UNESCO/IOC – NOAA ITIC Training Program in Hawaii (ITP-TEWS Hawaii)
TSUNAMI EARLY WARNING SYSTEMS
AND THE PACIFIC TSUNAMI WARNING CENTER (PTWC) ENHANCED PRODUCTS
TSUNAMI EVACUATION PLANNING AND UNESCO IOC TSUNAMI READY PROGRAMME
15-26 September 2025, Honolulu, Hawaii

# Learning Activity –
# What Happens When during an event
# Tsunami Warning Chain

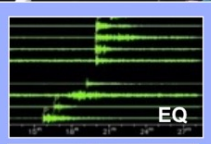
International Tsunami Information Centre

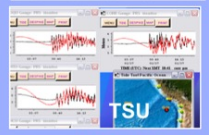
Pacific Tsunami Warning Center

Indian Ocean Tsunami Information Centre

# END-TO-END TSUNAMI WARNING

EQ
Tsunami





Country
Alert System

Emergency Alert System
& Mass Media


Public

TWC - Science

DMO / EMA – Safety

Intl / Natl

Natl / Prov / Local Govt

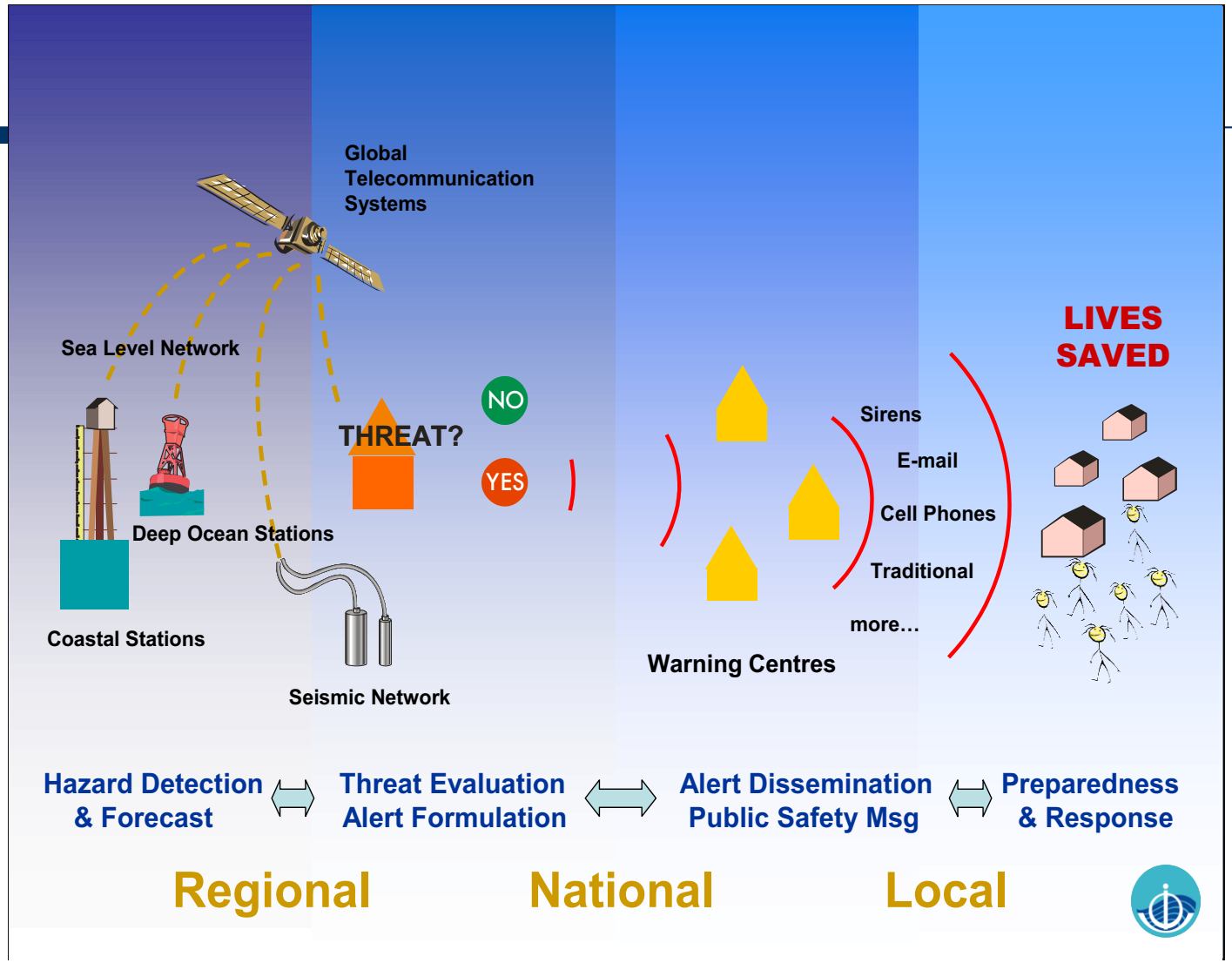
Community

EQ
T=0

Race against Time

LIVES
SAVED

WAVE
T=20 min


Global
Telecommunication
Systems
Sea Level Network
Deep Ocean Stations
Coastal Stations
Seismic Network
THREAT?
NO
YES
Warning Centres
Sirens
E-mail
Cell Phones
Traditional
more…
LIVES
SAVED
Hazard Detection
& Forecast
Threat Evaluation
Alert Formulation
Alert Dissemination
Public Safety Msg
Preparedness
& Response
Regional
National
Local

# Activity – What Happens and When?

- Put activities in chronological occurrence
- Work Individually – 15 min
- Plenary Discussion – 30 min

**LEARNING ACTIVITY: TSUNAMI EVENT CHRONOLOGY**
**TSUNAMI WARNING TIMELINE: WHAT HAPPENS AND WHEN DOES IT HAPPEN?**

During the occurrence and unfolding of a local tsunami event, reaction time is of the essence. Put the following activities in order of chronological occurrence from 1 to 24 for a local / regional tsunami scenario. Some activities may occur nearly simultaneously. Assume power and communications are still operable after the strong earthquake.

*Each major activity undertaken by government should be described by an SOP.*

_____ Drop, Cover, and Hold (Protect yourself from earthquake shaking damage)

_____ Earthquake is detected by a seismic station

_____ Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC)

_____ Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP)

_____ National Press Conference

_____ Initial Magnitude calculated (Mwp, $M_{JMA}$, $M_L$, $M_b$)

_____ TSP issues initial threat message

_____ Search and rescue operations begin

_____ National Tsunami Warning Center (NTWC) cancels Tsunami Warning

# WHAT HAPPENS WHEN ITP-TEWS HAWAII 2025

| | |
|---|---|
| __1__ | Drop, Cover, and Hold (Protect yourself from earthquake shaking damage) |
| __1__ | Earthquake is detected by a seismic station |
| __7_ | Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC) |
| __8__ | Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP) |
| __11__ | National Press Conference |
| __2__ | Initial Magnitude calculated (Mwp, MJMA, ML, Mb) |
| __5__ | TSP issues initial threat message |
| ___14_ | Search and rescue operations begin |
| __12__ | National Tsunami Warning Center (NTWC) cancels Tsunami Warning |
| __9__ | Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal |
| __9__ | Coastal sea level sensor(s) show 5 m zero to peak |
| __3__ | Expected Tsunami Arrival Times calculated (TSP, NTWC) |
| __1__ | Strong earthquake is felt |
| __5__ | DMO or Authority issues Evacuation order (except Chile which issues Evacuation before warning) |
| __12__ | TSP issues final message |
| __3__ | Telephones at National TWFP/NTWC/DMO start ringing |
| __13__ | All-Clear issued allowing Public to return to tsunami evacuation zone |
| __6__ | Evacuation of coastal areas |
| __4_ | NTWC/DMO issues Tsunami Warning |
| __16__ | NTWC, TSP post-event evaluation |
| __2__ | Public moves quickly to higher ground (self-evacuates) |
| __4c__ | Media disseminate Tsunami Warning Broadcast |
| __4b__ | Sirens sounded |
| __10__ | TSP issues Enhanced Graphical Products |
| __15__ | Road clearing/debris removal begins |

# Each major activity should have an SOP

__1__ Strong earthquake is felt

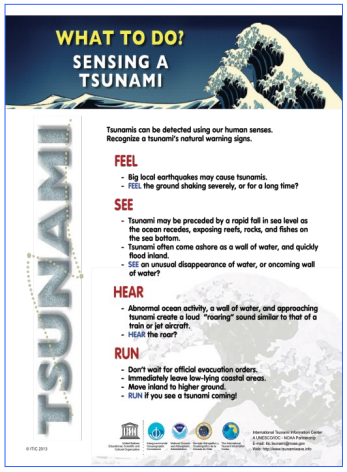
__2__ Protect yourself from earthquake (Drop, cover, hold)

_3__ Public moves quickly to higher ground

__7__ Rapid sea level change = Tsunami arrives

## *Local Tsunami SOP for public*

- *Know, Recognize, React to Natural Warning Signs*
- *Feel, Hear, See, Run*



__3__ Public moves quickly to higher ground

__4__ NTWC issues Tsunami Warning / RTSP issues msg

__5__ Sirens sounded

__5__ Media issues Tsunami Warning Broadcast

__5__ DMO or Local Authority issues Evacuation

**Each major activity should have an SOP**

***DMO SOP for Evacuation***

- ***Decide if community threatened***
- ***Issue public safety action (evacuate) by multiple methods***
  ***(voice, text, siren, video)***
- ***Enable Coastal Evacuation***
  ***(roadblocks, evacuation routes, designated safe areas buildings)***

# Thank You
# Muchas Gracias

International Tsunami Information Centre

Pacific Tsunami Warning Center

Indian Ocean Tsunami Information Centre

# WHAT HAPPENS WHEN ITP-TEWS CHILE 2024

| | |
|---|---|
| __2__ | Drop, Cover, and Hold (Protect yourself from earthquake shaking damage) |
| __1__ | Earthquake is detected by a seismic station |
| ___9_ | Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC) |
| __11_ | Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP) |
| __14__ | National Press Conference |
| __3b__ | Initial Magnitude calculated (Mwp, MJMA, ML, Mb) |
| __5a__ | TSP issues initial threat message |
| ___15_ | Search and rescue operations begin |
| __13__ | National Tsunami Warning Center (NTWC) cancels Tsunami Warning |
| ___10_ | Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal |
| ___8_ | Coastal sea level sensor(s) show 5 m zero to peak |
| ___7_ | Expected Tsunami Arrival Times calculated (TSP, NTWC) |
| ___1_ | Strong earthquake is felt |
| ___6a_ | DMO or Authority issues Evacuation order (except Chile which issues Evacuation before warning) |
| __16__ | TSP issues final message |
| ___2b_ | Telephones at National TWFP/NTWC/DMO start ringing |
| ___17_/18 | All-Clear issued allowing Public to return to tsunami evacuation zone |
| ___7_ | Evacuation of coastal areas |
| ___4a_ | NTWC/DMO issues Tsunami Warning |
| ___19_ | NTWC, TSP post-event evaluation |
| __3a__ | Public moves quickly to higher ground (self-evacuates) |
| ___4b_ | Media disseminate Tsunami Warning Broadcast |
| __6a__ | Sirens sounded |
| __12__ | TSP issues Enhanced Graphical Products |
| __17 /18 __ | Road clearing/debris removal begins |

# WHAT HAPPENS WHEN ITP-HAWAII 2023

| | |
|---|---|
| __2__ | Drop, Cover, and Hold (Protect yourself from earthquake shaking damage) |
| __1__ | Earthquake is detected by a seismic station |
| __8__ | Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC) |
| __9__ | Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP) |
| _13__ | National Press Conference |
| __3__ | Initial Magnitude calculated (Mwp, MJMA, ML, Mb) |
| __7__ | TSP issues initial threat message |
| _13__ | Search and rescue operations begin |
| _12__ | National Tsunami Warning Center (NTWC) cancels Tsunami Warning |
| _10__ | Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal |
| __6__ | Coastal sea level sensor(s) show 5 m zero to peak |
| __4__ | Expected Tsunami Arrival Times calculated (TSP, NTWC) |
| __1__ | Strong earthquake is felt |
| __5__ | DMO or Authority issues Evacuation order |
| _14__ | TSP issues final message |
| __4__ | Telephones at National TWFP/NTWC/DMO start ringing |
| _15__ | All-Clear issued allowing Public to return to tsunami evacuation zone |
| __5__ | Evacuation of coastal areas |
| __5__ | NTWC/DMO issues Tsunami Warning |
| _16__ | NTWC, TSP post-event evaluation |
| __3__ | Public moves quickly to higher ground (self-evacuates) |
| __5__ | Media disseminate Tsunami Warning Broadcast |
| __5__ | Sirens sounded |
| _ 11_ | TSP issues Enhanced Graphical Products |
| _13__ | Road clearing/debris removal begins |

# WHAT HAPPENS WHEN. ITP-Hawaii 2019

| | |
|---|---|
| ___3__ | Drop, Cover, and Hold (Protect yourself from earthquake shaking damage) |
| ___2__ | Earthquake is detected by a seismic station |
| ___14__ | Centroid Moment Tensor (Earthquake Mechanism) calculated (TSP, USGS, NTWC) |
| ___16__ | Expected Tsunami Wave Height forecast using actual earthquake mechanism (TSP) |
| ___19__ | National Press Conference |
| ___5__ | Initial Magnitude calculated (Mwp, MJMA, ML, Mb) |
| ___8__ | TSP issues initial threat message |
| ___21_ | Search and rescue operations begin |
| ___20__ | National Tsunami Warning Center (NTWC) cancels Tsunami Warning |
| ___17__ | Deep-ocean instrument pressure sensor (DART or other) shows 2 cm signal |
| ___15__ | Coastal sea level sensor(s) show 5 m zero to peak |
| ___7__ | Expected Tsunami Arrival Times calculated (TSP, NTWC) |
| ___1__ | Strong earthquake is felt |
| __10___ | DMO or Authority issues Evacuation order |
| ___23__ | TSP issues final message |
| ___6__ | Telephones at National TWFP/NTWC/DMO start ringing |
| ___24__ | All-Clear issued allowing Public to return to tsunami evacuation zone |
| ___13__ | Evacuation of coastal areas |
| ___9__ | NTWC/DMO issues Tsunami Warning |
| ___25__ | NTWC, TSP post-event evaluation |
| __ 4___ | Public moves quickly to higher ground (self-evacuates) |
| ___12__ | Media disseminate Tsunami Warning Broadcast |
| ___11__ | Sirens sounded |
| __18___ | TSP issues Enhanced Graphical Products |
| __22___ | Road clearing/debris removal begins |