



# National Transportation Safety Board

## Survival Factors

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# Overview

- Search and rescue (SAR)
- Position formatting (latitude/longitude)
- Emergency position indicating radio-beacons (EPIRBs)
- Personal locator beacons
- Survival craft requirements

# Search and Rescue (SAR) – Coast Guard

- Critical to get assets on scene
- Joaquin prevented search and rescue efforts for two days
- During first two days, Coast Guard positioned assets





## Assets Utilized During Search Efforts



CG MH-60



CG HC-144



CG HC-130



CG MH-65



CGC NORTHLAND



CGC RESOLUTE



CGC CHARLES SEXTON



USAF HC-130



USN P-8



JSTARS



U.S. COAST GUARD

# SAR Position Formatting Error

<u>Source</u>	<u>Format</u>	<u>Position</u>
Inmarsat-C	DD.MM	23.28N, 73.48W
Traditional	DD°MM'	23°28'N, 073°48'W
but SAROPS interpreted	DD.dd	23.28N, 73.48W
and converted to	DD-MM.mmm	23-16.800N, 073-28.800W <u>23 NM error</u>



# SAR Latitude/Longitude Formatting

<u>Source &amp; Format</u>		<u>Source Format</u>
Navigation	DD°MM.m'	23°28.0'N, 073°48.0'W
Inmarsat-C	DD.MM	23.28N, 73.48W
SSAS	DD:MM.mm	23:25.39N, 073:52.51W
USCG	DD-MM.mmm	23-28.000N, 73-48.000W

# Emergency Position Indicating Radio-Beacon (EPIRB)

- Automatic alert
- Indicates location
- Float-free
- Automatic activation
- Detectable anywhere
- 406 MHz frequency
- Non-GPS or with GPS



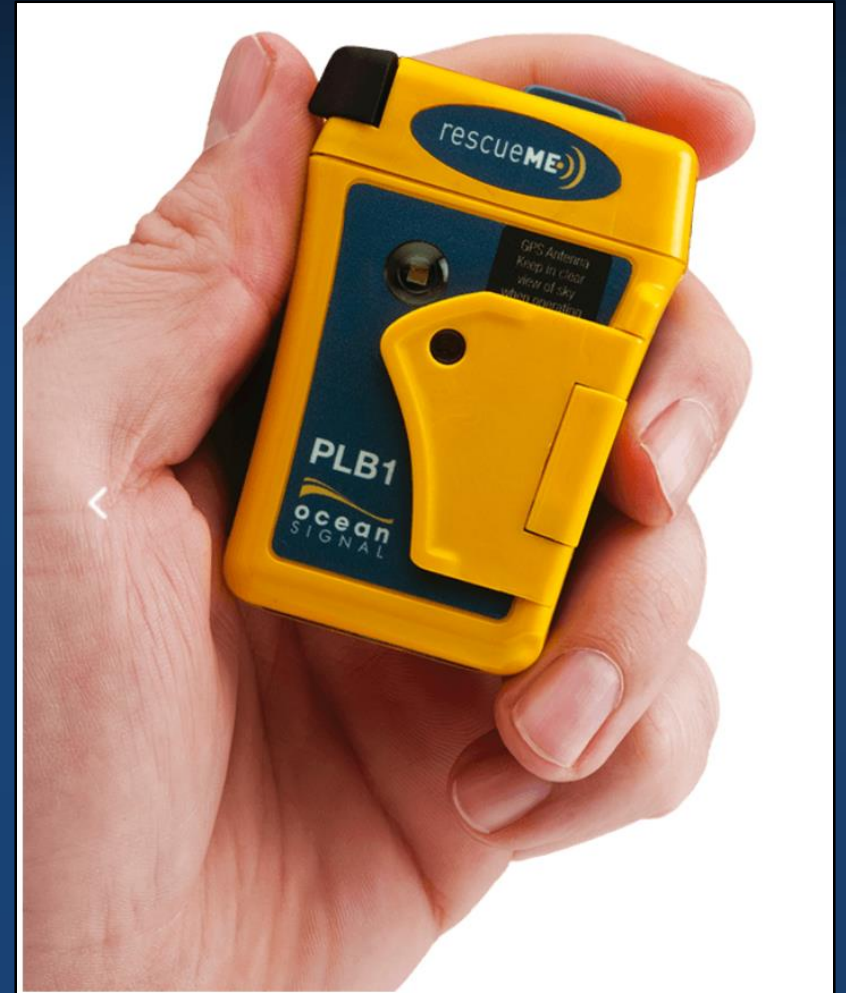
# Emergency Position Indicating Radio-Beacon (EPIRB)

- *El Faro's* EPIRB
  - Detected at 0736
  - Location not determined
- GPS-enabled EPIRB – sends an accurate position with the first transmission
- *Lady Mary* accident in 2009
  - 6 of 7 crew perished
  - Delayed sending SAR assets

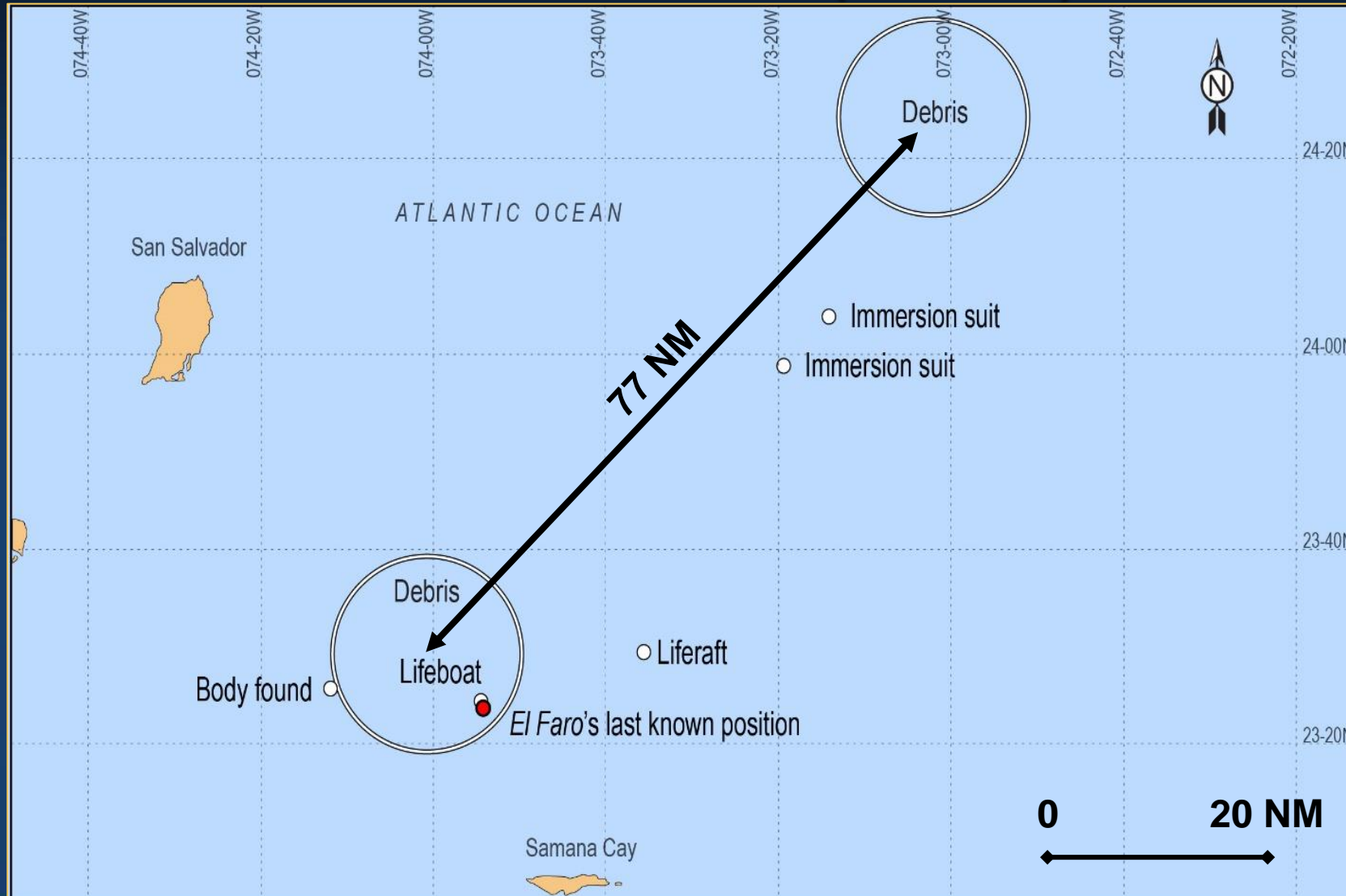


# Personal Locator Beacons (PLBs)

- Portable
  - Small manual EPIRB
- GPS input capable
- *Trinity II* accident in 2011
  - Crew evacuated
  - 3 days to rescue
  - Drifted 150 miles
  - 4 of 10 crew lost



# Personal Locator Beacons (PLBs)



# Survival Craft – Open Lifeboats

- 1980s: recognized as inadequate
- Does not protect crew from elements
- Not allowed on new vessels since 1986
- Allowed to remain if maintained





# Open Lifeboats



# Enclosed Lifeboats



Side-launched



Stern-launched Freefall



# Inflatable Liferafts



Stowed Liferafts



Inflated Liferaft

# Inflatable Liferrafts

- Survivors swim to liferaft through
  - Floating containers
  - Mountainous seas
  - Sea-foam from winds
- Then board liferaft

# Review of Regulatory Standards

- Major modification/conversion
  - Opportunities to update
- No modifications – no review
- Advances in lifesaving benefits crew

# Review of Regulatory Standards

- Average vessel lifespan is 20 to 30 years
  - El Faro was 40 years old
  - Open lifeboats superseded by enclosed 30 years ago
- To review and upgrade – 5 years or an important regulatory or class event
- Maximum 20 years to upgrade to new standards

# Summary – Survival Factors

- Findings
- Recommendations



