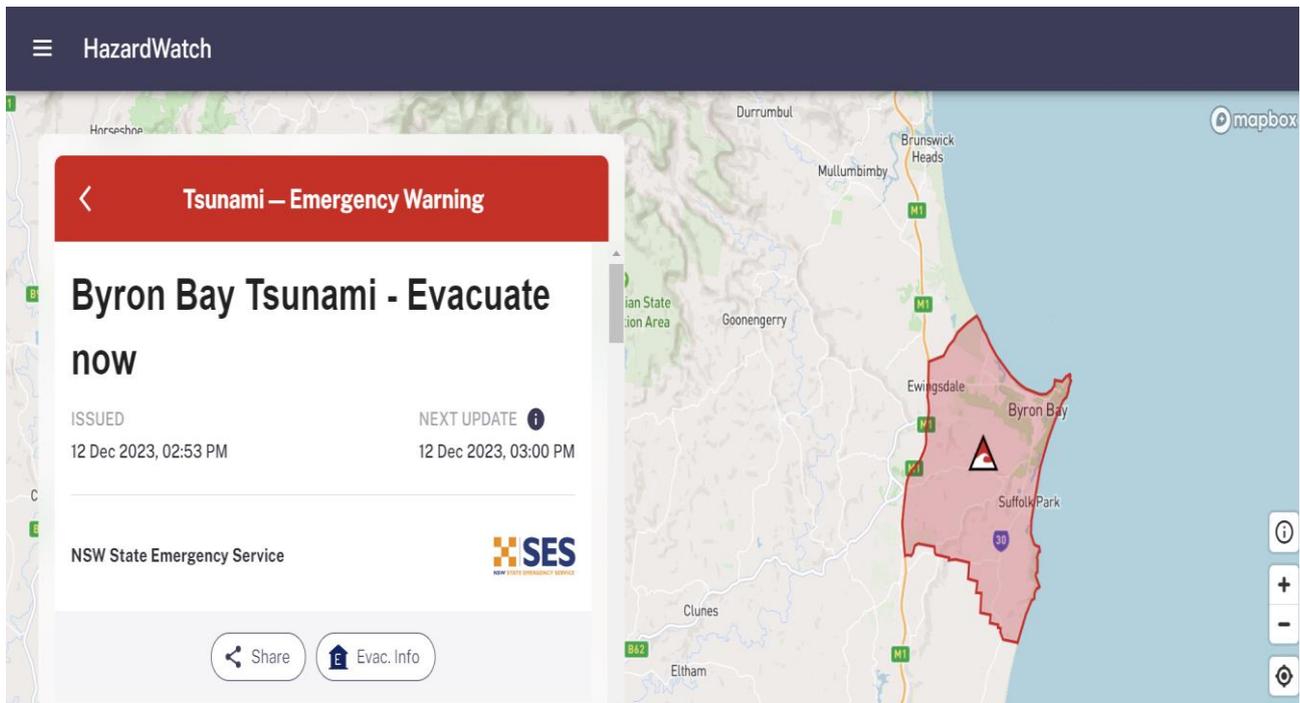
## 2.4 WARNING EXAMPLE

HazardPublisher is the platform used by NSW SES to develop, approve, and disseminate tsunami warnings. Once the warning is ready to publish and distribute, the warning is published to the SES website, HazardWatch and the Hazards Near Me application (7).

Utilising the three warning elements and two warning levels in line with AWS, once published, a NSW SES tsunami warning product would look like –

### BYRON BAY TSUNAMI + EVACUATE NOW + EMERGENCY WARNING

Figure 4 - Example of HazardWatch Tsunami Warning



## 3 KEY STAKEHOLDERS AND THEIR ROLES

### 3.1 GEOSCIENCE AUSTRALIA (GA)

Geoscience Australia advises the Bureau of seismic events which have the potential to generate a tsunami. In addition, GA provide specialist scientific advice to assist the NSW SES, other State Government Agencies and Local Government Councils on tsunami-related matters.

<https://www.ga.gov.au>



### 3.2 THE BUREAU OF METEOROLOGY (THE BUREAU)

The Bureau has historical and statutory responsibility for the issuing of warnings of undersea earthquakes likely to give rise to tsunamis. The Bureau provides warning services for tsunami across the state.

<https://www.bom.gov.au>



### 3.3 NATIONAL EMERGENCY MANAGEMENT AGENCY (NEMA)

The National Emergency Management Agency works with the NSW SES, Geoscience Australia, and the Bureau in the development of tsunami warning systems for NSW.

<https://www.nema.gov.au>



### 3.4 NSW STATE EMERGENCY SERVICE (NSW SES)

As the legislated Combat Agency for tsunamis, NSW SES is responsible for the control of tsunami operations. NSW SES works with the Bureau to ensure warning products and messaging are consistent across the state.

NSW SES are responsible for developing a Tsunami Intelligence System which documents seismic activity and associated warning information as well as consequences at varying seismic activity levels and recommended response actions.

<https://www.ses.nsw.gov.au>

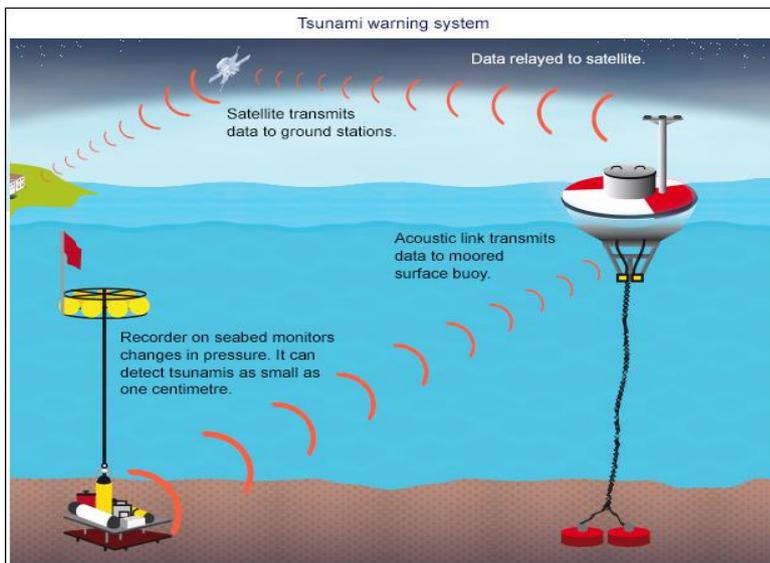


## 4 COMPONENTS OF THE TSUNAMI WARNING SYSTEM

### 4.1 TSUNAMI WARNING NETWORKS

GA operates an enhanced network of seismic stations nationally and has access to data from international monitoring networks. It advises the Bureau of the magnitude, location and characteristics of a seismic event which has the potential to generate a tsunami.

Figure 5 - Tsunami Warning System (Supplied by ABC Science)

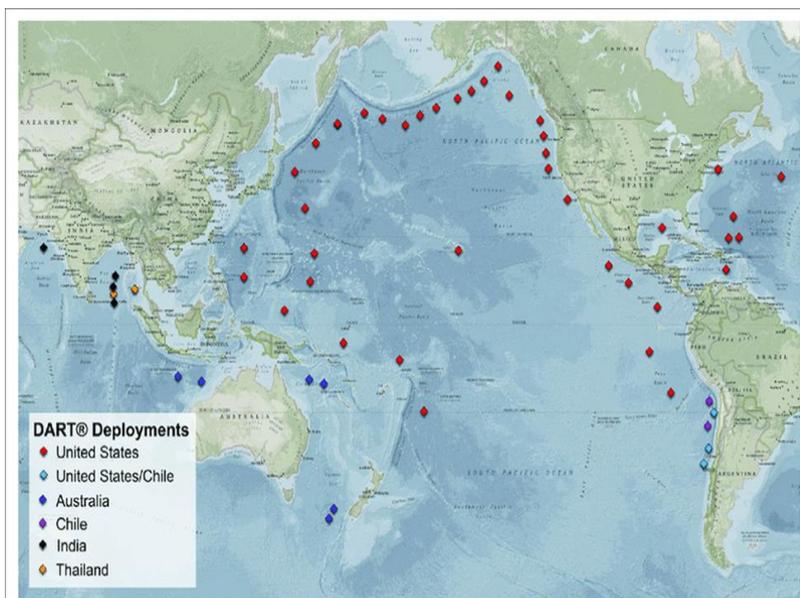


Based on this seismic information from GA, the Bureau runs a tsunami model to generate a first estimate of the tsunami size, arrival time and potential impact locations. The Bureau then uses its network of sea-level monitoring equipment (including coastal sea level gauges and deep ocean tsunami detection buoys) to verify the existence of a tsunami.

<https://www.abc.net.au/science/articles/2014/12/17/4027721.htm>

Deep-ocean tsunami detection buoy technology was initially developed in the USA and is referred to as “DART” (Deep-ocean Assessment and Reporting of Tsunami buoys). These buoys monitor the oceans around Australia’s subduction zones (8).

Figure 6 - Dart Locations



This map provides a visual summary of the DART system network as of November 2018. The DART network includes United States systems as well as systems owned and operated by Australia, Chile, India, and Thailand.

**Source: Adapted from NOAA National Centres for Environmental Information**

## 4.2 WARNING PRODUCTS

Tsunami warning products communicate potential risks and associated consequences of tsunamis, as demonstrated in Figure 3. Warning products can also communicate required actions to respond to the tsunami threat.

### Warning products issued by JATWC through the Bureau

Tsunami warnings issued by the Australian Government Bureau of Meteorology (Bureau) on behalf of the JATWC are categorised into three threat levels:

**No Threat:** A seismic or non-seismic source has been detected however it has not generated a tsunami, or the tsunami poses no threat to Australia.

**Marine and immediate foreshore threat:** Warning of potentially dangerous rips, waves and strong ocean currents in the marine environment and the possibility of only some localised overflow onto the immediate foreshore.

**Land inundation threat:** Warning for low-lying coastal areas of major land inundation, flooding, dangerous rips, waves, and strong ocean currents.

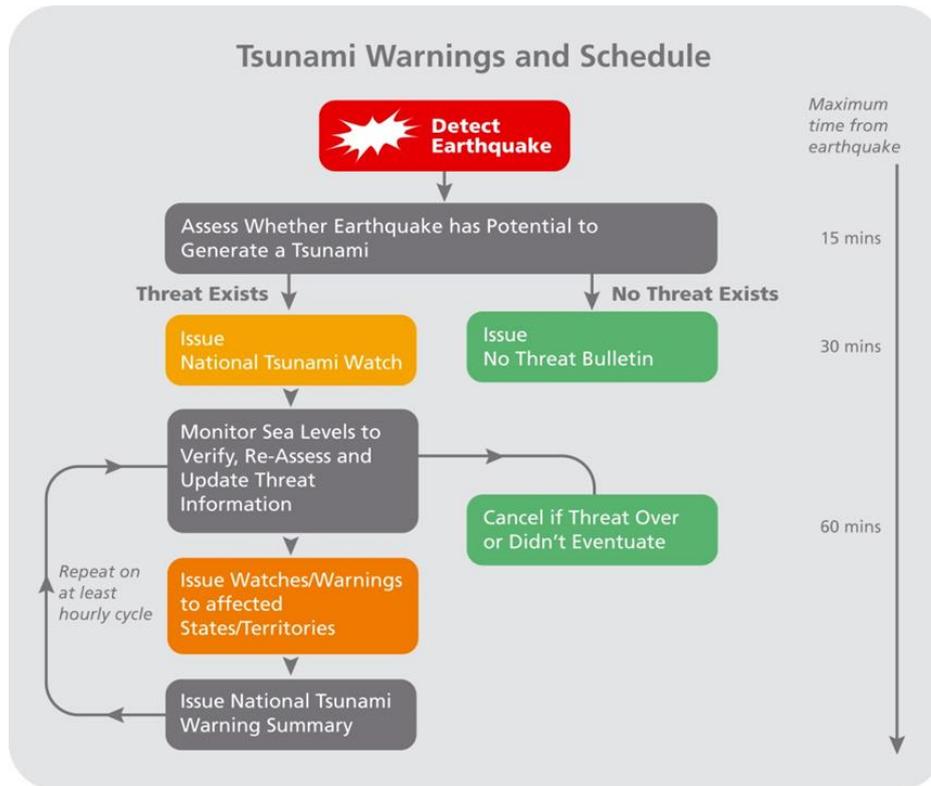
Figure 7 - Warning Messages - Types and Purpose



A *Warning Cancellation* message will be issued by the JATWC after confirmation that the destructive potential of the tsunami has ceased in both the marine and land environment.

The Bureau issues JATWC Watches, Warnings and Bulletins for earthquake / tsunami events according to the following schedule:

Figure 8 - Tsunami Warning Schedule



Tsunamis generated by volcanic eruptions, meteor strikes and landslides are warned to, however the Australian Tsunami Warning System only monitors and detects tsunamis generated by undersea earthquakes. The JATWC tsunami operations focus on seismic tsunami events. While other sources such as volcanic eruptions and undersea landslides are also capable of generating tsunamis, there is a significant lack of understanding and detection capability globally to deal with such non-seismic tsunami events. The JATWC does, however, have basic procedures in place to issue warnings for non-seismic events. In these events, warnings are issued to nearby coastal zones based on observed tsunami waves, without the guidance of tsunami model predictions (10).

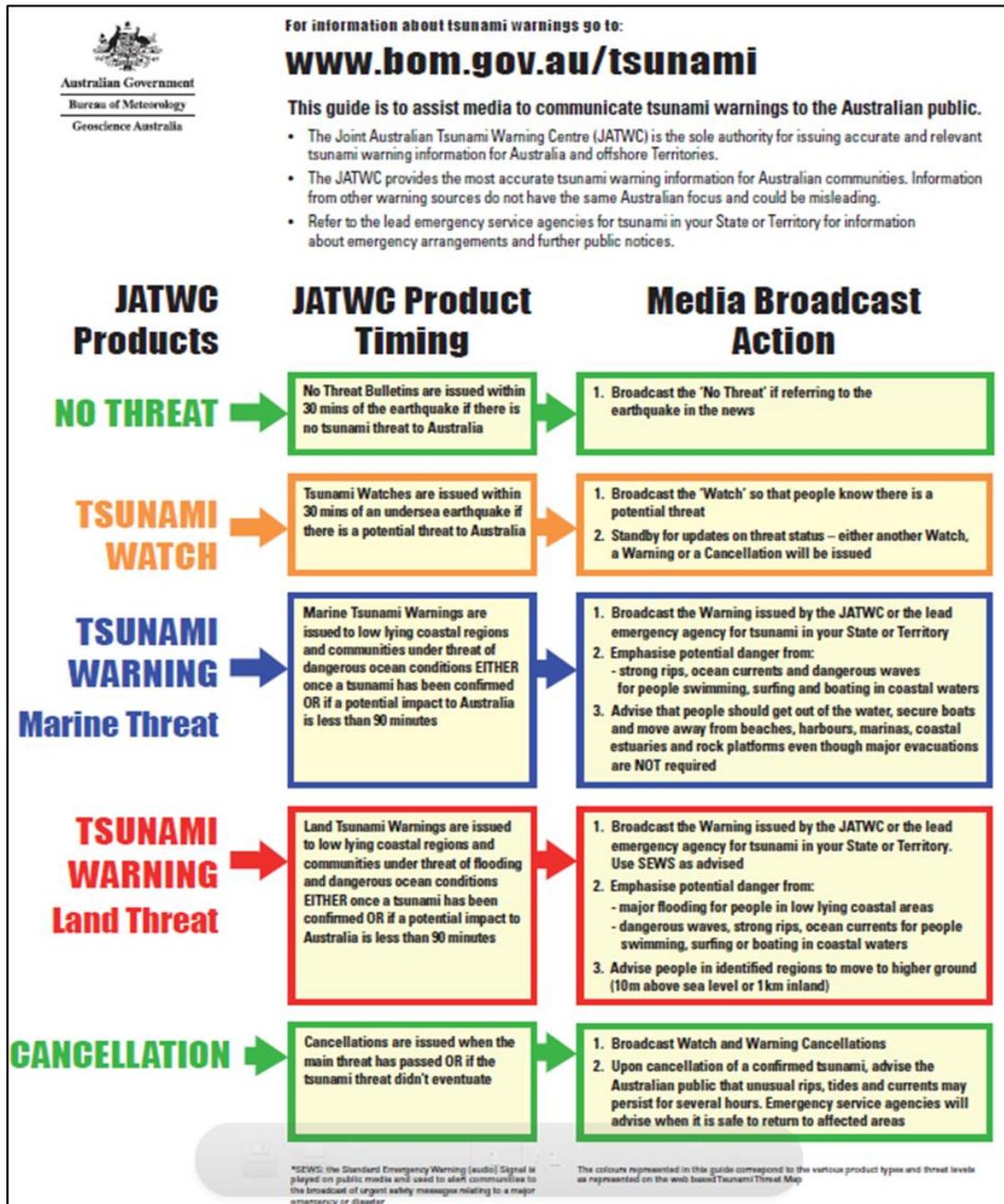
In some circumstances, warning and evacuation may need to be initiated immediately at the local level:

- a. If a strong earthquake is felt in a coastal area i.e. ground shaking lasting 20 seconds or longer, or unusual ocean behaviour indicative of tsunami is observed, such as a noticeable rise or retreat of coastal waters.
- b. Local tsunami can also be produced by submarine or coastal landslides for which there will be no warning time for communities immediately adjacent to the landslide. Some warning time (20-60 minutes) may be available for communities north and south of the initial point of impact.

The Bureau disseminates all JATWC Watches, Warnings and Bulletins directly to the media and all emergency services. These products are available at [www.bom.gov.au/tsunami](http://www.bom.gov.au/tsunami).

The Pacific Tsunami Warning Centre (PTWC) also issue advice regarding potential Regional and Distant tsunamis in the Pacific Ocean. This advice can be found at <https://tsunami.gov/>. The JATWC Tsunami warning products are however regarded as the authoritative source of tsunami information for NSW.

Figure 9 - JATWC Tsunami Warning Product



Tsunami Warnings for NSW issued through the Bureau are intended to cover the entire NSW coast and will include only general instructions and safety advice (provided by the NSW SES) in a pre-agreed format. Separate warnings are also issued for Lord Howe Island.

The NSW SES Emergency Warning products will incorporate warnings from JATWC products, expected consequences, including possible local effects, actions required, and community response advice as follows:

### **Marine and Immediate Foreshore Threat:**

- Get out of the water and move away from beaches, coastal rock platforms and the water frontage of harbours, coastal streams, and lakes.
- Boats in harbours, estuaries and in shallow coastal water should return to shore. Secure your boat and move away from the waterfront.
- Vessels already out to sea should stay offshore in water at least 25 metres deep until further advised.
- Obey all signs about road, beach and foreshore closures, and instructions from emergency services. Check that your neighbours are aware of this advice.

### **Land Inundation Threat (in addition to advice above):**

- Go immediately to high ground at least ten metres (10m) above sea level or, in the case of beaches, coastal rock platforms and the water frontage of harbours, coastal streams, and lakes move one kilometre (1km) away, or in the case of coastal estuaries and rivers move a further ten kilometres (10kms) upstream from the open coast.
- If you are unable to reach high ground, take shelter in an upper storey of a sturdy brick or concrete building. Take only essential items that you can carry including important papers, family photographs and medical needs.
- Gather your pet(s) for safe travel.
- Walk to safety, if possible, to avoid traffic jams.
- If you have a Home or Business Emergency Plan, refer to it now.

The NSW SES Incident Controllers will issue the following NSW SES Warnings aligning to the AWS:

**Advice (Yellow)** – issued when there is a heightened level of threat, and the community needs to stay up to date as the situation changes.

**Emergency Warning (Red)** – The highest level of warning. Issued when the community may be in danger and need to take immediate action.

## **4.3 WARNING DISSEMINATION**

NSW SES provides alerts and delivers tsunami information to affected communities using a combination of public information. NSW SES disseminates warnings through some of the following methods where resources are available:

- NSW SES Website
- HazardWatch
- Hazards Near Me NSW App
- Doorknocking (if warning time permits)
- Emergency Alert
- Social Media
- Community Meetings
- Broadcast Media

- Distribution lists (direct to media outlets and stakeholders)
- Mobile and fixed public address systems
- Low flying aircraft equipped with public address systems, dependent on weather, availability, and suitable risk assessment
- Marine Rescue Vessel public address systems
- Surf Life Saving NSW Coastal Radio Network
- Public marine radio channels (i.e. VHF)
- Marine Satellite phone
- Telephony (including Auto dial systems)
- Standard Emergency Warning Signal
- Variable message signs
- Community notices in identified hubs

NSW SES may request supporting agencies redistribute NSW SES warnings, alerts, and information.

Marine Rescue NSW (MRNSW) broadcasts Bureau and NSW SES warnings to boaters in the NSW marine radio network (public marine radio channels i.e. VHF with remote link to bases outside impact areas).

The Australian Maritime Safety Authority (AMSA) will disseminate official warnings and related information to commercial shipping in Australian and international waters.

A Joint Media Information Centre may be formed and coordinated by NSW SES.

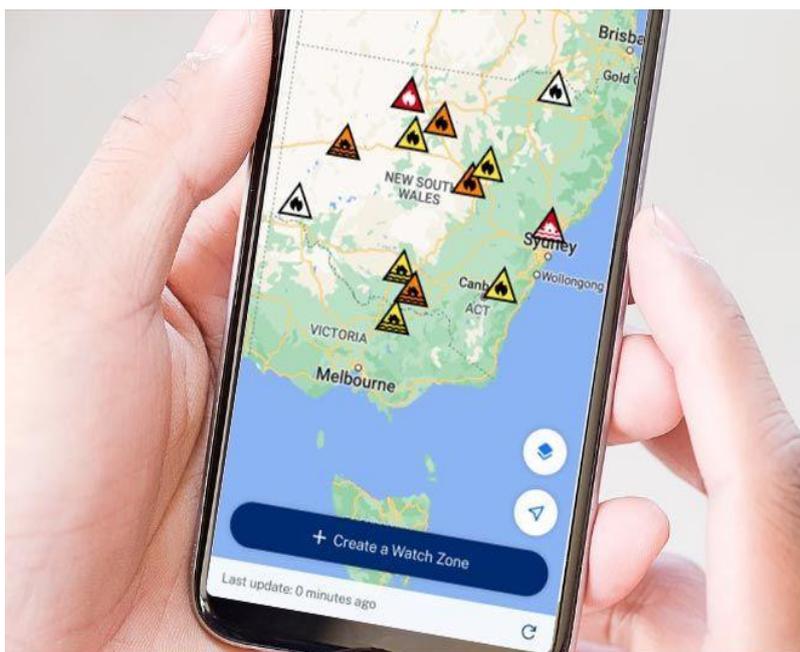
### **Social Media**

To ensure a multi-channel approach to informing communities during an emergency, NSW SES warnings must be shared across relevant social media accounts. The NSW SES utilises the following for Warnings:

- State Facebook page (NSW SES)
- Various Zone Facebook pages (organised for example by catchment, previous NSW SES regions etc.)
- Unit pages (e.g. Lismore Unit)
- State Twitter (@NSWSES)

**HazardWatch** is a national, multi-hazard warning platform that provides real time access to critical hazard information during emergency events. HazardWatch will display all NSW SES warnings and polygon map areas as published, updated, and managed by NSW SES. HazardWatch allows users to view warnings on a responsive map and list view in the Australian Warning System format. HazardWatch is currently online at [HazardWatch](#)

Figure 10 – Hazards Near Me



The **Hazards Near Me** mobile application shows information relating to tsunamis, as well as other emergencies such as floods and bush fires, as provided by emergency services. **Hazards Near Me** relays real-time warnings, along with advice on what to do to stay safe in the event of a hazard; and sends push notifications if there are new incidents or when information changes. [Hazards Near Me](#)

The **Standard Emergency Warning Signal (SEWS)** is a distinctive audio signal that has been adopted to alert the community to the broadcast of an urgent safety message relating to a major emergency. It is intended to be played on public media such as radio, television, public address systems, and mobile sirens to attract listeners attention to the fact that they should take notice of the emergency message. Its use is limited to very severe conditions (for example leading to residential inundation and involving evacuation, especially when time is limited, and urgent action is necessary).

The use of SEWS is detailed in the SEWS National Guidelines. Requests to the media to broadcast SEWS contain details of the text of the message, information stating when the broadcasts are to commence, their frequency and the geographic location for broadcast.

**Emergency Alert** is the national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area about potential emergencies. **Do not block +61 444 444 444. This number is related to the Emergency Alert Service.** Where appropriate and possible, and usually in conjunction with other warning messages, Emergency Alert is used to send SMS and/or voice alerts to land lines and mobile phones within a specified geographic area. The short warning times which apply to tsunamis may preclude the use of EA, however in general it should be used in conjunction with advice products and emergency warnings.

Figure 11 - Warnings and Alerts (source: Hinchinbrook Shire Council)



## **IN AN EMERGENCY, YOUR MOBILE PHONE MAY BE SENT A WARNING BASED ON YOUR LOCATION.**

If you are travelling, staying or living within an area affected by an emergency, your mobile phone may be sent an emergency warning message. This enhanced Emergency Alert service is available across all phone networks, in addition to the existing service which sends warnings to landlines and mobile phones based on your telephone's service address.

Do not rely on receiving a warning message on your phone. You still need to prepare for an emergency and you shouldn't wait to receive a warning before you act. For details visit [www.emergencyalert.gov.au](http://www.emergencyalert.gov.au)

**EMERGENCY ALERT.**  
**BE WARNED. BE INFORMED.**

Supported by the VIC, NSW, QLD, SA, ACT, TAS and NT Governments, with financial assistance from the Commonwealth Government.

The Triple Zero (000) service should only be used to contact Police, Fire or Ambulance in life threatening or emergency situations.

KEY NUMBER

<https://www.hinchinbrook.qld.gov.au/community-environment/disaster-and-emergency-information/how-to-be-prepared/warnings-and-alerts/>

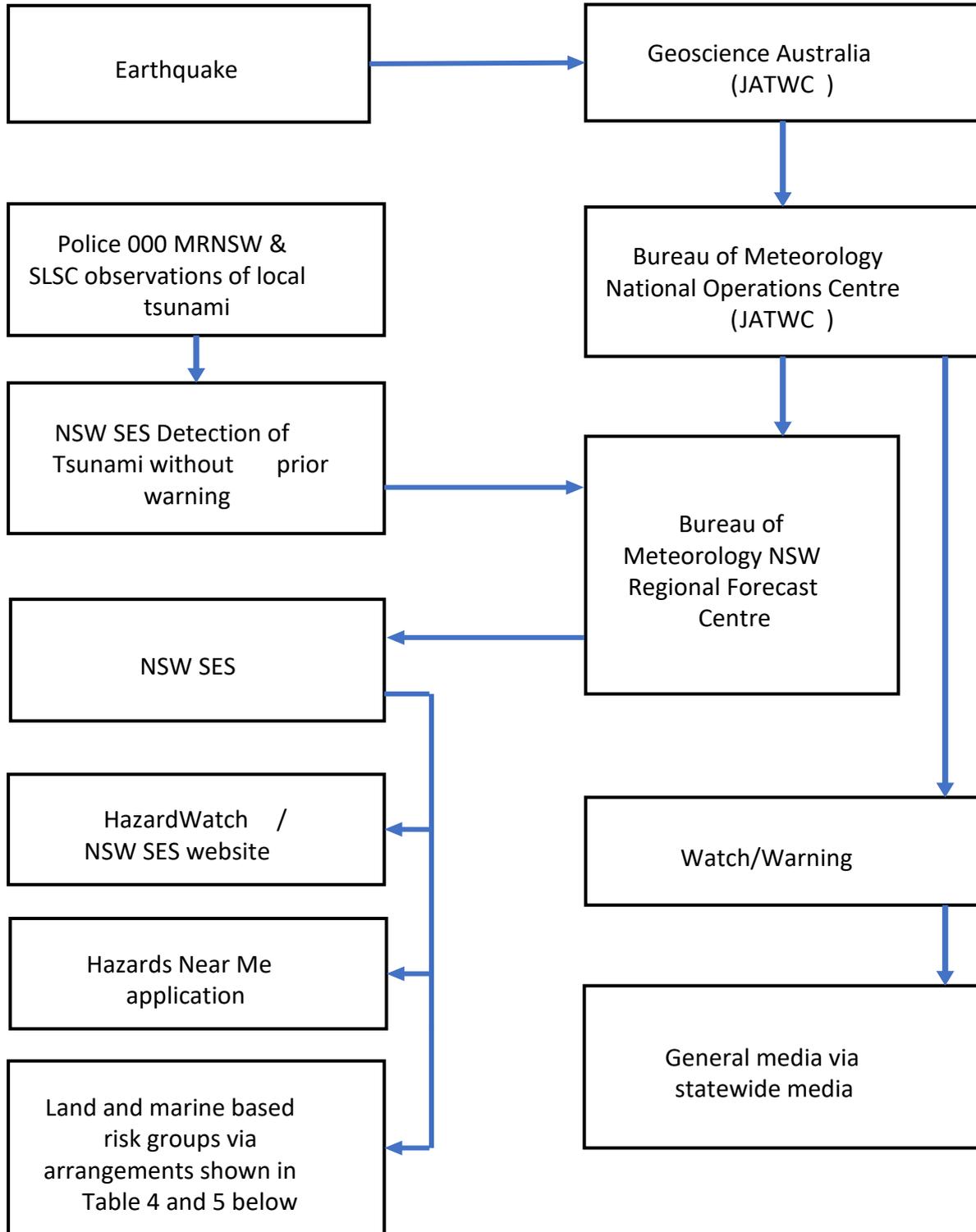
Figure 12 - Aerial photo, March 2011, Tsunami - Northeastern Japan. (Kyodo News via AP, File)



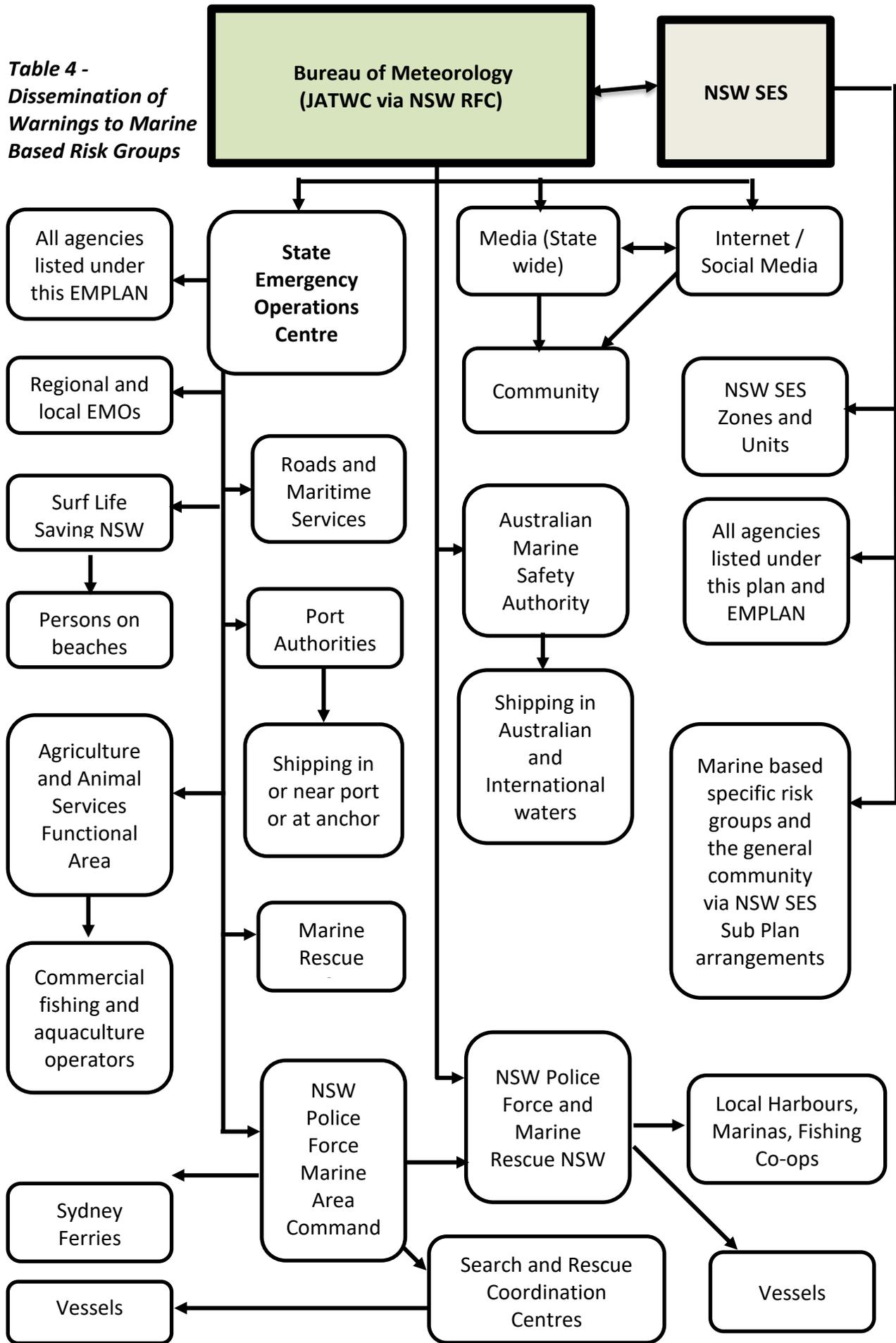
## Warning Groups

Warnings are disseminated to marine and land-based risk groups according to the following three tables -

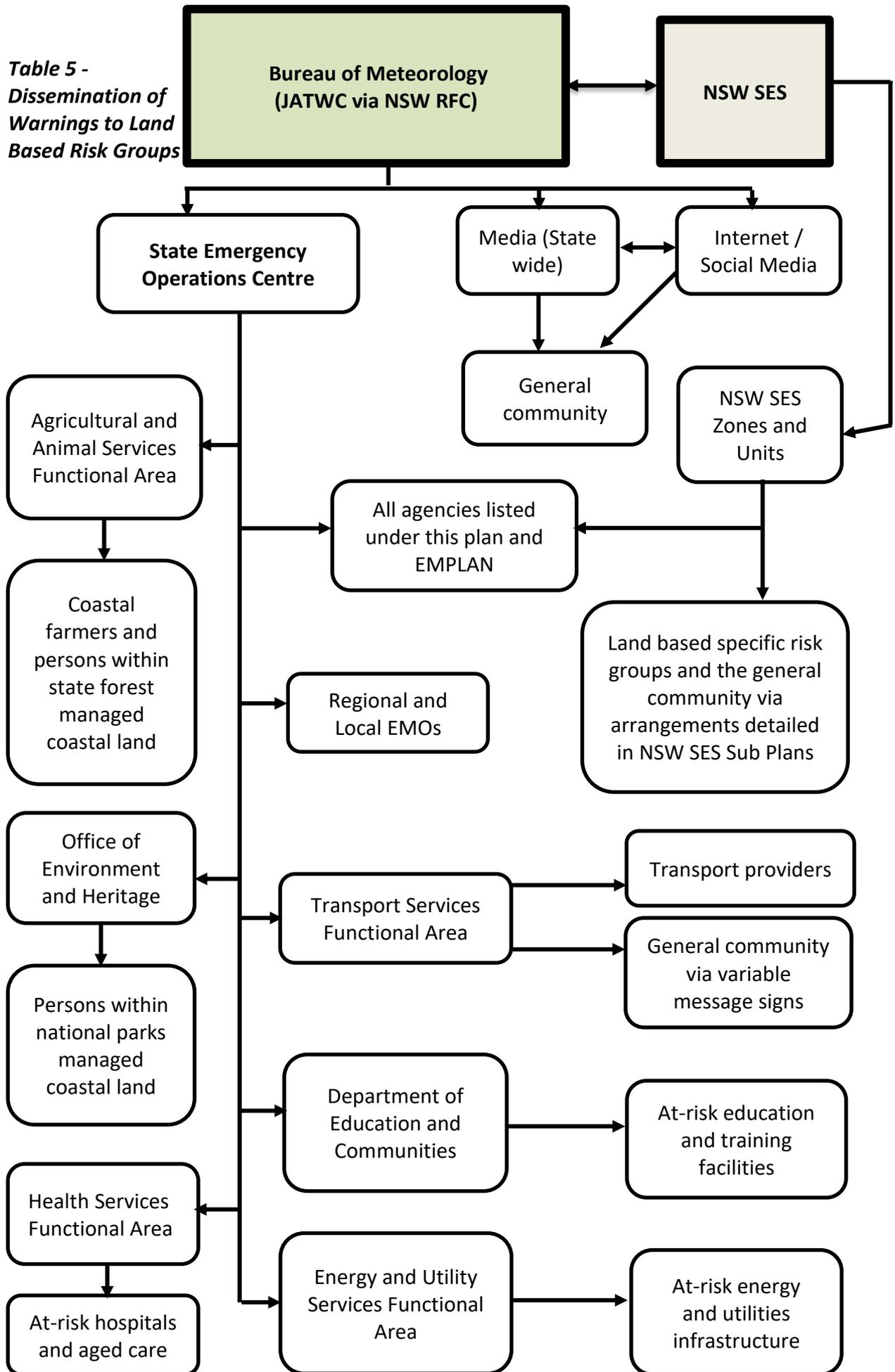
**Table 3 – Flow of Information and Warnings**



**Table 4 -  
Dissemination of  
Warnings to Marine  
Based Risk Groups**



**Table 5 -  
Dissemination of  
Warnings to Land  
Based Risk Groups**



## 4.4 SUMMARY OF WARNING ARRANGEMENTS AND METHODS

Risk areas / groups	Agencies	Methods
Aquaculture (land/marine)	NSW SES Agriculture and Animal Services Functional Area NSW Police Force Fire and Rescue NSW NSW Rural Fire Service Marine Rescue NSW	Emergency Alert HazardWatch Hazards Near Me application Social media Telephone tree Radio and television broadcasts Doorknocking
Beach users (marine)	NSW SES Surf Life Saving NSW NSW Police Force Fire and Rescue NSW NSW Rural Fire Service Marine Rescue NSW	Fixed and mobile public address systems Low flying aircraft equipped with public address system Radio broadcasts Sirens Emergency Alert HazardWatch Hazards Near Me application Social media
Boats and their crew (marine)	NSW Police Force Marine Area Command Roads and Maritime Services Marine Rescue NSW Australian Marine Safety Authority Port Authority of NSW Marine Parks Authority NSW (Department of Primary Industries) Lord Howe Island Port Operations Agriculture and Animal Services Functional Area Private Boat Companies	Marine radio calling and distress frequencies Low flying aircraft equipped with public address system Radio broadcasts Marine satellite phone
Camping areas (land)	NSW SES Office of Environment and Heritage (National Parks and Wildlife Service) Agriculture and Animal Services Functional Area NSW Police Force Fire and Rescue NSW NSW Rural Fire Service NSW VRA Marine Rescue NSW	Radio broadcasts Doorknocking of known camp sites Mobile public address system Low-flying aircraft equipped with public address systems. Emergency Alert HazardWatch Hazards Near Me application Social media
Caravan Parks (land)	NSW SES NSW Police Force Fire and Rescue NSW NSW Rural Fire Service NSW VRA Marine Rescue NSW	Doorknocking Emergency alert Radio and television broadcasts Mobile public address systems HazardWatch Hazards Near Me application Social media

<b>Risk areas / groups</b>	<b>Agencies</b>	<b>Methods</b>
Divers and snorkelers (marine)	NSW Police Force Marine Area Command Marine Rescue NSW Marine Parks Authority NSW (Department of Primary Industries) Roads and Maritime Services	Marine radio calling and distress frequencies Low flying aircraft equipped with public address system Marine satellite phone
Farmland in low-lying areas including farmers, animals, and crops (land)	NSW SES Agriculture and Animal Services Functional Area NSW Rural Fire Service NSW Police Force NSW VRA Fire and Rescue NSW Marine Rescue NSW	Emergency Alert HazardWatch Hazards Near Me application Social media Radio and television broadcasts Doorknocking Internet
Infrastructure (marine/land)	NSW SES Energy and Utility Services Functional Area	Emergency Alert Radio and television broadcasts HazardWatch Hazards Near Me application Social media
Institutions such as schools and hospitals located in low-lying coastal areas (land)	NSW SES Health Services Functional Area NSW Department of Education and Communities NSW Police Force Fire and Rescue NSW NSW Rural Fire Service NSW VRA	Emergency Alert HazardWatch Hazards Near Me application Social media Radio and television broadcasts Doorknocking
Motorists and vehicles on low-lying coastal roads (land)	NSW SES Transport Services Functional Area NSW Police Force Fire and Rescue NSW NSW Rural Fire Service Marine Rescue NSW	Radio broadcasts Emergency Alert HazardWatch Hazards Near Me application Social media Fixed variable message signs Mobile public address
Ports, harbours, and marinas (marine)	NSW SES Port Authority of NSW Roads and Maritime Services NSW Police Force (NSW Police Force Marine Area Command) Marine Rescue NSW Fire and Rescue NSW NSW Rural Fire Service	Emergency Alert Radio and television broadcasts Doorknocking Two-way radio Mobile public address systems
Residential, commercial, and industrial buildings and their occupants in low-lying coastal areas or floodplains	NSW SES NSW Police Force Fire and Rescue NSW NSW Rural Fire Service NSW VRA Marine Rescue NSW	Radio and television broadcasts Mobile and fixed public address system Emergency Alert HazardWatch Hazards Near Me application Social media

Risk areas / groups	Agencies	Methods
in tidal river areas (land)		Doorknocking Sirens Variable message signs Low-flying aircraft equipped with public address systems
Walkers in coastal parks and reserves (land/marine)	NSW SES Office of Environment and Heritage (National Parks and Wildlife Service) Agriculture and Animal Services Functional Area NSW Police Force Fire and Rescue NSW NSW Rural Fire Service NSW VRA Marine Rescue NSW	Mobile Public Address system Low-flying aircraft equipped with public address systems Emergency alert Sirens

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