

HAWAII TSUNAMI WARNING SYSTEM:



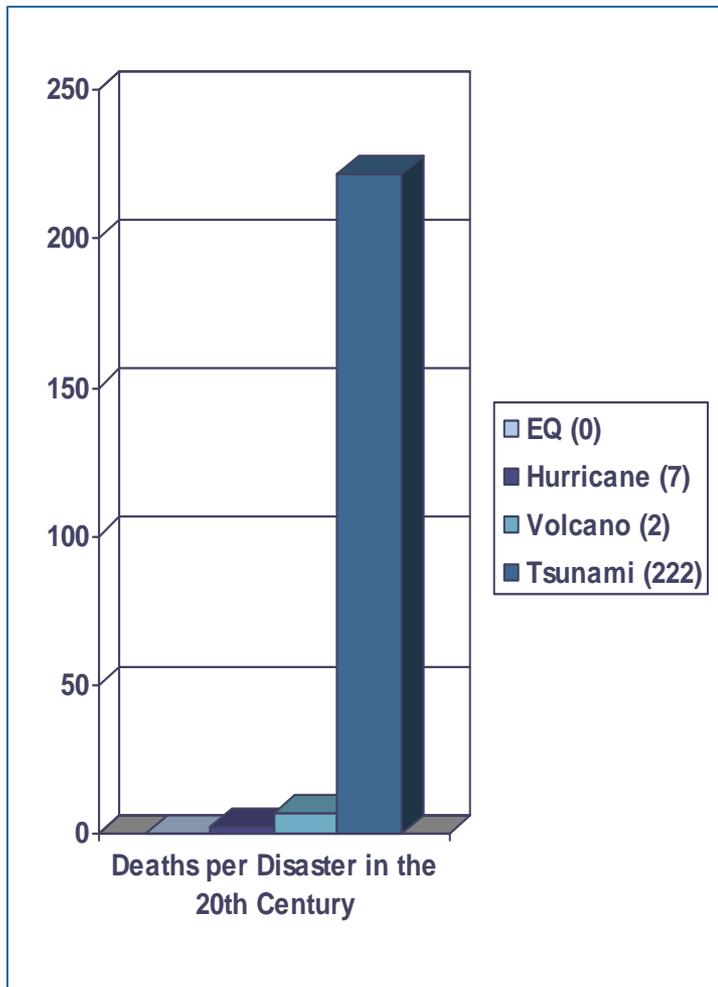
EMERGENCY RESPONSE and TSUNAMI PREPAREDNESS



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International Tsunami Information Centre



Major Natural Disaster Fatalities in Hawaii during the 20th Century



- 13 Pacific-wide tsunamis hit the Hawaiian Islands.
- The three most destructive tsunamis caused a combined total of 222 deaths and hundreds of injuries:
 - April 1, 1946 (Aleutian Islands)
 - May 23, 1960 (Chile)
 - November 29, 1975 (Kalapana)

Hilo, April 1946



Hilo, May 1960



PTWC AND HAWAII AS EXAMPLE OF END-TO-END SYSTEM

- HAWAII DID TSUNAMI **HAZARD ASSESSMENTS** IN THE 1970's AND CONTINUE TO UPDATE
- TSUNAMI **EVACUATION ZONES** PUBLISHED IN TELEPHONE BOOKS
- PUBLIC **EDUCATION PROGRAMS** IN PLACE INCLUDING A “TSUNAMI AWARENESS MONTH”
- STATE AND COUNTIES RECEIVE PTWC BULLETINS BY **MULTIPLE MEANS**
- PUBLIC IS NOTIFIED BY **MULTIPLE MEANS**: SIRENS, RADIO, TELEVISION, AIRPLANES



PTWC AND HAWAII AS EXAMPLE OF END-TO-END SYSTEM

- **COUNTIES PARTICIPATE IN NWS **TSUNAMI-READY** PROGRAM**
- **STATE CONDUCTS SEMI-ANNUAL **TSUNAMI EXERCISES****
- **STATE AND COUNTIES HAVE **PRE-ESTABLISHED PROCEDURES** FOR CARRYING OUT TSUNAMI EVACUATIONS AND RESPONSE WITH POLICE, FIRE, AND OTHER DEPARTMENTS**



PTWC AND HAWAII AS EXAMPLE OF END-TO-END SYSTEM

- STATE ORGANIZES AND HOLDS SEMI-ANNUAL STAKEHOLDERS MEETINGS OF ITS **TSUNAMI TECHNICAL REVIEW COMMITTEE** THAT INCLUDES PTWC, EMERGENCY MANAGERS, EMERGENCY RESPONDERS, AND SCIENTISTS
- STATE OF HAWAII AND ITS COUNTIES HAVE EXPERTS THAT SERVE AS **TSUNAMI ADVISORS**
- HAWAII PARTICIPATES IN THE **U.S. NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM**



Hawaii Civil Defense System

MISSION

- Minimize loss of life and property
- Provide for welfare & safety of citizens
- Restore vital services
- Provide for continuity of government
- Manage resources for recovery

AUTHORITIES

- Federal, State laws
- Governor's Directive to lead Emergency Response



Mitigation

Insurance Coverage
Regulations
Codes
Legislation

Pre-Event

Preparedness

Plans
Information
Training
Education
Resources

**Comprehensive
Emergency
Management**

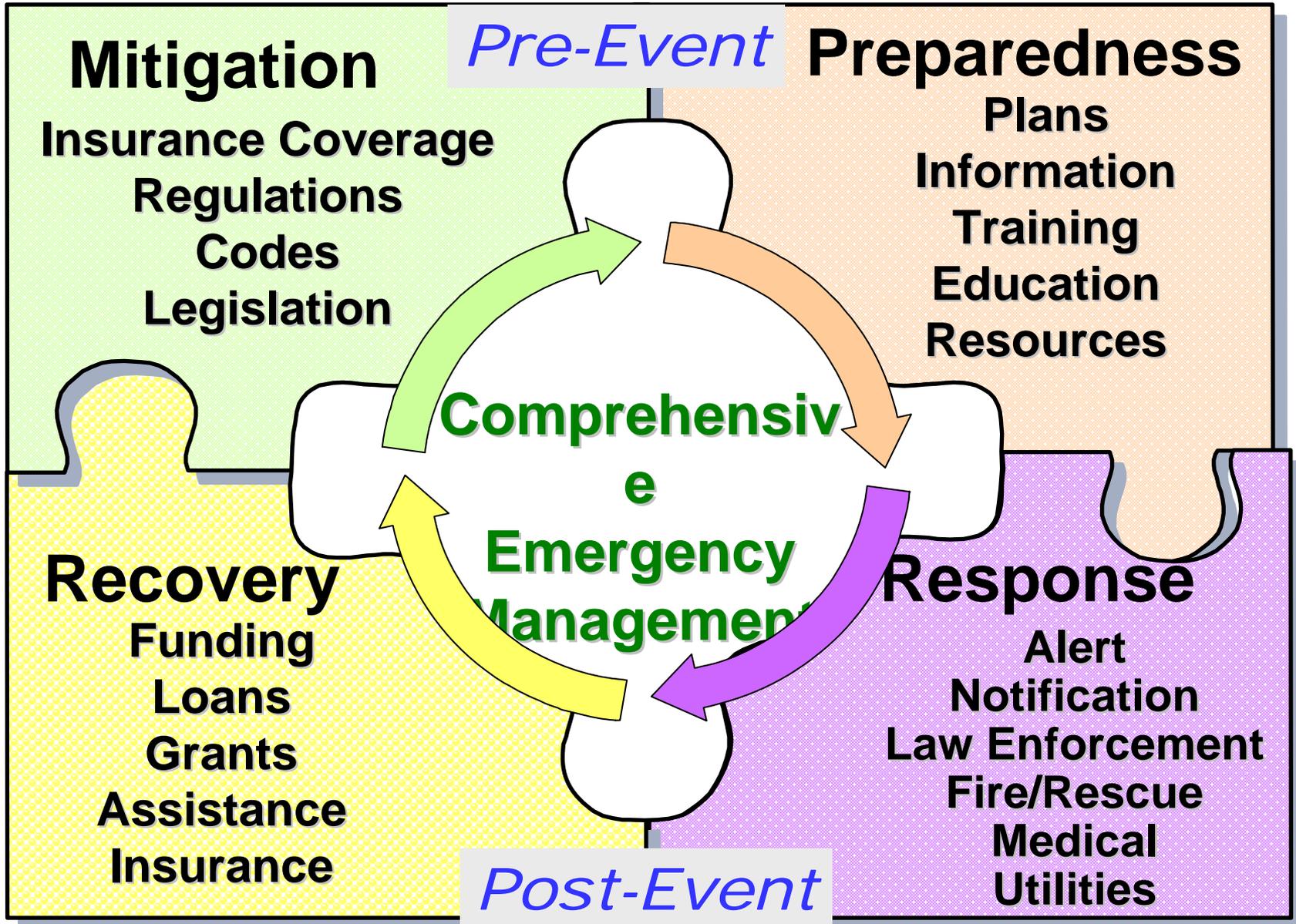
Recovery

Funding
Loans
Grants
Assistance
Insurance

Post-Event

Response

Alert
Notification
Law Enforcement
Fire/Rescue
Medical
Utilities



Hawaii Civil Defense System

Federal Agencies

State Agencies

County Agencies

Private Supporting Agencies





Emergency Communications

Sirens

Emergency Alert

System

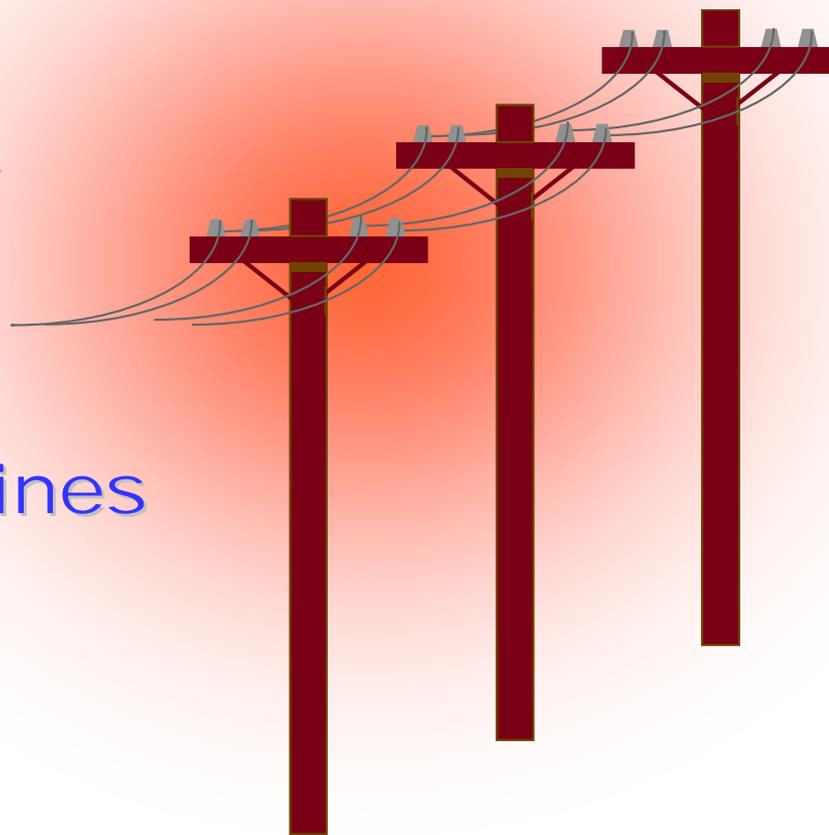
Radios

Telephones/Hotlines

Wire

Data Systems

Satellite



Statewide Siren Warning System

● 356 total sirens Statewide:

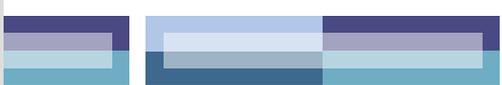
● Kauai	47
● Oahu	176
● Maui	66
● Big Island	67

● All sirens are radio controlled.

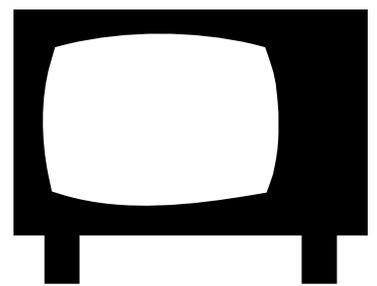
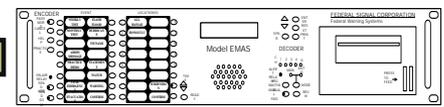
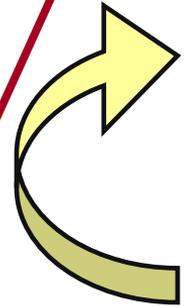
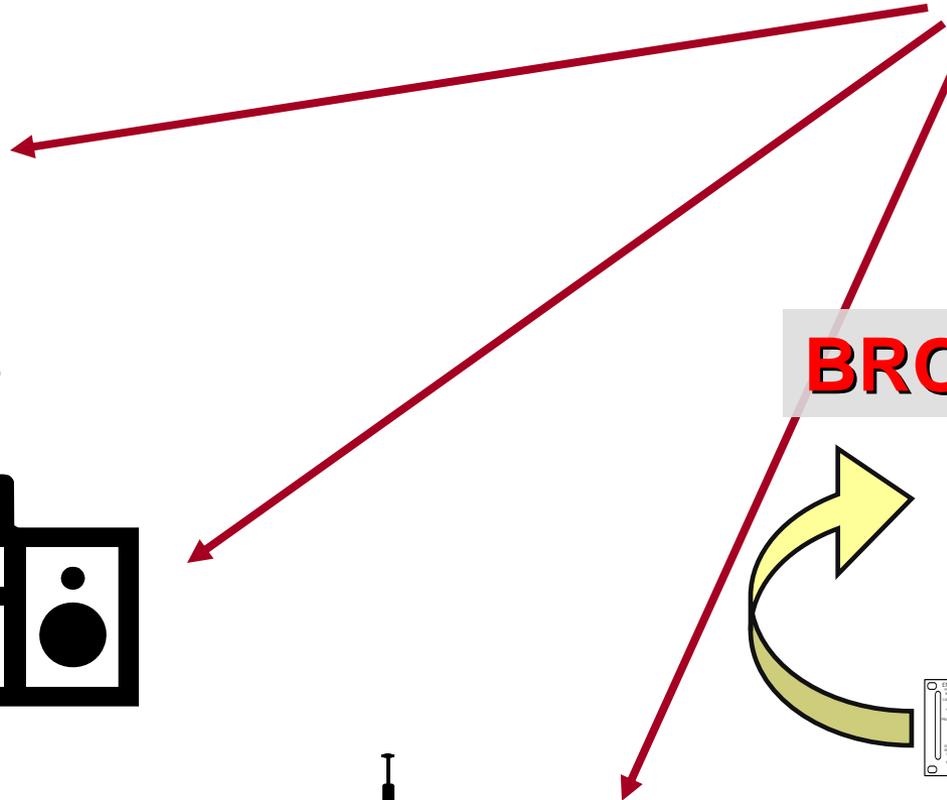
● New sirens are solar powered.



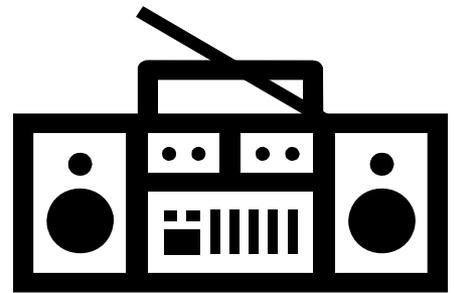
How it Works (Emergency Alert System, EAS):



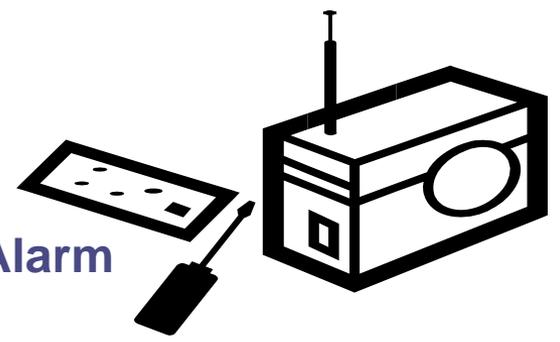
BROADCASTERS



Audio & Crawlers



Audio



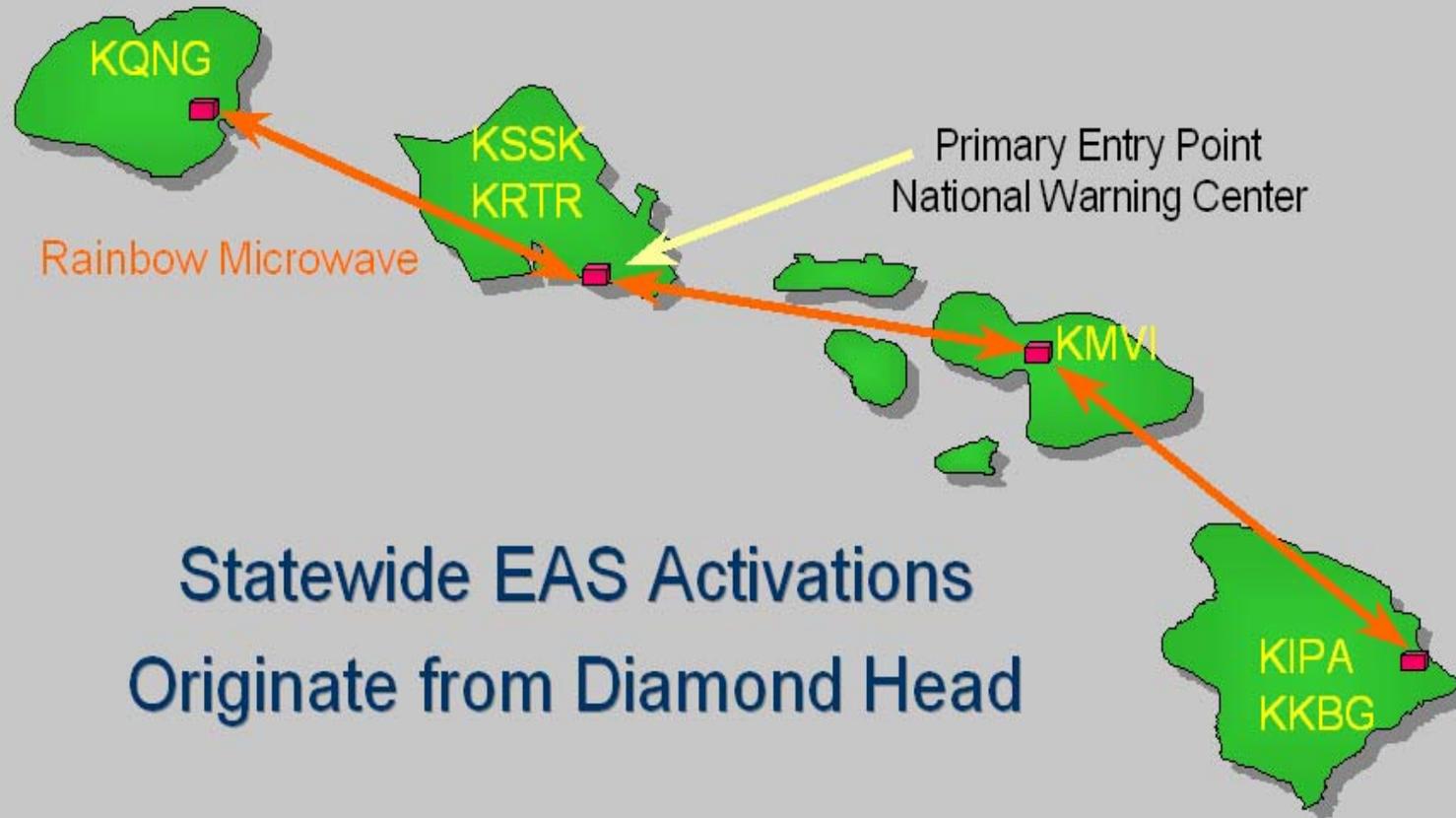
EAS Audio & Alarm

Activated by:
National Weather Service
State Civil Defense
County Civil Defense



Emergency Alert System (EAS)

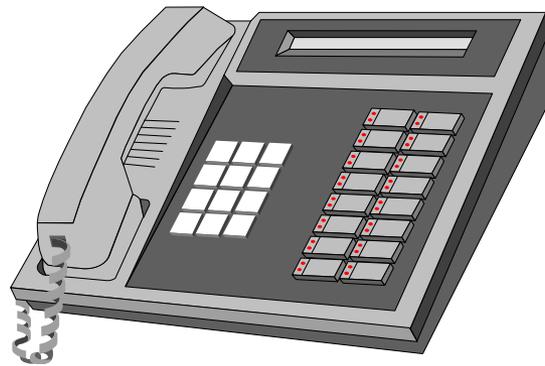
- *SCD EOC initiates public message,*
- *Transmits immediately by dedicated microwave link*
- *Designated radio stations - neighbor islands*
- *TV broadcasts (crawlers) originate from Honolulu*



Emergency Communications

Telephones

Governor
NAWAS
HAWAS
SWP/HPD
OCDA EOC
National Guard



Hotlines

CINCPAC
USARPAC/AUTOVON
Secure Phone(STU III)
Facsimile

Satellite System

60-Channel Recorder (radio & wire)
Computer Notifier System
After-Hours Coverage

- Systems tested weekly

Emergency Management Data Systems

STATE EOC

Six Servers (Including Backup)
SUN Sparc Stations (email & web site)
Micron NT Servers (Office automation)

FIBER OPTIC CONNECTIVITY

Maui PDC
Statewide
Nationwide

STATE DIGITAL MICROWAVE wide area network

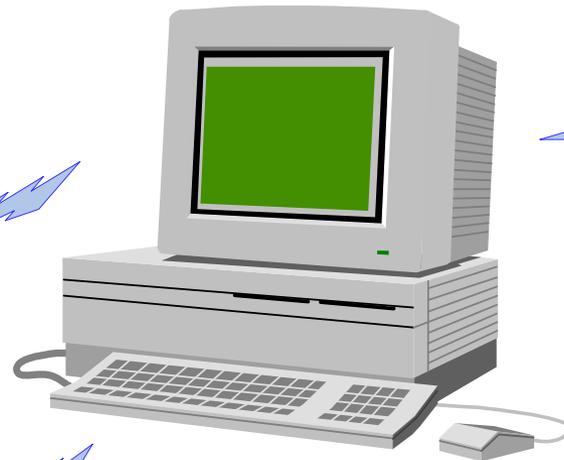
PC's-Oahu, Kauai,
Maui, Hawaii EOC's

LOCAL AREA NETWORK

Workstations, Printers,
Scanners, CD Rom Tower

SATELLITE BACKUP, WIRELESS LINKS

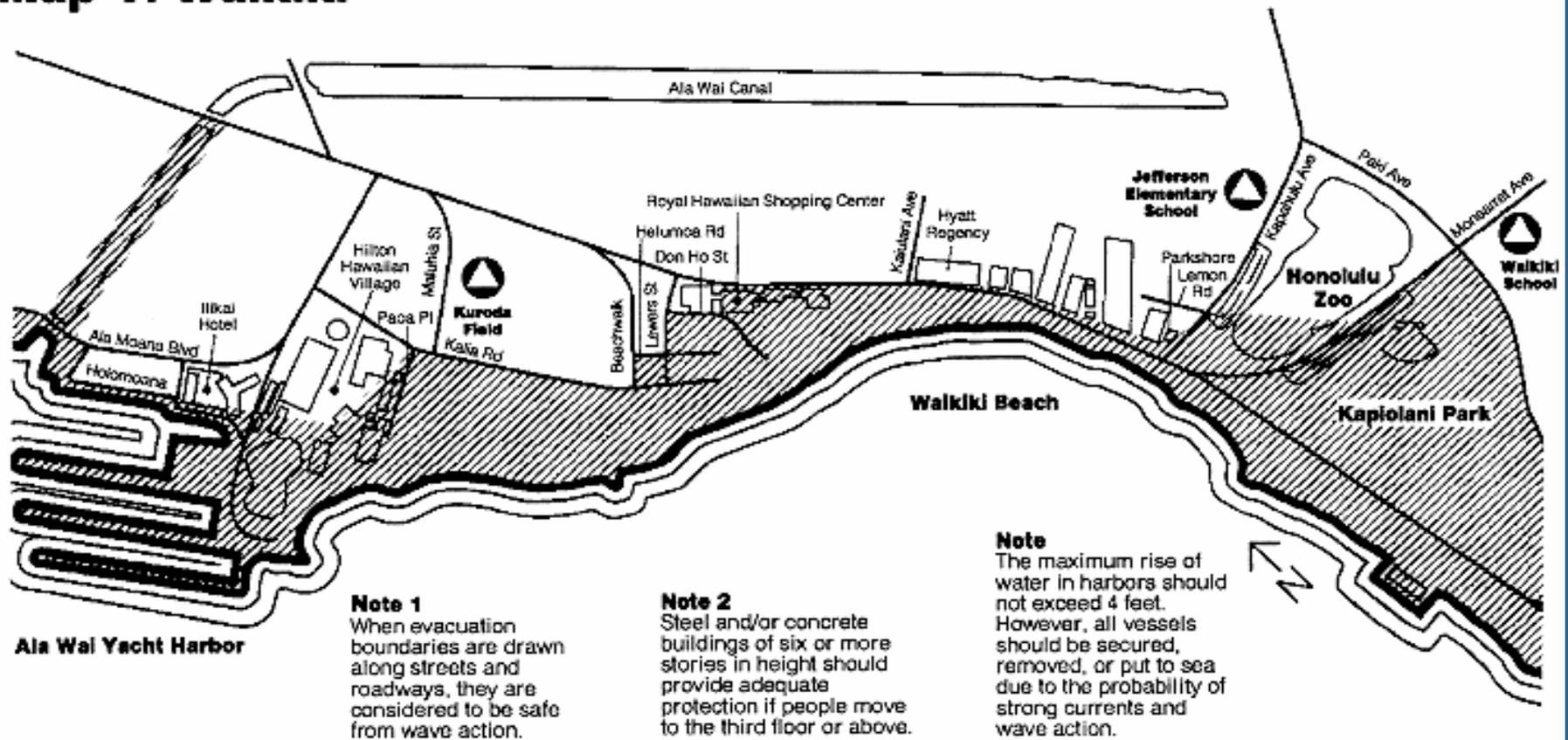
Connecting County EOC's



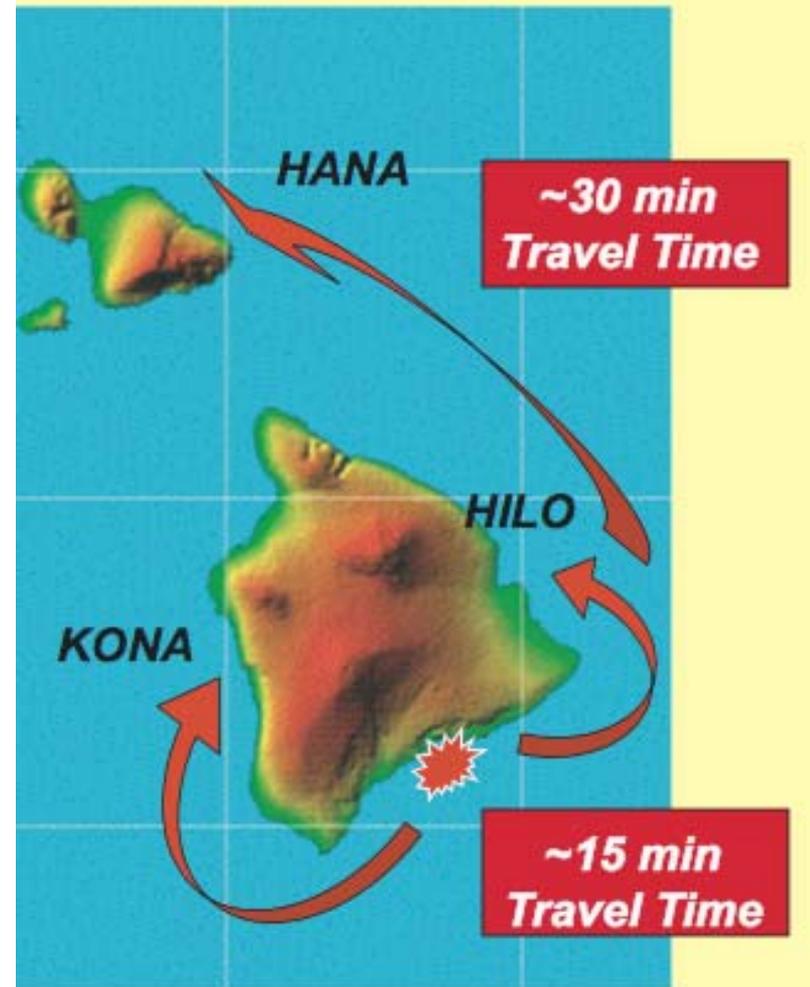
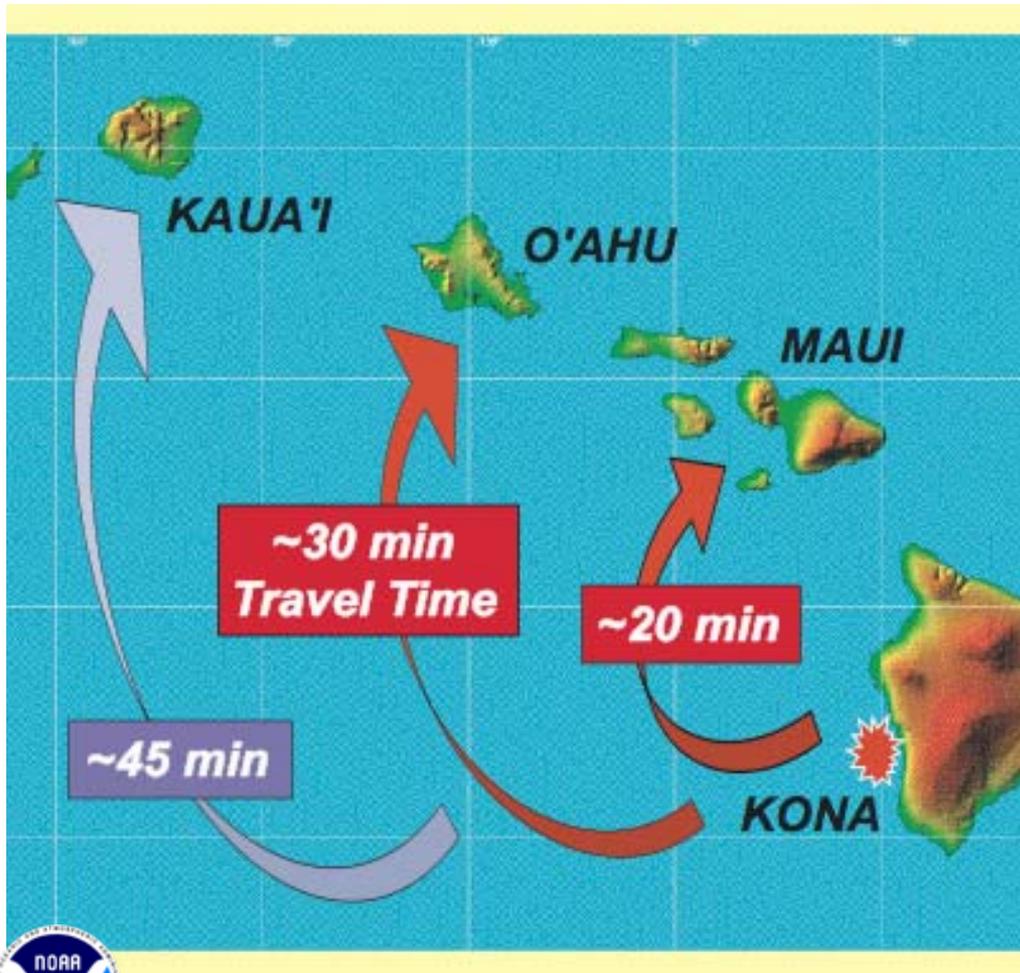
Tsunami Evacuation Maps

located in the front of Telephone White Pages

Map 1: Waikiki



Local Tsunami Threat: 30 minutes to Waikiki, Oahu





SENSE-ing a Tsunami

TOUCH

- Strong local earthquakes may cause tsunamis.
- **FEEL** the **ground shaking** severely? Evacuate low-lying coastal areas and move inland to higher ground!

SIGHT

- As a tsunami approaches shorelines, water may recede from the coast, exposing the ocean floor and reefs.
- **SEE** an unusual **disappearance of water**? Evacuate low-lying coastal areas and move inland to higher ground!

SOUND

- The abnormal ocean activity, a wall of water, and approaching tsunami waves create a loud “roaring” sound similar to that of a train or jet aircraft.
 - **HEAR** the **roar**? Evacuate low-lying coastal areas and move inland to higher ground!
- 



Local Tsunami

Warning & Evacuation

- *PTWC issues an urgent tsunami warning* for local earthquakes magnitude 6.9 or greater.
 - *County Warning Points sound sirens* in designated Counties (e.g. Hawaii and Maui Counties).
 - *National Weather Service broadcasts* warning and evacuation through the *EAS*.
 - *EOC activate* and prepare for disaster response operations.
- 



LOCAL TSUNAMI WARNING – RADIO BROADCAST SCRIPT

- “The Pacific Tsunami Warning Center has issued a Tsunami Warning for the Islands of (select islands or geographical location).
 - A local tsunami has been generated. Immediately evacuate all beaches and all low lying coastal areas. Move inland to higher ground or move to the 3rd floor and above in reinforced concrete buildings.
 - I Repeat,
- 



Distant Tsunami

Warning & Evacuation

- *PTWC issues Tsunami Watch and Warning Bulletins* to the State of Hawaii for distant earthquakes magnitude 7.9 or greater.
 - Emergency Operation Centers (*EOC activate and alert*) emergency response agencies.
 - EOC coordinate *siren sounding* statewide *at least 3 hours before 1st wave arrival* in conjunction with radio and television Emergency Alert System (EAS) broadcasts.
 - EOC coordinate *school closures* and *release of government workforce* within tsunami evacuation zones.
 - EOC prepare for disaster response operations.
- 



Oahu Bus Routes & Roadblocks

- ***City buses*** along the shoreline will alter their routes and ***shuttle people*** to the nearest inland shelter.
 - ***Police*** will ***establish roadblocks*** 45 minutes prior to first wave arrival.
 - All emergency ***response personnel*** will ***cease operations*** and move inland to safety ***30 minutes prior*** to first wave arrival.
 - Special concern in Hawaii is education of surfers – ***tsunamis are not surfing waves!***
- 



Public Safety Notification

“ALL CLEAR”

- **PTWC** will **cancel** the **tsunami warning** when destructive waves have ceased.
 - Search & Rescue operations commence.
 - **County Civil Defense** agencies announce “**All Clear**” over radio and television. No sirens will sound.
 - **Public may return** to coastlines after “**All Clear**” is announced.
- 



1986, 1994 Tsunami Warnings Media Reports

**Pacific -wide Tsunami Warnings Issued
Sirens sounded, Statewide evacuations
Small, non-destructive tsunamis**

- **1986 - mid-afternoon to pm rush hour
1994 - early morning to am rush hour**

Losses

1994 (DBEDT Study) => \$50M

1986 (extrapolated) => \$30M

2003 (extrapolated) => \$68M

- **Media reports shape public opinion**

EMERGENCY PREPAREDNESS: Conducting Exercises

HAWAII DISTANT TSUNAMI EXERCISE



April 1, 2005



PURPOSE

- The statewide distant tsunami exercise will focus on Hawaii's ability to respond to a distant tsunami from the Aleutian Islands in Alaska.
 - The exercise provides an opportunity for participants to *review their distant tsunami response procedures* and to promote emergency preparedness.
 - The exercise is *planned by SCD with PTWC*, who plays by issuing prescribed voice messages on the HAWAS and sending other electronic and hard copy messages.
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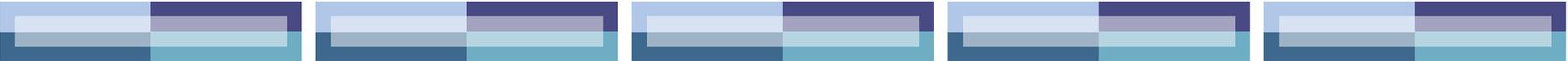
EXERCISE OBJECTIVES

● Validate:

- **Warning and Communications Procedures** for a distant generated tsunami.
- **Organizational Procedures** in emergency.

● Review:

- Organization **Procedures for Evacuation:**
 - Inland Evacuations
 - Vertical Evacuations
 - Public Transportation
 - Kick off “April Tsunami Awareness Month” Public Awareness Campaign.
- 



EXERCISE SCENARIO

- 10:15 a.m.** An **earthquake** greater than 8.0 magnitude occurs in the vicinity of the Alaska Aleutian Islands.
- 10:25 a.m.** Pacific Tsunami Warning Center (PTWC) issues a **Tsunami Watch Bulletin** for the State of Hawaii. First wave arrival to Hawaii is 4 hrs 30 mins after earthquake origin time.
- 11:45 a.m.** Hawaii placed in a **Tsunami Warning** (3 hours before first wave arrival at 2:45 p.m.)
Statewide siren sounding (monthly Siren System test).
- 2:45 p.m.** **First wave** arrival.
- 3:30 p.m.** End of Exercise.
- 



EXAMPLE, HAWAII:

***STAKEHOLDER COORDINATION
MECHANISM***

***IMPLEMENTATION, POLICY,
EMERGENCY RESPONSE,
PUBLIC AFFAIRS AND MEDIA,
OUTREACH, EDUCATION***

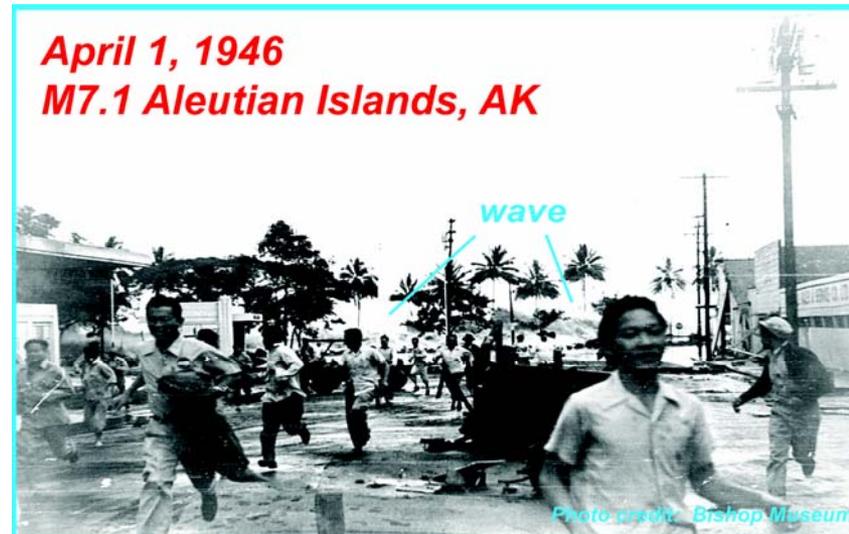




HAWAII TSUNAMI TECHNICAL REVIEW COMMITTEE (TTRC)

- ***Reduce risk of tsunamis to State of Hawaii***
Founded 1998, meets 2x/year
Funded by State & NOAA (NTHMP)
- ***Scientists, engineers, planners, Emergency managers, public affairs personnel***

***NOAA, FEMA, USACE, USCG,
DOD, FEB, Univ. Hawai`i,
Pacific Disaster Center,
Red Cross, Pacific Tsunami
Museum, State & Local
Agencies (DOE, DBEDT, DOT,
DLNR, CZM, Warning Points,
Civil Defense,
Tsunami advisors)***





- ***Activities***

***Hazard ID, Risk Assessment, Warning Guidance
Awareness and Mitigation***

- ***Recent TTRC Agenda Topics***

PTWC Operations Report

Runup and Inundation Modelling – Evacuation Maps

Tsunami Observer Program, Post-Tsunami Survey Plan

Multi-Level Regional Warning and Coastal Evacuation

Statewide Exercise - Local Tsunami

Public Affairs Working Group Activities (Awareness Month)

Event Response, “Expert” Contact List, Press Pool, Web

Social Science Perspectives on Tsunami Warnings

Maritime operations during tsunami events –

Ocean Currents in Harbors, Shipping ports, boating safety

Civil Air Patrol Capabilities

Working Groups: Emergency Mgmt, Scientific , Public Affairs



Any Questions?

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