



# **SANTA ROSA COUNTY TSUNAMI/ROGUE WAVE EVACUATION PLAN**



Banda Aceh, Indonesia, December 2004, before/after tsunami photos

## Table of Contents

Introduction .....	3
Purpose.....	3
Definitions.....	3
Assumptions.....	4
Participants.....	4
Tsunami Characteristics.....	4
Tsunami Warning Procedure.....	6
National Weather Service Tsunami Warning Procedures.....	7
Basic Plan.....	10
Concept of Operations.....	12
Public Awareness Campaign.....	10
Resuming Normal Operations.....	13
Tsunami Evacuation Warning Notice.....	14

## **INTRODUCTION:**

Santa Rosa County Emergency Management developed a Santa Rosa County-specific ***Tsunami/Rogue wave Evacuation Plan***.

In the event a Tsunami<sup>1</sup> threatens Santa Rosa County, the activation of this plan will guide the actions of the responsible agencies in the coordination and evacuation of Navarre Beach residents and visitors from the beach and other threatened areas. The goal of this plan is to provide for the timely evacuation of the Navarre Beach area in the event of a Tsunami Warning.

An alternative to evacuating Navarre Beach residents off of the barrier island involves ***vertical evacuation***. Vertical evacuation consists of the evacuation of persons from an entire area, floor, or wing of a building to a higher floor or wing. The National Weather Service has determined that fifteen feet is the minimum acceptable level for vertical evacuation on the Barrier Island.

Plans for vertical evacuation of Navarre Beach residents and visitors would only be effective if designated structures are designed to withstand both strong near-source ground motions and the velocity and impact loads of tsunami inundation. Since no studies have been conducted to evaluate the level of protection current structures provide, vertical evacuation is only recommended from a near-source tsunami when public notification may not be possible (very likely for Santa Rosa County); or, when only a few hours or minutes of warning is available.

This plan will include components from the Incident Command System. The highest priority is the safety of the public at large and our first responders.

## **PURPOSE:**

The purpose of this plan is to provide an outline for maintaining operations in responding to and recovering from a Tsunami strike on the Gulf Coast.

1. Ensure that Santa Rosa County has established evacuation procedures in response to tsunami warning;
2. Provide for the timely, coordinated, systematic warning and safe evacuation of the Peninsula;
3. Present guidelines to assist with the protection of life and property and to aid persons who may be injured and are in need of medical attention;
4. Provide search and rescue procedures;
5. Furnish assistance with disaster recovery operations, if required;
6. Establish training requirements;
7. Provide assistance with citizen information presentations.

## **DEFINITIONS**

Mean Lower Low Water Level – The average low tide water elevation often used as a reference to measure run up.

Mean Sea Level – An average of all high and low tides over an 18.6 year period.

---

<sup>1</sup> Henceforth the word tsunami also applies to rogue waves.

Mw Moment Magnitude – Magnitude based on the size and characteristics of the fault rupture, and determined from long-period seismic waves.

Tsunami – the word “tsunami” is Japanese meaning “harbor wave”. A tsunami is a series of long waves created by a disturbance that displaces a large amount of water. This disturbance is primarily associated with earthquakes in oceanic or coastal regions. Landslides, volcanic eruptions, nuclear explosions, and even impacts from objects from outer space, such as meteorites, asteroids and comets could also create a tsunami.

Tsunami Warning – a bulletin issued by the Alaska Tsunami Warning Center defining the immediate threatened area, usually based on seismic information without tsunami confirmation. Provides earliest possible alert and is repeated hourly until cancelled.

### **ASSUMPTIONS:**

- There are sufficient key personnel to carry out the plan and procedures
- There will be a limited notification period
- Citizens will cooperate with evacuation plans
- A tsunami will affect the coastline as a Category 5 surge from a hurricane or greater
- City of Gulf Breeze will cooperate with evacuations

### **PARTICIPANTS:**

The following agencies/departments are to be included but not limited to when being identified as having operational responsibilities during disaster/emergency operations:

- Santa Rosa County Emergency Management
- Law Enforcement
- Local EMS Provider
- Fire Services
- School Board
- City of Gulf Breeze
- Condominium managers/owners
- Businesses on or near coast

### **Tsunami Characteristics**

Tsunamis act very differently from typical surf swells; they propagate at high speeds and can travel great transoceanic distances with little energy loss. Tsunamis are often no taller than normal wind waves, however they are much more dangerous. Wind generated waves are separated by an average five to twenty seconds; the length of a wind-wave averages between three hundred to six hundred feet. With a tsunami wave, the frequency pattern may be ten minutes to two hours (or more). The length of a tsunami wave can be greater than three hundred miles.

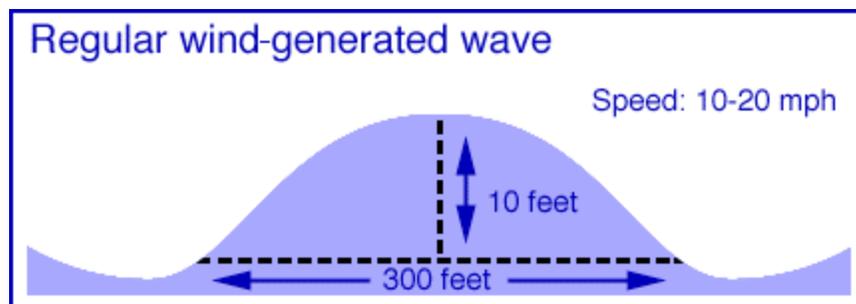


Figure 3

Tsunamis run quickly over the land as a wall of water. From the coastline, a tsunami may appear as a rapidly rising or falling tide, or a series of breaking waves. Strong currents and debris carried by the wave add to the destructive nature of this inundating flood. Tsunamis are extremely deadly, having killed tens of thousands of people. Although not classified as a tsunami, on July 3, 1992, a rogue wave struck Daytona Beach. This wave was ten feet in height, and swamped the shoreline for 30 miles, resulting in 75 injuries and damage to numerous vehicles and beach front property.

Tsunamis are generated by any large, impulsive displacement of the sea level. Tsunamis are also triggered by landslides into or under the water surface, and can be generated by volcanic activity and meteorite impacts.

Tsunami velocity depends on the depth of water through which it travels (velocity equals the square root of the product of the water depth times the acceleration of gravity). Tsunamis travel approximately 475 mph in 15,000 feet of water. In 100 feet of water the velocity drops to about 40 mph.

Tsunamis range in size from inches to over a hundred feet. In deep water (greater than 600 feet), tsunamis are rarely over 3 feet and will not be noticed by ships due to their long period (time between crests).

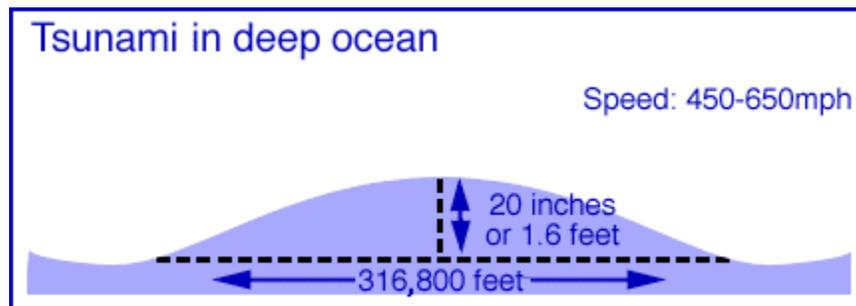


Figure 4

As tsunamis propagate into shallow water, the wave height can increase by over 10 times. Tsunami heights vary greatly along a coast. The waves can be amplified by shoreline and bathymetric (sea floor) features. A large tsunami can flood low-lying coastal land over a mile from the coast.

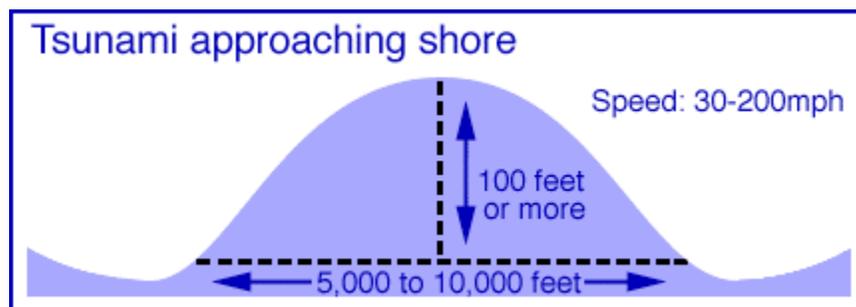


Figure 5

Tsunamis rarely become great, towering, breaking waves. Sometimes the tsunami may break far offshore. On occasion, a tsunami may form a bore, a step-like wave with a steep breaking front, which can happen if the tsunami moves from deep water into a shallow bay or river.

The first wave may not be the largest in the series of waves. One coastal area may see no damaging wave activity, while in another area; destructive waves can be large and violent.

The vertical height reached by a tsunami onshore above sea level is called a run-up height. In extreme cases, the water level can rise to more than 50 feet (15 meters) above sea level for tsunamis of distant origin, and over 100 feet (30 meters) for tsunamis generated nearby. A notable exception to this is the 1958 landslide-generated tsunami in Lituya Bay, Alaska which produced a 1,722 foot (525 meter) wave.

The first warning sign of a possible tsunami is the earthquake itself; however tsunamis can strike thousands of miles away, where the earthquake is only felt weakly or not at all. Also, in the minutes preceding a tsunami strike the sea often recedes temporarily from the coast.

### Tsunami Warning Procedure

#### National Weather Service Tsunami Warning Procedures:

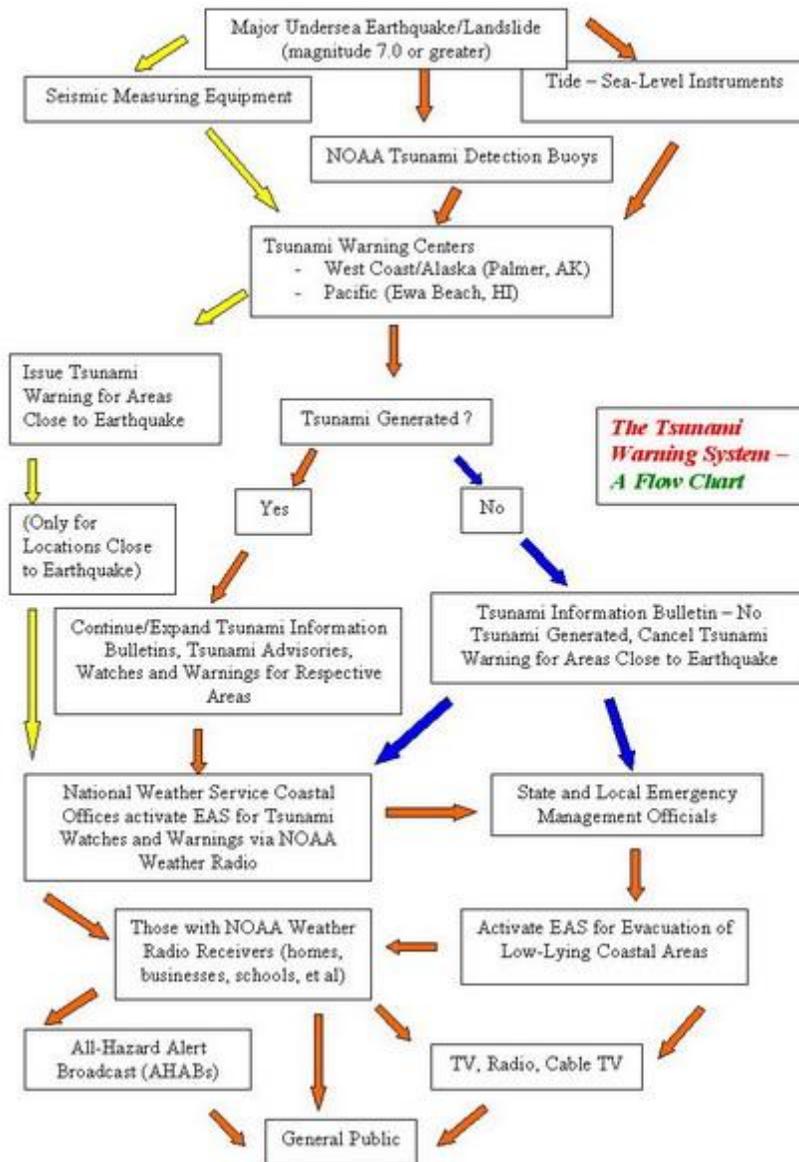


Figure 6

In addition to all public safety warning points, the Santa Rosa County Emergency Operations Center will be notified. Television and radio override alerts will be broadcast. The Emergency Operations Center also has the capability to activate an emergency telephone call notification system (“Reverse 911”). NWS Mobile will continue to broadcast tsunami alert warnings VIA the NOAA weather radio broadcast system.

**Current threat**

New data from the United States Geological Service (USGS) shows that there is a tsunami threat the Santa Rosa County from underwater landslides that can occur in the Gulf of Mexico.

## Landslide Sources and Coastal Locations for Inundation Mapping

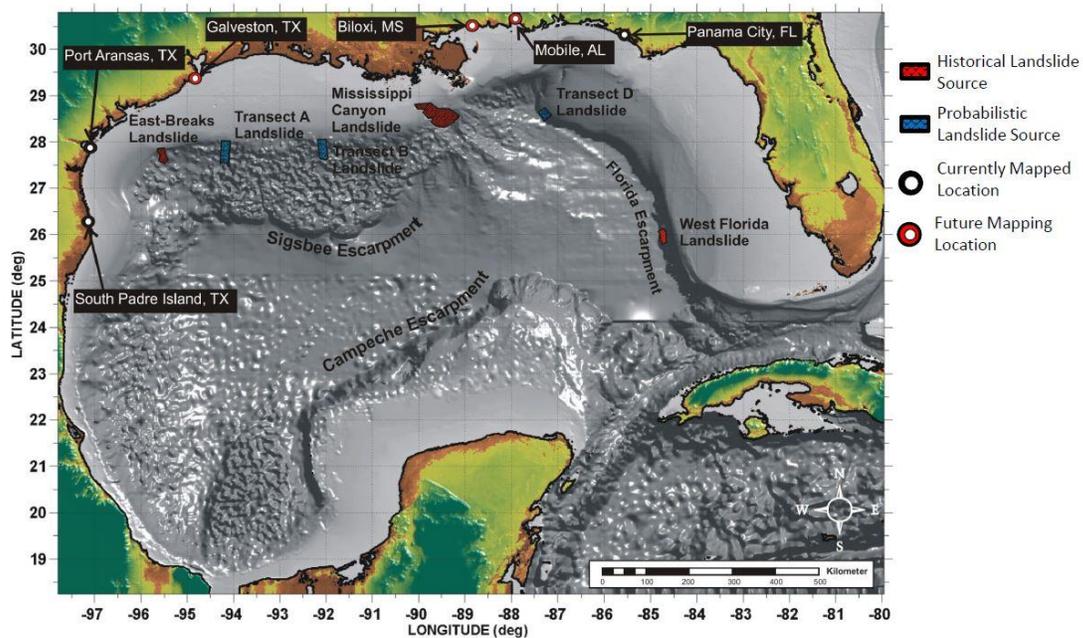


Figure 7

As seen above, there are several historic landslide sources, as well as potential landslide sources in the Gulf. Below is a time line for the Mississippi Canyon slide.

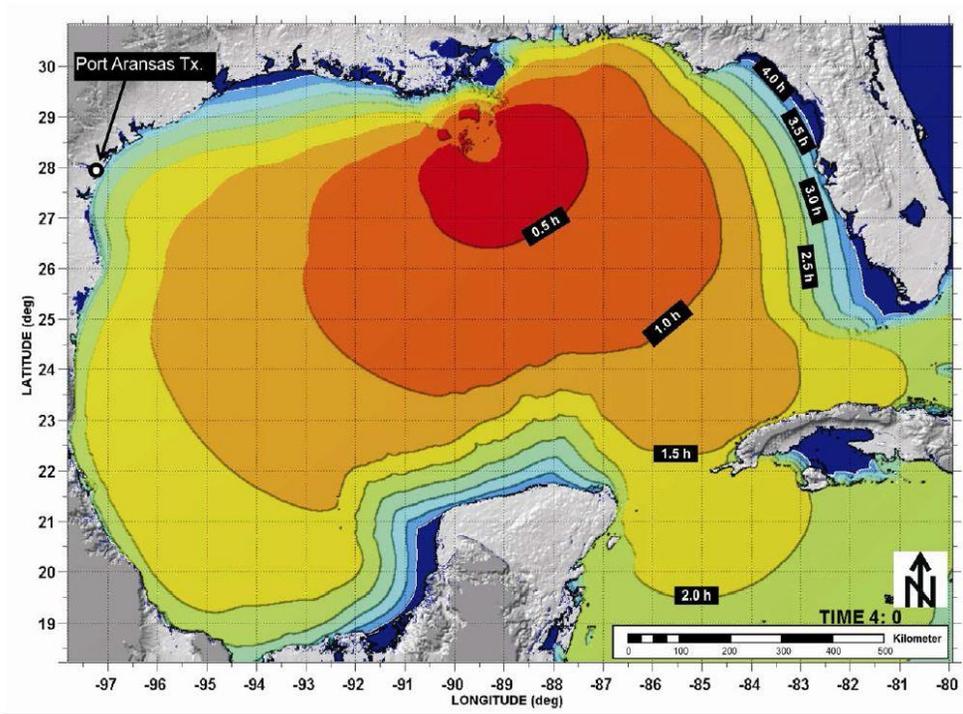


Figure 32. Tsunami arrival time for the Mississippi Canyon landslide.

74

Figure 8

## Maximum Wave Amplitude Probabilistic Source Transect D

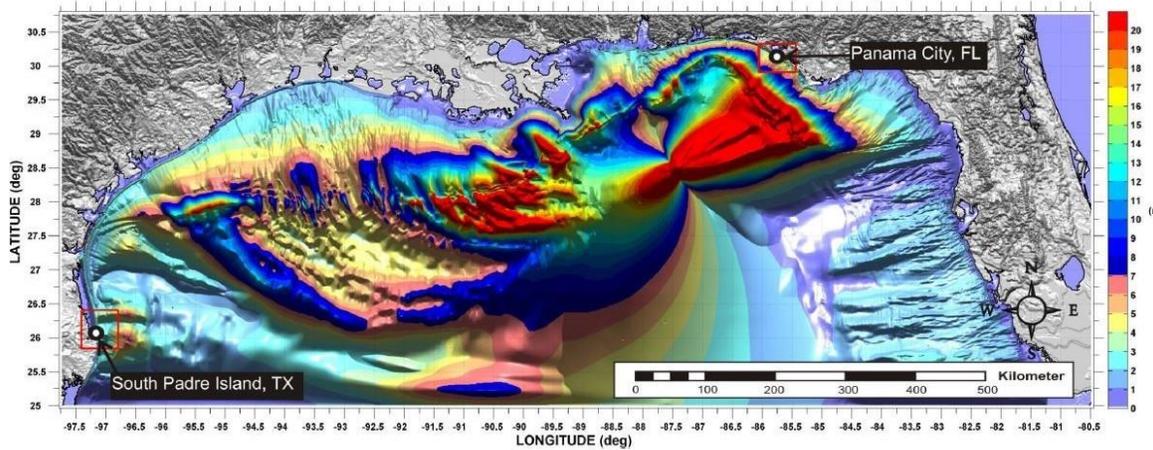


Figure 9

Above is the maximum predicted wave height from the Transect D location.

NWS Mobile made the following prediction of threat to Santa Rosa County based upon current knowledge of tsunami hazards.

### **Tsunami Information for Santa Rosa County**

Recent studies headed by the Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group (2009) have shown that while the Gulf of Mexico (GOM) Tsunami threat is very minimal, there is a credible threat to the beaches of the western Florida panhandle, primarily resulting from sea bed landslides.

Potential tsunami sources in the GOM are local submarine landslides, which have been examined by the Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group.

Survey data suggests that there are three historical ancient landslide sources in the GOM (East Breaks landslide off mid TX coast, Mississippi Canyon landslide off SE LA coast, and the West Florida landslide off SW FL coast). There are also at least three probabilistic landslide sources (Transect A,B and D).

Research has shown that the two sources that could potentially have the greatest impact on the western Florida panhandle coast should a landslide occur would be the Mississippi Canyon and Transect D source regions.

Sediment continues to empty into the GOM from the Mississippi River, contributing to a steepening slope of the continental shelf, which could lead to landslide activity in the Mississippi Canyon source region.

The Atlantic and Gulf of Mexico Tsunami Hazard Assessment Group has begun a project to construct tsunami maps based on the identified ancient local submarine landslides in the GOM. In order to estimate the extent and magnitude of the inundation by tsunami waves generated from local landslide sources, numerical models have been used. Several tsunami scenarios were investigated, resulting in modeled tsunami waves generated by the three ancient underwater landslides mentioned earlier, as well as for potential Transect D source region off the Florida panhandle coast.

The Hazard Assessment Groups study will attempt to determine tsunami flooding inland-extent, maximum inundation depth, maximum inundation elevation and maximum momentum flux and direction for several forecast points along the U.S. Gulf Coast. This inundation data has been calculated for Port Aransas, TX and Panama City Florida, FL (with several other coastal locations to be mapped in the future).

**The latest information with regard to the tsunami threat to the western Florida panhandle (including Santa Rosa County) follows:**

Maximum Wave Amplitude along the western Florida panhandle coast resulting from a Mississippi Canyon slide could potentially be 4–6 meters. This does not directly relate to possible inland inundation, but does signify a credible threat of significant flooding into normally dry land areas. Based on the most recent research, wave arrival time along the western Florida panhandle coast for a Mississippi Canyon slide would likely be around 2 hours after slide event. For a Transect-D slide event, Maximum Wave Amplitude at the coast could potentially be 3-4 meters (again, this does not correlate to inland inundation), arriving at the coast 1-2 hours after the slide event. (\*\*Please see the above Graphics related to the Mississippi Canyon and Transect-D landslide source regions).

No inundation maps are available for Santa Rosa County. Inundation mapping has been done for the Panama City Beach area, and the data does suggest a potential for severe and damaging flooding in that area, with water depth over normally dry land ranging from around 1 to 5 meters.

While research is still ongoing, based on the best current information available, this study has confirmed that these landslide scenarios indeed have the potential to cause severe flooding and damage to GOM coastal communities.

Local emergency management consider the threat to Santa Rosa County to be primarily on Navarre Beach. Navarre Beach is a 4 mile stretch of Santa Rosa County owned Barrier Island, some of which is developed. The rest of the barrier island is National Seashore, Eglin Airforce Base, or Escambia County. Figure 9 below shows all of Santa Rosa county property, and does not include the whole coastal area. This shows the small amount of property on the Barrier Island that Santa Rosa County is responsible for. Figure 11 is a close up of the southern part of the county showing the Barrier Island in its entirety, the pass into Pensacola Bay, and the peninsula behind the Barrier Island. Figure 12 is a close up of Navarre Beach, with the green to the west being National Seashore, and the dotted line to the east being the county border.

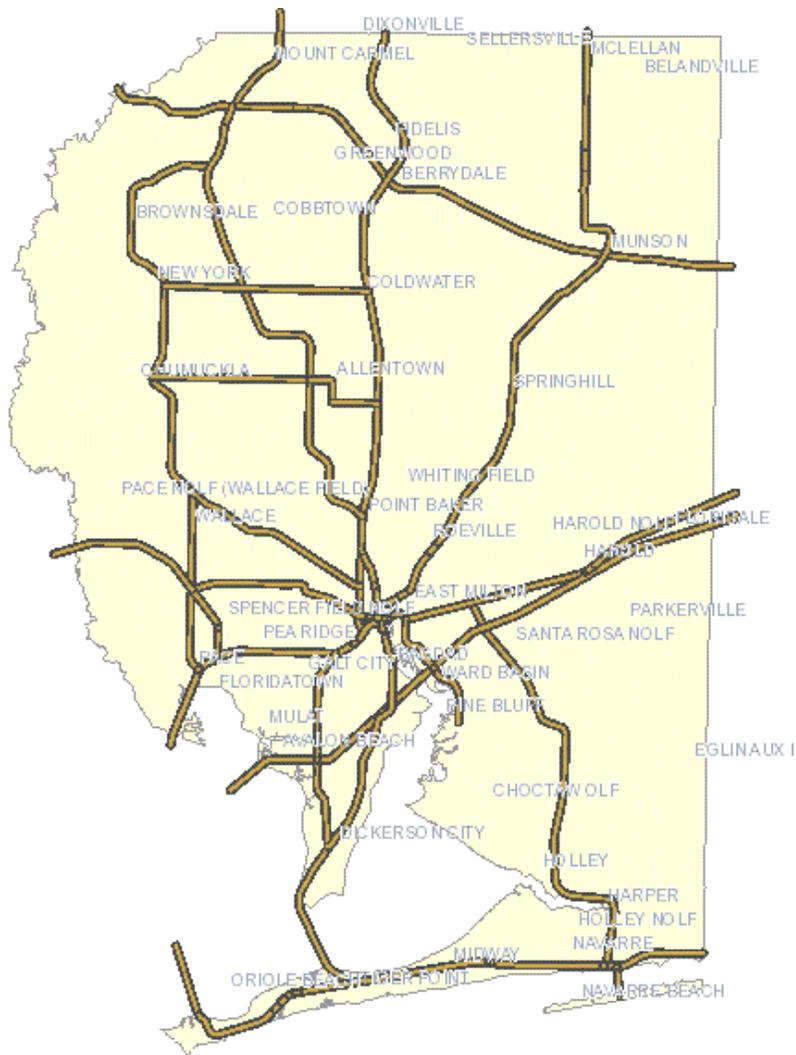
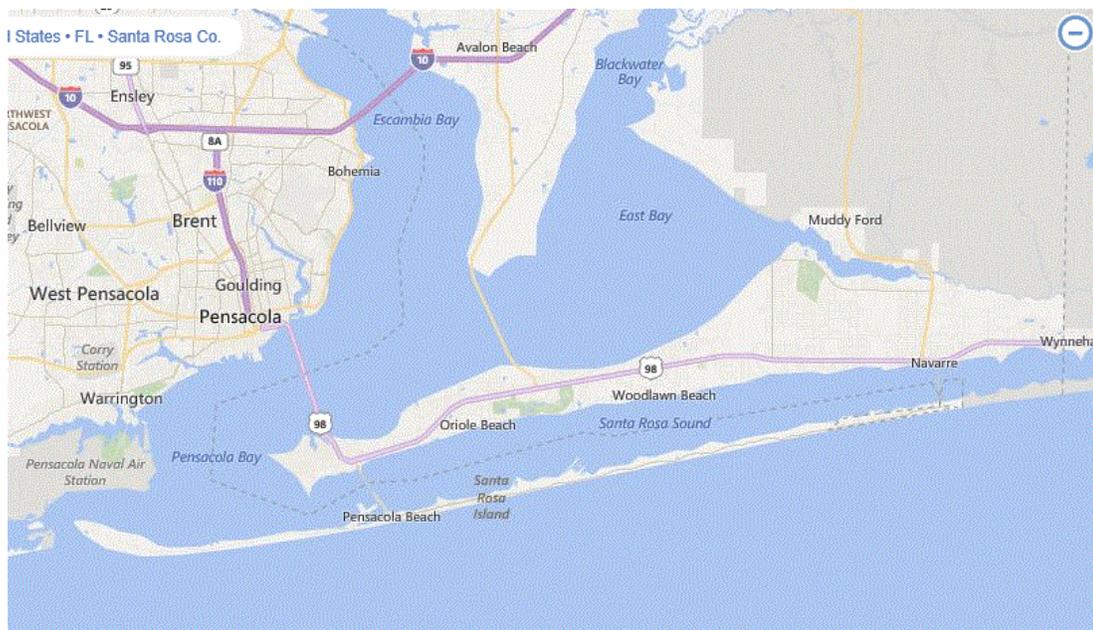


Figure 10 (whole county above)

Figure 11 (barrier island below)



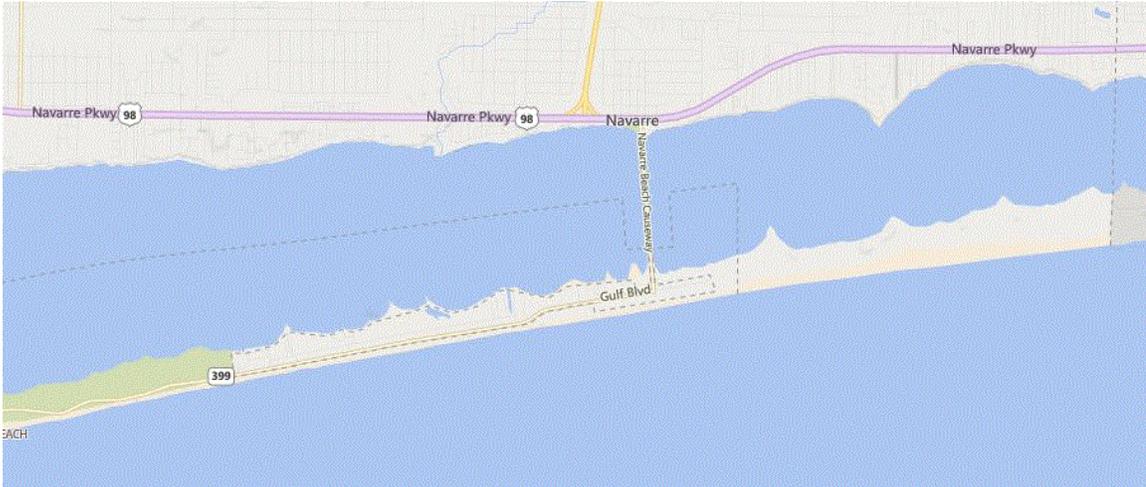


Figure 12

## **BASIC PLAN**

Although a tsunami event may involve hundreds of miles of Florida coastline, this plan is specific to Santa Rosa County. This plan will incorporate and coordinate the response to such an event by Santa Rosa County Emergency Management, Santa Rosa County Sheriff's Office, and those municipalities located on the Peninsula with separate police and fire departments.

Santa Rosa County is aware that the time table for evacuating the coastal regions of the County will be limited based upon the location of the incident causing the tsunami. The National Weather Service will provide timely notification of a tsunami when they are alerted to its presence. When notified via email or through the weather service, these persons will notify the Director of Emergency Management or a representative, and the public notification process may begin if it is determined that a tsunami will develop. Due to the extremely limited reaction time and the scale of evacuations, it may be the responsibility of the notified individual to make the evacuation determination without waiting for guidance.

The DOT has given permission to enact life saving procedures without their approval. These activities may include ignoring traffic lights by having a traffic control point at an intersection, or it may include switching the flow of traffic to northbound only on Avalon Blvd from Garcon Point Bridge to Interstate 10, the Bay bridge into Pensacola, and CR87 up to Interstate 10.

The Sheriffs office is aware of these plans and the potential for traffic congestion or accidents as a result.

The primary goal of these activities will be to save the lives of citizens on Navarre Beach first, followed by the evacuation of coastal regions of the peninsula next. Priority should be given to the Gulf Breeze, Midway area since they are in the lowest lying area of the peninsula and are most affected by hurricane surge zones which are being used as the model for a tsunami response.

It is possible that seeking shelter in a high rise building or an inland roof may be adequate to save lives versus evacuation, however it should be noted that first responders may not have the equipment or personnel necessary to assist in the rescue of everyone who may decide to seek shelter in evacuation zones. Additionally, depending on the time available, it may be in the best interest of everyone on Navarre Beach and the peninsula to shelter in high rises, in which case the same rules of survival for a hurricane apply, and disaster kits must be kept up to date and with 5 days food and water.

Signage and public education will be a part of Santa Rosa County emergency management protocols, as will keeping up with current tsunami threat information for the Gulf of Mexico.

## Procedure

1. Upon notification by the Mobile National Weather Service Station to Santa Rosa County Warning Point/Emergency Management that a tsunami warning is in effect, the following notifications will take place (simultaneous with State Warning Point notification):

- a) Sheriff's Office
- b) Beachside municipal law and fire departments
- c) Hotel/motel and condominium POC's via "Reverse 911"
- d) Beachside residents/businesses via "Reverse 911"
- e) Santa Rosa County School Board
- f) County Manager

While these notifications are taking place, the County Emergency Operations Center will be activated to a Level II (partial) status, if required for an incident resulting in more than the anticipated 18 inch tsunami. ESF's 1, 2, 4, 5, 6, 8, 9, 14, 16, 17, and all municipal liaisons for impacted areas, will be contacted and directed to report to the EOC. Procedures for sheltering operations, mass care, evacuation transportation, and public information will be implemented.

2. The Santa Rosa County EOC will support the Sheriff Incident Command Post (ICP). The senior deputy in the south (or his designee) will assume the role of Incident Commander. Santa Rosa County Sheriff's Office personnel, municipal law enforcement and fire personnel have the primary responsibility of notifying the public on the Peninsula and managing the evacuation process from the Peninsula to mainland Santa Rosa County should a wider ranged evacuation be required. Santa Rosa County Sheriff's Office personnel have the primary responsibility of evacuating the beaches on Navarre Beach.

NOTE: The time of the tsunami warning alert will dictate one of two types of coordinated responses. The first situation involves a tsunami warning alert being made on a weekday other than a County paid holiday, between 0800 hours and 1700 hours. During this time frame County employees are present and available to assist in the implementation of evacuation operations. The second circumstance would involve a tsunami alert being received on a weekend, holiday, or after 1700 hours. Additionally an evacuation could be for the beaches on Navarre Beach, or the Navarre Beach Barrier Island and parts of the peninsula including Gulf Breeze, depending on the severity of the incident.

### **Procedure (1) - During week days during 0800 hours and 1700 hours:**

***Emergency Management Office*** - Upon receiving notification of a Tsunami Warning (and following notification of the State Warning Point):

- a) Notify appropriate municipal police/fire agencies
- b) Notify SRC Sheriff's Office
- c) Initiate "Dialogic" notification procedures through dispatch centers
- d) Notify SRC School Board

If additional assistance is needed, request additional personnel per Mutual Aid Agreements.

3. Upon completion of evacuation operations, the Incident Commander will confer with the Santa Rosa County Emergency Management Director to ensure all notification measures have been taken, and all response personnel are accounted for.

4. Utilizing County and municipal law enforcement resources IAW established evacuation procedures, prevent persons from re-entering evacuated areas.

5. After the Tsunami event has occurred, coordinate within the EOC for deployment of personnel to conduct search and rescue/damage assessment.
6. Request assistance from the Santa Rosa County Sheriffs Office Aviation Unit to support the search for injured or stranded persons.
7. Ensure that all related reports are accurate and complete.

**Procedure (2) - for weekdays after 1700 hours, weekends and holidays:**

On weekdays after 1700 hours, weekends and holidays, the number of immediate available personnel is reduced significantly. Until additional personnel resources can be summoned, the Santa Rosa County Emergency Management office, Santa Rosa County Sheriff's Office, and municipal law enforcement and fire agencies will be responsible for implementing evacuation procedures as delineated in **Procedure (1)**. With limited personnel resources, the evacuation of persons from the ocean and on the beach is the first priority. As personnel resources increase the other components of this plan will be implemented.

**Tsunami Evacuation Routes**

Tsunami evacuation routes include any roadway that provides egress to the Santa Rosa County peninsula:

1. Navarre Beach Causeway

If the wider ranged evacuations of the peninsula are required, then the following egress routes may be used

1. Pensacola Bay Bridge, with the knowledge that Pensacola may be flooded
2. Gulf Breeze Parkway (east)
3. Garcon Point Bridge, with knowledge that Avalon road may be flooded
4. HWY 87 north

**CONCEPT of OPERATIONS**

Emergency Management

- The State Warning Point shall be notified.
- Request assistance via the Statewide Mutual Aid Plan.
- Assist with notification of public through PIO and media outlets.

Sheriffs Office

- Utilize deputies available to notify personnel on Navarre Beach and direct traffic north, both on Navarre Beach and the Peninsula.
- Utilize Fire Departments for traffic control if available.

Fire Departments

- Assist with notification of citizens and/or traffic control at the direction of law enforcement.

Gulf Breeze

- Utilize Law Enforcement and Fire Departments to notify citizens and expedite traffic North over Bay Bridge.

School District

- If incident occurs during school hours, utilize ever means of transportation on the peninsula to evacuate students North to Administrative complex for accountability
- If school is not in session prepare to open all schools as shelters starting with those approved as risk shelters. Others may be required as host shelters.

Local EMS Provider

- Assist in the evacuation of nearest nursing home/retirement home, or school if required, otherwise standby to respond to medical emergencies.

### **Tsunami Public Awareness Campaign**

A public awareness campaign will be adopted and implemented by the following methodologies:

- a) Information articles promulgated to local media by Santa Rosa County Public Information;
- b) Public presentations by Santa Rosa County Emergency Management personnel;
- c) Distributing informational flyers;
- d) Posting of tsunami zone informational signs at select beach access points;
- e) Including tsunami information in the Santa Rosa County Disaster Preparedness Guide on an annual basis.

### **RESUMING NORMAL OPERATION**

Normal operations may resume when the following conditions are met:

- Conditions are safe for reentry
- PDA is complete
- Accountability of citizens is as complete as possible

### **Attachments**

Condo Notification Paper:

The list of business and condominium contacts is included as a paper copy “master” list of what is contained in the Dialogic database. This list will be updated annually and incorporated into the Dialogic database. (Under development)

Planning Scenarios:

Three scenarios to consider when planning and training for potential tsunami/rogue wave incidents.

# **TSUNAMI**

# **EVACUATION**

## **WARNING NOTICE**

**DATE: \_\_\_/\_\_\_/\_\_\_ TIME: \_\_\_ AM / \_\_\_  
PM**

**ALL PERSONS RESIDING ON THE GROUND FLOOR SHOULD IMMEDIATELY EVACUATE TO MAINLAND SANTA ROSA COUNTY OR TO AN UPPER FLOOR OF THIS BUILDING.**

**AUTHORITY: SANTA ROSA COUNTY BOARD OF COUNTY COMMISSIONERS DIVISION OF EMERGENCY MANAGEMENT 850-983-5360.**

Appendix 2

Scenario 1

- Middle of high tourist season
- Day time
- Weather is good

- Tsunami warning issued

#### Scenario 2

- Winter
- Night time
- Tsunami warning issued

#### Scenario 3

- Tourist season
- Night time
- Tsunami warning issued