# SAFESEAS Overview

July, 2006

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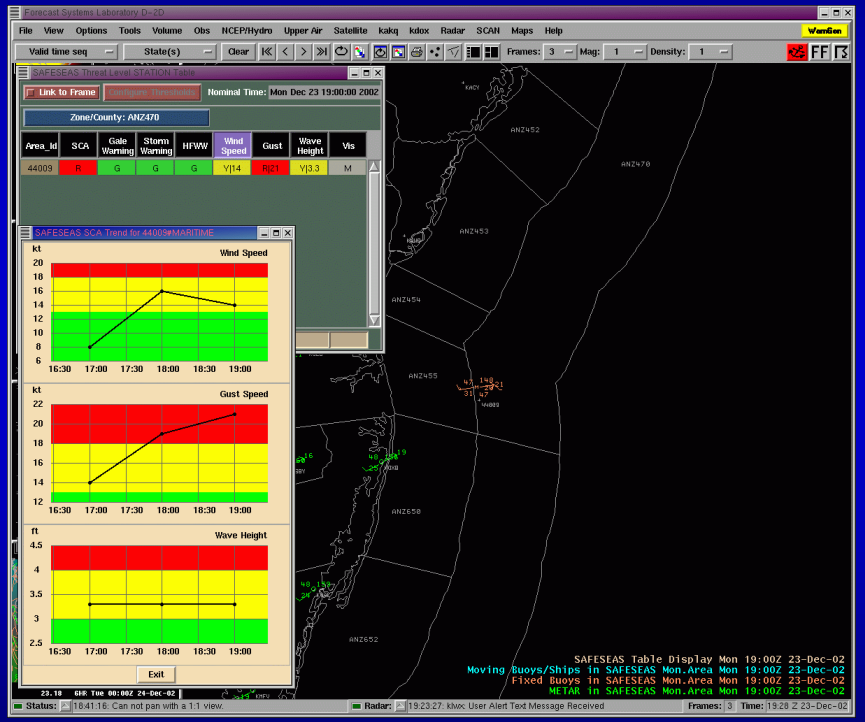
# SAFESEAS Overview

- What is SAFESEAS?
- Background Monitoring
- Table and D-2D Display Features
- Localization
- Customizing SAFESEAS
- The Future of SAFESEAS

# SAFESEAS Overview

## *What is SAFESEAS?*

SAFESEAS is a set of applications in the National Weather Service's Advanced Weather Interactive Processing System (AWIPS). SAFESEAS continuously monitors marine and adjacent overland conditions for specific marine weather hazards. It automatically alerts NWS forecasters whenever such conditions are detected, and provides interactive graphic user interfaces with which the forecaster can easily investigate the data.



# SAFESEAS Overview

## *What is SAFESEAS?*

**Marine warnings and advisories**

Observations

AWIPS

Database

SAFESEAS

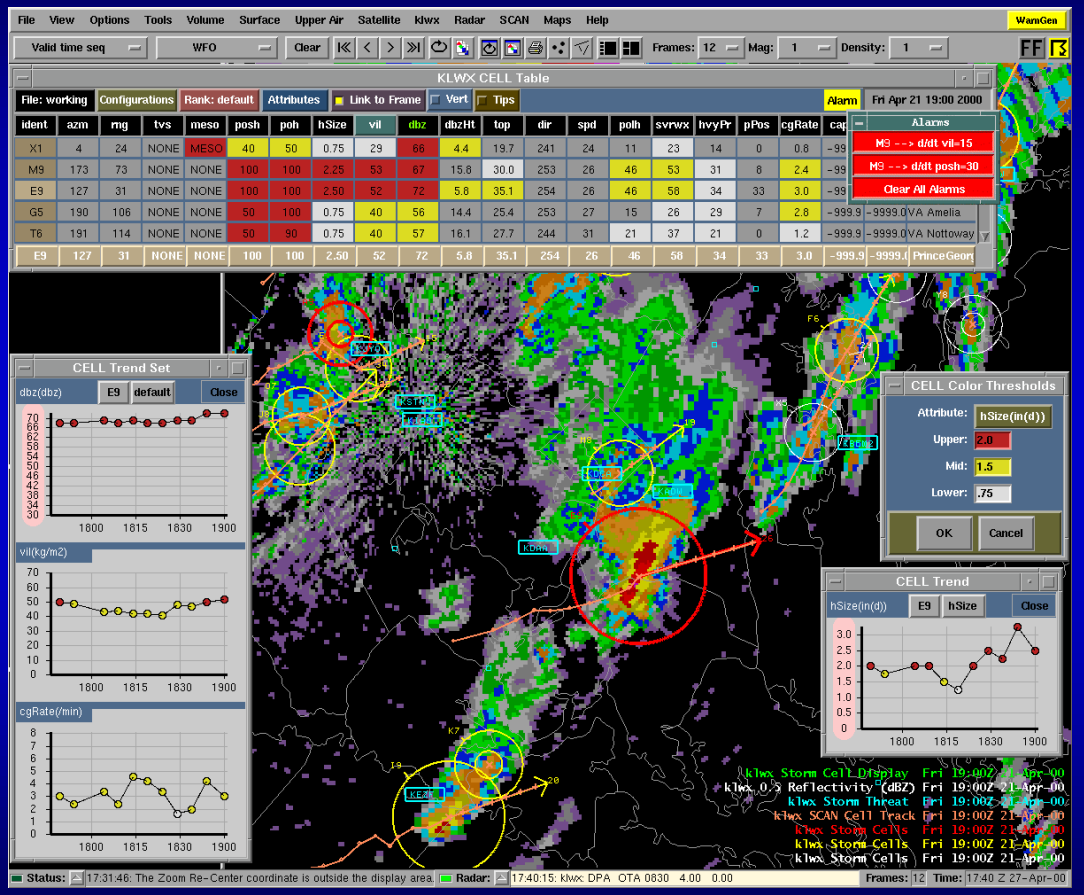
D-2D

Forecaster

# SAFESEAS Overview

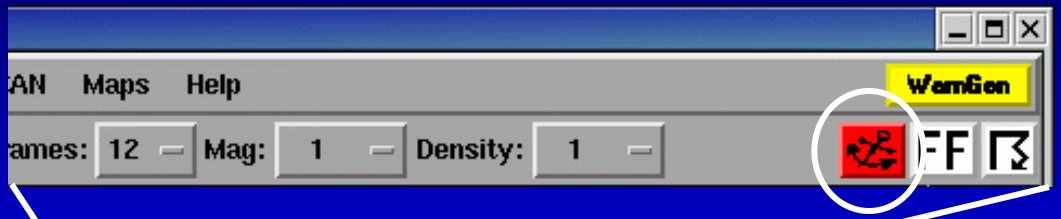
## *What is SAFESEAS?*

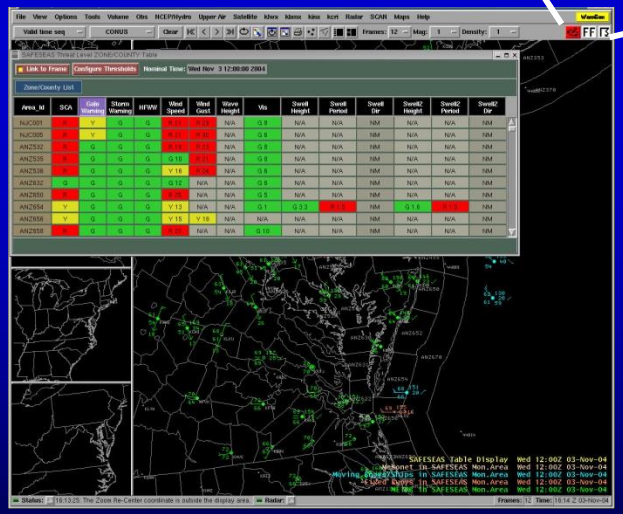
SAFESEAS uses the same approach as SCAN – a persistent background monitor coupled with an interactive D-2D display



# SAFESEAS Overview

## *Background Monitoring*

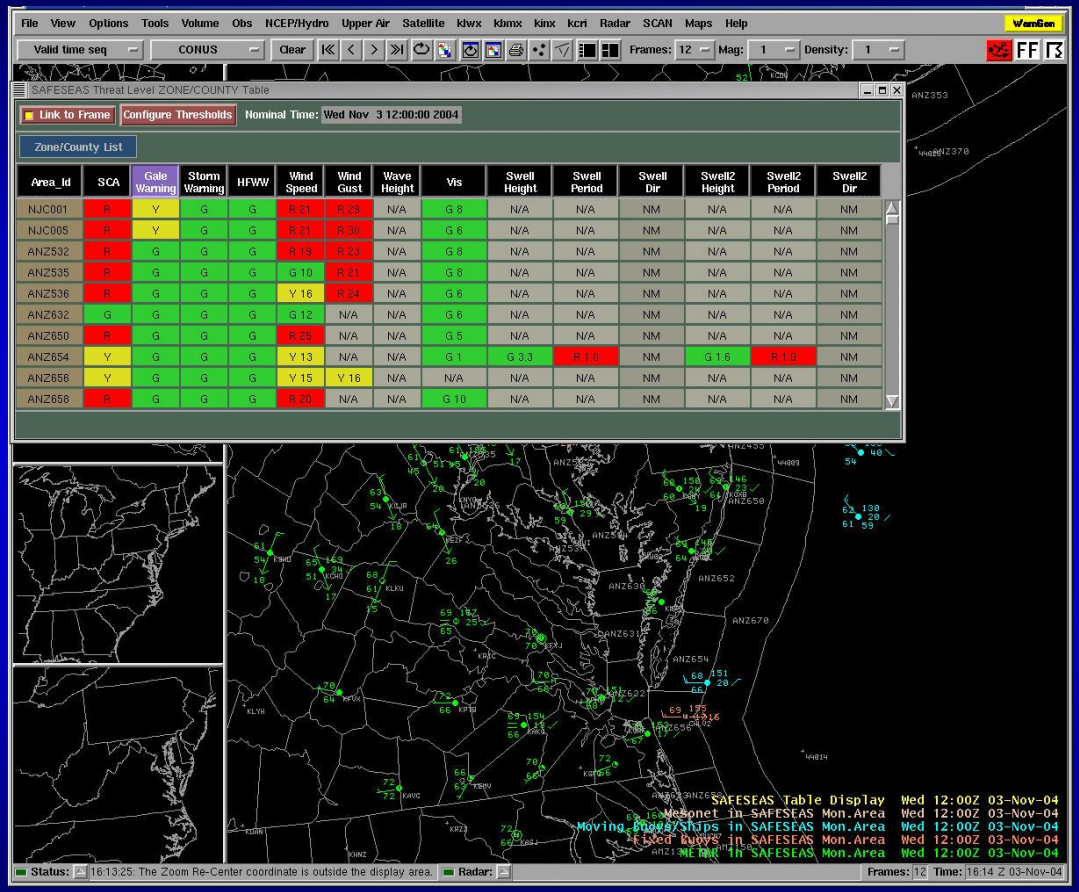


The SAFESEAS Alert button provides configurable, worst-case monitoring, even if SAFESEAS displays are not in use. This is an example of the SCAN monitoring concept.

# SAFESEAS Overview

## *Table and D-2D Display Features*




Interactive Table and D-2D display.

# SAFESEAS Overview

## *Table and D-2D Display Features*

SAFESEAS Threat Level ZONE/COUNTY Table

Link to Frame | Configure Thresholds | Nominal Time: Wed Nov 3 12:00:00 2004

Zone/County List

| Area_Id | SCA | Gale Warning | Storm Warning | HFWW | Wind Speed | Wind Gust | Wave Height | Vis | Swell Height | Swell Period | Swell Dir | Swell2 Height | Swell2 Period | Swell2 Dir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NJC001 | R | Y | G | G | R 21 | R 29 | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM |
| NJC005 | R | Y | G | G | R 21 | R 30 | N/A | G 6 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ532 | R | G | G | G | R 19 | R 23 | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ535 | R | G | G | G | G 10 | R 21 | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ536 | R | G | G | G | Y 16 | R 24 | N/A | G 6 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ632 | G | G | G | G | G 12 | N/A | N/A | G 6 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ650 | R | G | G | G | R 25 | N/A | N/A | G 5 | N/A | N/A | NM | N/A | N/A | NM |
| ANZ654 | Y | G | G | G | Y 13 | N/A | N/A | G 1 | G 3.3 | R 1.0 | NM | G 1.6 | R 1.0 | NM |
| ANZ656 | Y | G | G | G | Y 15 | Y 16 | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM |
| ANZ658 | R | G | G | G | R 20 | N/A | N/A | G 10 | N/A | N/A | NM | N/A | N/A | NM |

The SAFESEAS Table initially displays the worst-case conditions in each county or zone. Each column can be sorted by value. Selecting a county/zone name will provide information for that area. Letters in the cells aid color-blind forecasters.

# SAFESEAS Overview

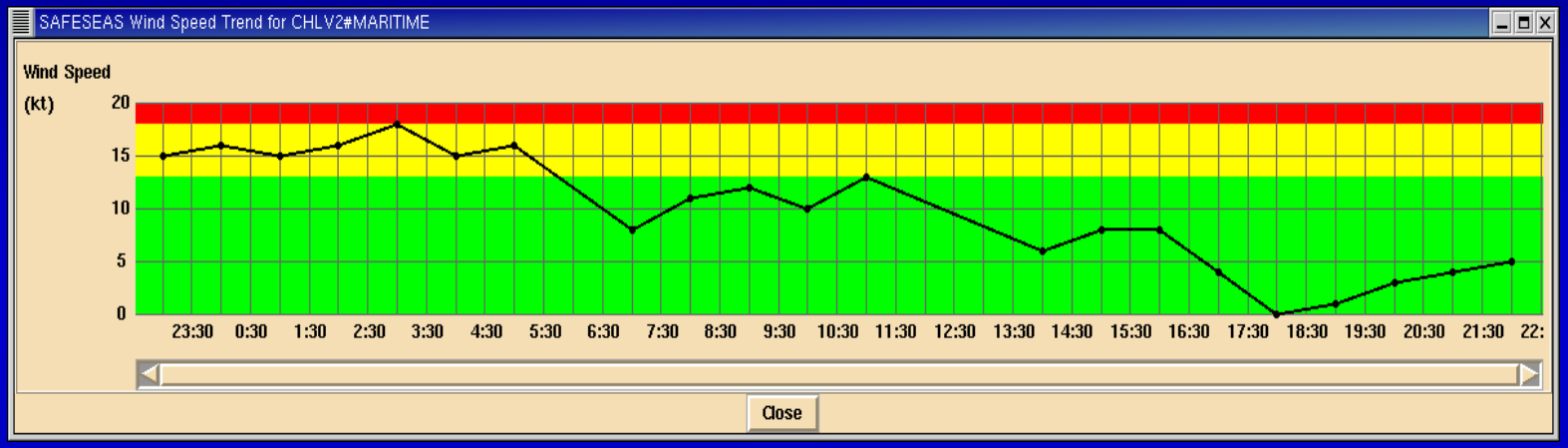
## *Table and D-2D Display Features*

| Area_Id | SCA | Gale Warning | Storm Warning | HFWW | Wind Speed | Wind Gust | Wave Height | Vis | Swell Height | Swell Period | Swell Dir | Swell2 Height | Swell2 Period | Swell2 Dir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPLM2 | R | G | G | G | R 19 | R 23 | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM |
| KNAK | Y | G | G | G | Y 15 | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM |

The selected area's observation data points will be displayed. The D-2D map will zoom into the area.

# SAFESEAS Overview

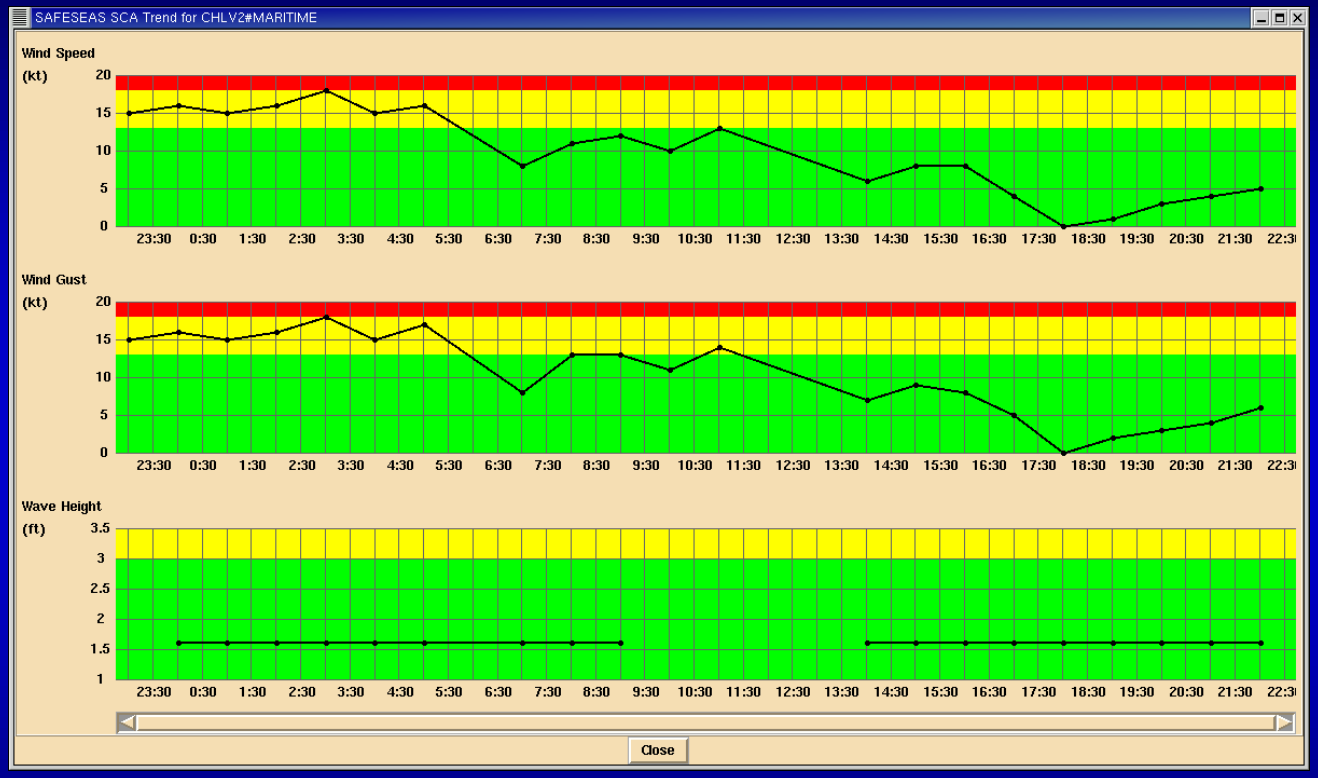
## *Table and D-2D Display Features*




24-Hour trend graphs are available for most parameters.
Color levels correspond to those in the table.

# SAFESEAS Overview

## *Table and D-2D Display Features*

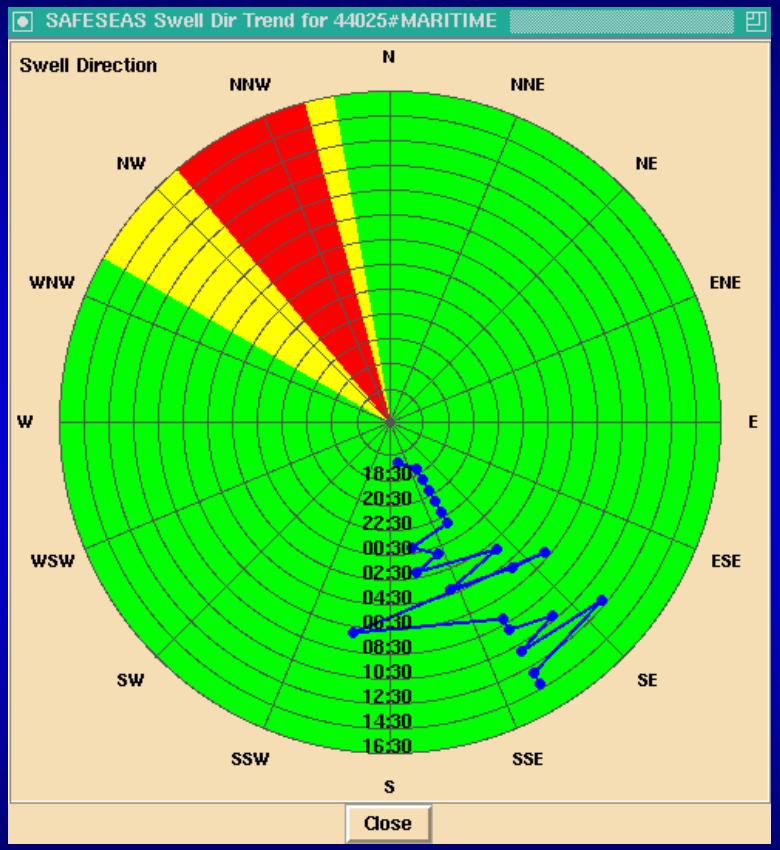



Parameters dependent on multiple values can be represented by a series of trend graphs.

# SAFESEAS Overview

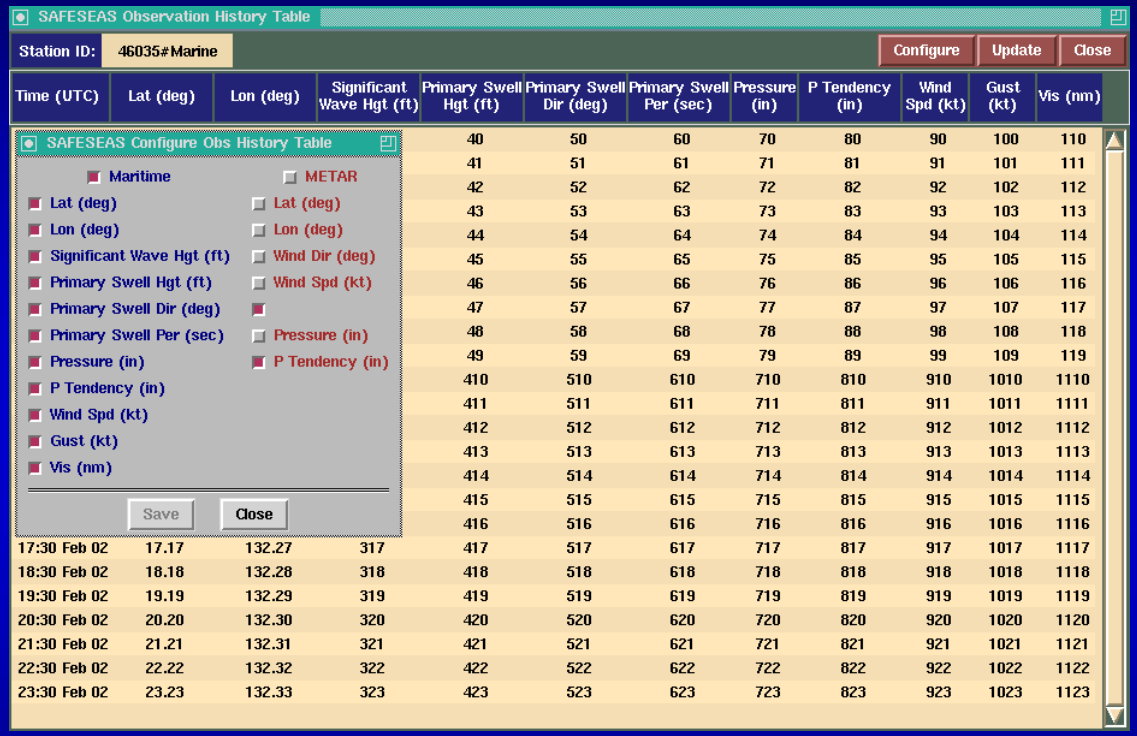
## *Table and D-2D Display Features*

Directional parameter trends are represented by hodographs.



# SAFESEAS Overview

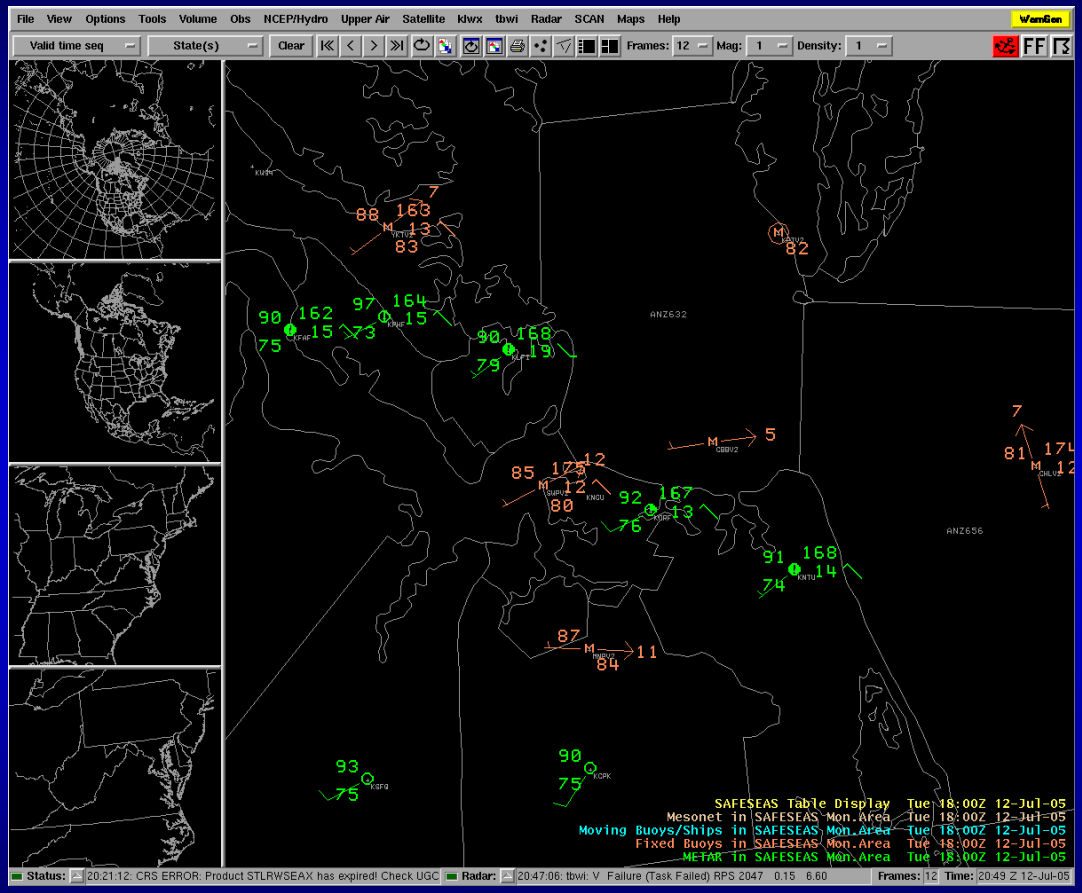
## *Table and D-2D Display Features*




Observation History Table gives trends in tabular form.

# SAFESEAS Overview

## *Table and D-2D Display Features*

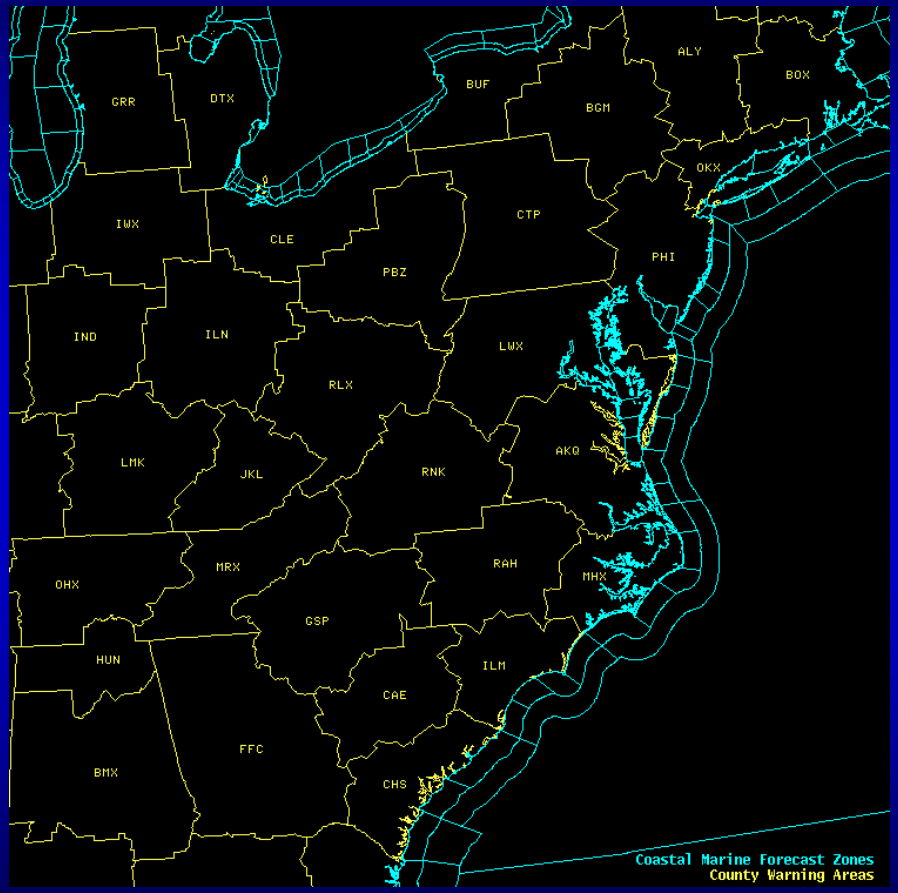



SAFESEAS multiload provides a conventional observation display, differentiated in color by station type.

# SAFESEAS Overview

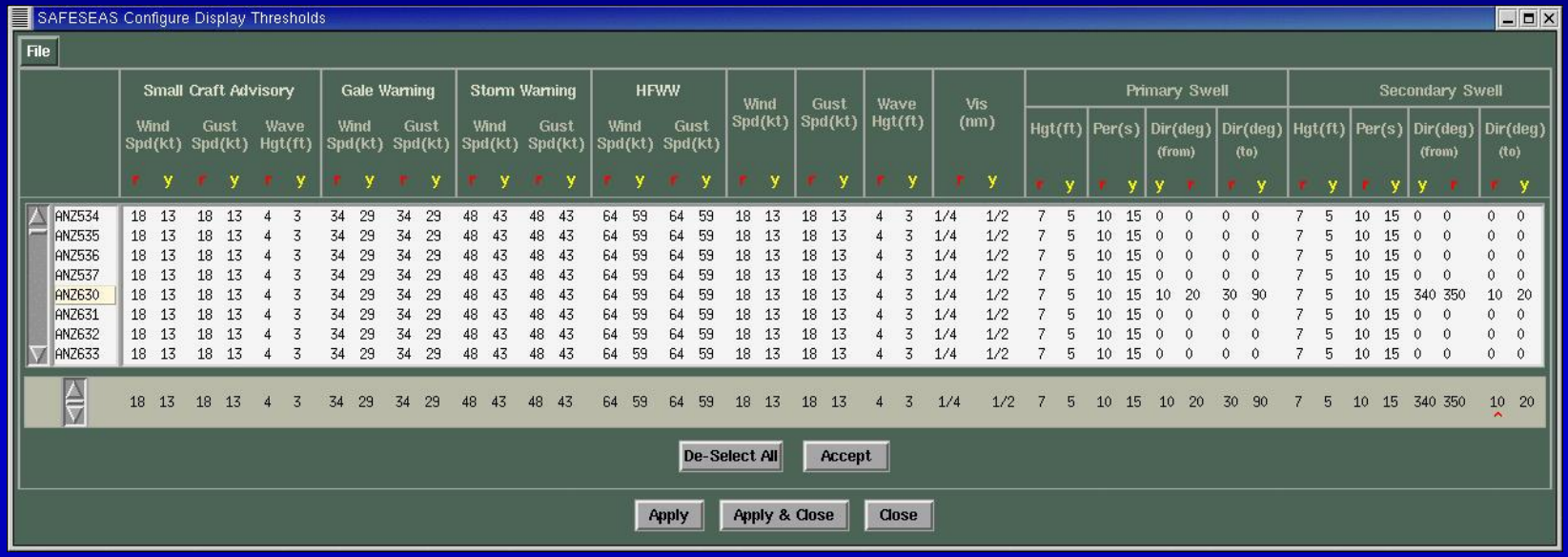
## *Localization -- Scope*

SAFESEAS localization will be centered around each forecast offices County Warning Area. The localization will set up monitoring for the home county warning area, the neighboring County Warning Areas from maritime forecast offices, and the marine zones covered by those forecast offices.



# SAFESEAS Overview

## *Customizing SAFESEAS -- Display Thresholds*



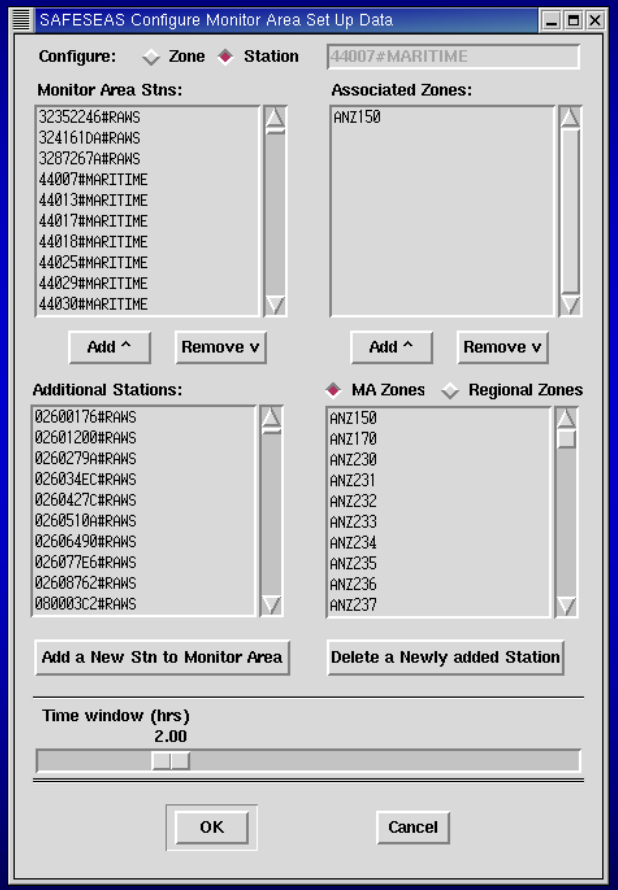

Display Threshold Configuration Tool allows users to customize the levels at which the table parameters change color.

# SAFESEAS Overview

## *Customizing SAFESEAS – Monitoring Area*

SAFESEAS provides a tool for customizing its monitoring area. The forecast office can:

- Add and delete zones and counties.
- Add and delete fixed stations.
- Associate fixed observation stations with zones and counties.



# SAFESEAS Overview

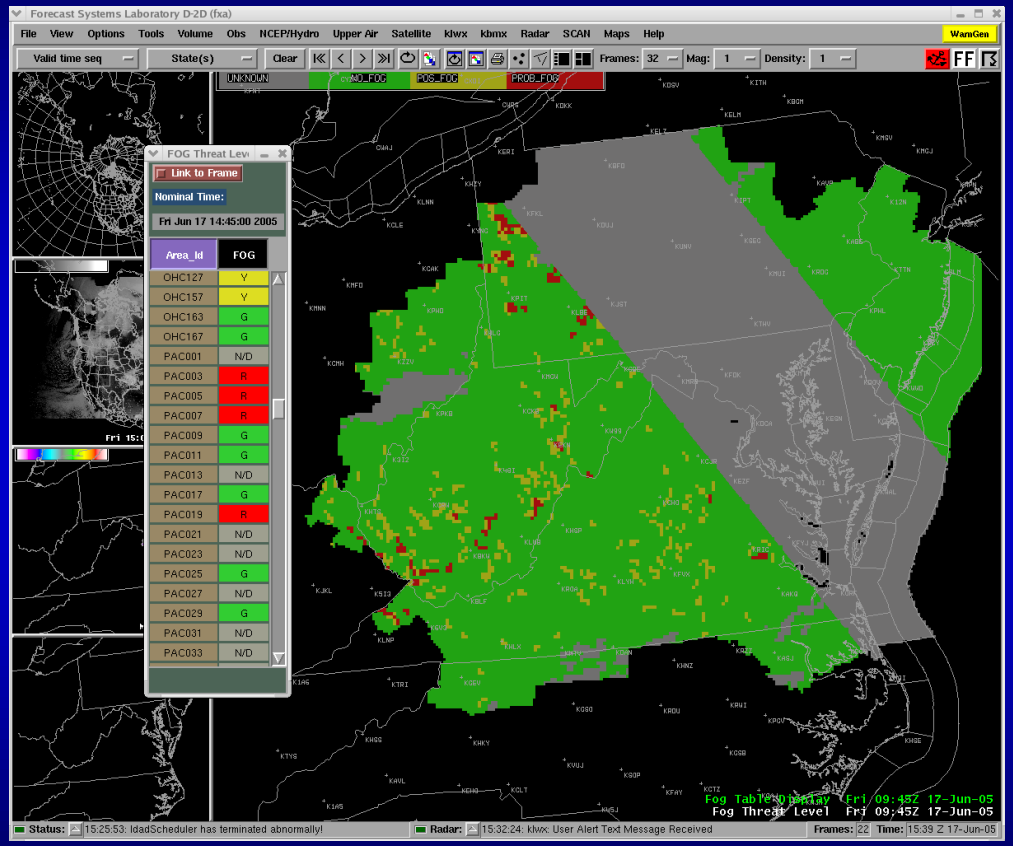
## *Customizing SAFESEAS -- Thresholds*

SAFESEAS provides a tool for customizing the monitor thresholds. Thresholds are zone-specific, and so may be customized for each zone individually.

# SAFESEAS Overview

## *Fog Monitor*

The Fog Monitor uses various algorithms to highlight suspected areas of fog from satellite data. This will be especially helpful in marine zones, where observations are scarce. The first version is being tested for deployment. Point observations will be added in later.



# SAFESEAS Overview

## *The Future of SAFESEAS – Fog Monitor*

The Fog Monitor algorithms will be highly configurable, to allow users to find the best solution for their environment.

# SAFESEAS Overview

## *Fog Monitor Mandatory Thresholds*

- **Fog Product [T (10.7μm) – T (3.9μm)]**

  Nighttime threshold setting allows user to adjust the Fog Product's temperature difference range.

- **VIS (Normalized Count)**

  Daytime range of normalized brightness values.

- **Maximum Cloud Temperature (C)**

  Determines the 10.7μm threshold temperature value which the Fog Monitor uses to decide if it is detecting clouds instead of fog.

# SAFESEAS Overview

## *Fog Monitor Optional Thresholds(1)*

- **Daytime Ice/Snow vs. Fog Threshold (C)**

  Takes advantage of strong fog scattering properties at 3.9μm. Helps distinguish bright snowpack from fog.

- **Cool Fog vs. Warm Surface Threshold (C)**

  Sets a 10.7 micron brightness temperature (best in thick fog layers, where the measured layer top is colder than the ground).

- **Daytime Smoothness Threshold (%)**

  Finds areas of uniform brightness (helps distinguish fog from mid-level clouds).

# SAFESEAS Overview

## *Fog Monitor Optional Thresholds(2)*

- **Adjacency Threshold**

  Filtering the suspected fog areas by size. Sets minimum size standards to discount spurious bright pixels.

- **Twilight Angle (deg)**

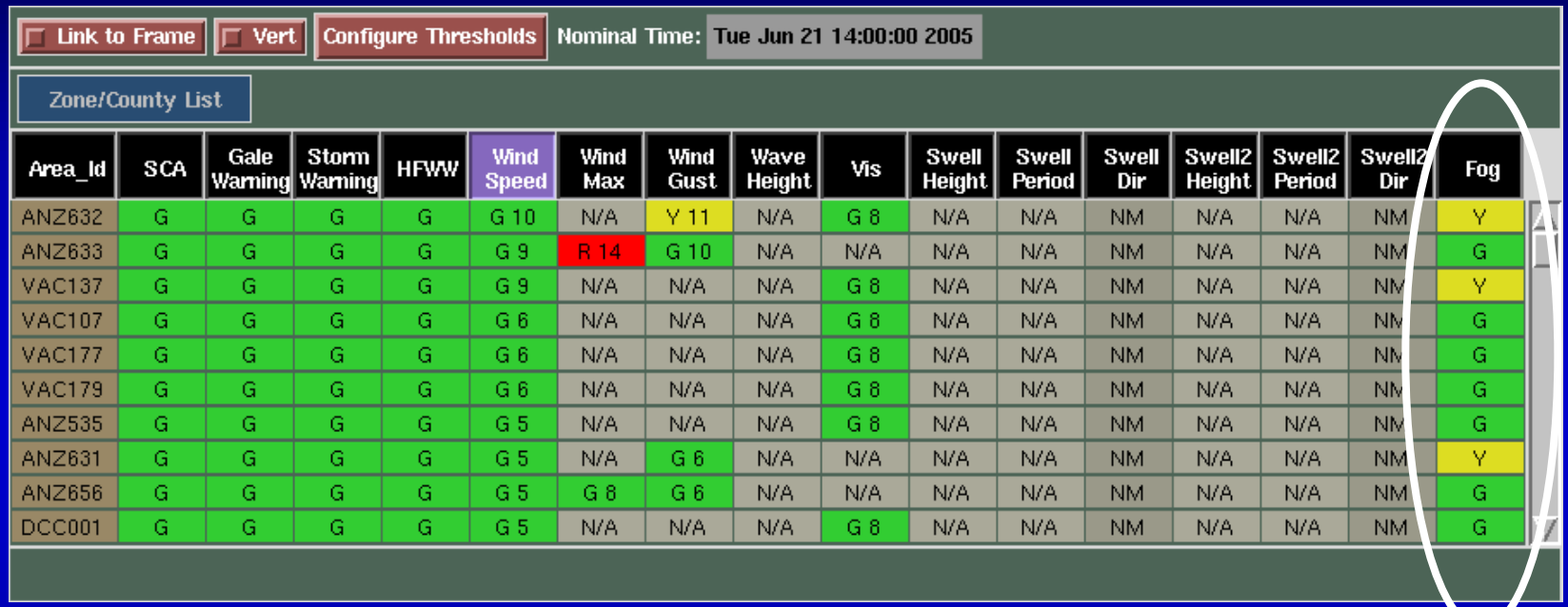
  Sets the sun angle for "dawn/dusk" area.

- **Fractal Dimension Threshold**

  This is a measure of the "jaggedness" of the edges of the detected area. Useful in identifying linear fog bank boundaries compared to jagged cloud edges (but may also filter dendritic valley/river fog.)

# SAFESEAS Overview

## *Fog Monitor in SAFESEAS*



Link to Frame | Vert | Configure Thresholds | Nominal Time: Tue Jun 21 14:00:00 2005

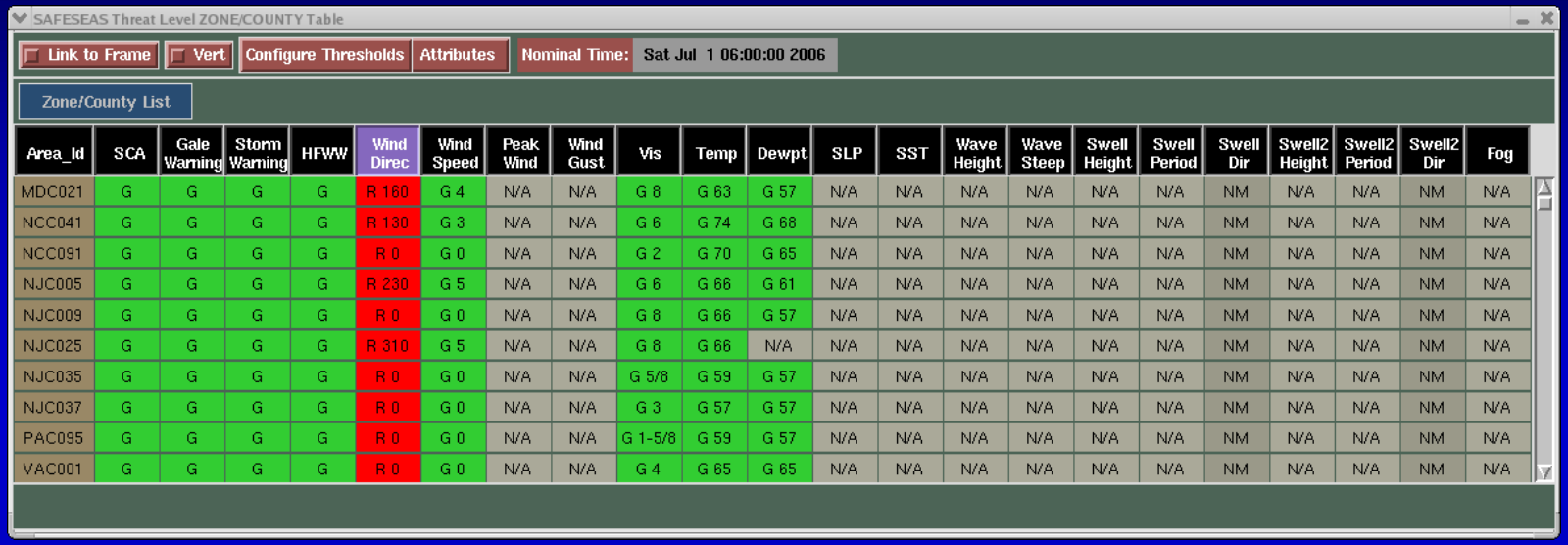
Zone/County List

| Area_Id | SCA | Gale Warning | Storm Warning | HFWW | Wind Speed | Wind Max | Wind Gust | Wave Height | Vis | Swell Height | Swell Period | Swell Dir | Swell2 Height | Swell2 Period | Swell2 Dir | Fog |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANZ632 | G | G | G | G | G 10 | N/A | Y 11 | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | Y |
| ANZ633 | G | G | G | G | G 9 | R 14 | G 10 | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | G |
| VAC137 | G | G | G | G | G 9 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | Y |
| VAC107 | G | G | G | G | G 6 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | G |
| VAC177 | G | G | G | G | G 6 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | G |
| VAC179 | G | G | G | G | G 6 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | G |
| ANZ535 | G | G | G | G | G 5 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | G |
| ANZ631 | G | G | G | G | G 5 | N/A | G 6 | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | Y |
| ANZ656 | G | G | G | G | G 5 | G 8 | G 6 | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | G |
| DCC001 | G | G | G | G | G 5 | N/A | N/A | N/A | G 8 | N/A | N/A | NM | N/A | N/A | NM | G |

Because of Fog Monitor's potential impact on marine fog awareness, its output will be available in the SAFESEAS table.

# SAFESEAS Overview

## *Upcoming Enhancements(1)*


SAFESEAS Threat Level ZONE/COUNTY Table

Link to Frame | Vert | Configure Thresholds | Attributes | Nominal Time: Sat Jul 1 06:00:00 2006

Zone/County List

| Area_Id | SCA | Gale Warning | Storm Warning | HFWW | Wind Direc | Wind Speed | Peak Wind | Wind Gust | Vis | Temp | Dewpt | SLP | SST | Wave Height | Wave Steep | Swell Height | Swell Period | Swell Dir | Swell2 Height | Swell2 Period | Swell2 Dir | Fog |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDC021 | G | G | G | G | R 160 | G 4 | N/A | N/A | G 8 | G 63 | G 57 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NCC041 | G | G | G | G | R 130 | G 3 | N/A | N/A | G 6 | G 74 | G 68 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NCC091 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 2 | G 70 | G 65 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC005 | G | G | G | G | R 230 | G 5 | N/A | N/A | G 6 | G 66 | G 61 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC009 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 8 | G 66 | G 57 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC025 | G | G | G | G | R 310 | G 5 | N/A | N/A | G 8 | G 66 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC035 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 5/8 | G 59 | G 57 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC037 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 3 | G 57 | G 57 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC095 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 1-5/8 | G 59 | G 57 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| VAC001 | G | G | G | G | R 0 | G 0 | N/A | N/A | G 4 | G 65 | G 65 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |

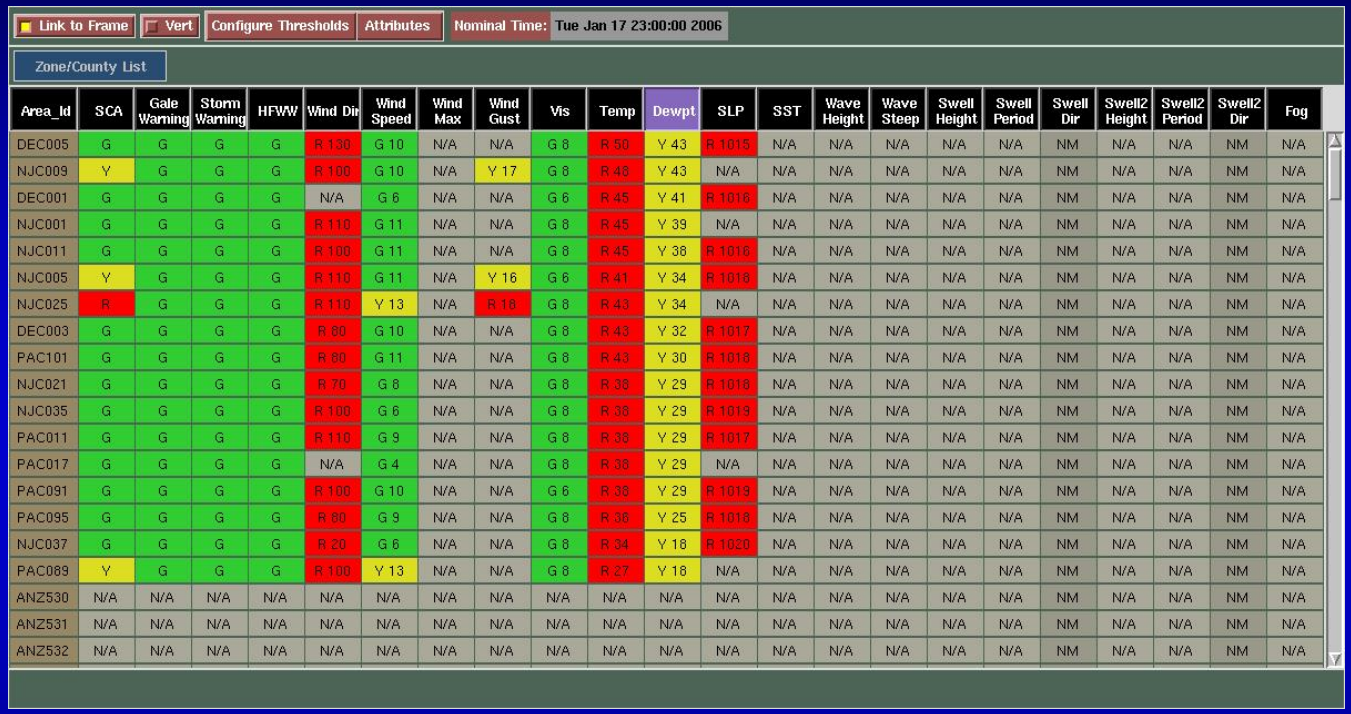
## New parameters:

Wind Direction, Temperature, Dewpoint, Sea Level Pressure,
Sea Surface Temperature, Wave Steepness.

Wind Max renamed to “Peak Wind”

# SAFESEAS Overview

## *Upcoming Enhancements(2)*




| Area_Id | SCA | Gale Warning | Storm Warning | HFWW | Wind Dir | Wind Speed | Wind Max | Wind Gust | Vis | Temp | Dewpt | SLP | SST | Wave Height | Wave Steep | Swell Height | Swell Period | Swell Dir | Swell2 Height | Swell2 Period | Swell2 Dir | Fog |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEC005 | G | G | G | G | R 130 | G 10 | N/A | N/A | G 8 | R 50 | Y 43 | R 1015 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC009 | Y | G | G | G | R 100 | G 10 | N/A | Y 17 | G 8 | R 48 | Y 43 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| DEC001 | G | G | G | G | N/A | G 6 | N/A | N/A | G 6 | R 45 | Y 41 | R 1016 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC001 | G | G | G | G | R 110 | G 11 | N/A | N/A | G 8 | R 45 | Y 39 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC011 | G | G | G | G | R 100 | G 11 | N/A | N/A | G 8 | R 45 | Y 38 | R 1016 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC005 | Y | G | G | G | R 110 | G 11 | N/A | Y 16 | G 6 | R 41 | Y 34 | R 1018 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC025 | R | G | G | G | R 110 | Y 13 | N/A | R 18 | G 8 | R 43 | Y 34 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| DEC003 | G | G | G | G | R 80 | G 10 | N/A | N/A | G 8 | R 43 | Y 32 | R 1017 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC101 | G | G | G | G | R 80 | G 11 | N/A | N/A | G 8 | R 43 | Y 30 | R 1018 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC021 | G | G | G | G | R 70 | G 8 | N/A | N/A | G 8 | R 38 | Y 29 | R 1018 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC035 | G | G | G | G | R 100 | G 6 | N/A | N/A | G 8 | R 38 | Y 29 | R 1019 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC011 | G | G | G | G | R 110 | G 9 | N/A | N/A | G 8 | R 38 | Y 29 | R 1017 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC017 | G | G | G | G | N/A | G 4 | N/A | N/A | G 8 | R 38 | Y 29 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC091 | G | G | G | G | R 100 | G 10 | N/A | N/A | G 6 | R 38 | Y 29 | R 1019 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC095 | G | G | G | G | R 80 | G 9 | N/A | N/A | G 8 | R 36 | Y 25 | R 1018 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| NJC037 | G | G | G | G | R 20 | G 6 | N/A | N/A | G 8 | R 34 | Y 18 | R 1020 | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| PAC089 | Y | G | G | G | R 100 | Y 13 | N/A | N/A | G 8 | R 27 | Y 18 | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| ANZ530 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| ANZ531 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |
| ANZ532 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | NM | N/A | N/A | NM | N/A |

## Resizable Table

Instead of having a fixed number of visible zones/counties, the OB7 SAFESEAS table will allow the user to resize it by “dragging”.

# SAFESEAS Overview

## *Upcoming Enhancements(3)*

## Attributes Menu

Users will be able choose which attributes to display in the SAFESEAS table. This functionality has been adapted from the SCAN table.

# SAFESEAS Overview

## *Upcoming Enhancements(4)*

- Additional SAFESEAS enhancements being tested:
  - Inclusion of MAROBS in SAFESEAS
  - Redesigned SAFESEAS configuration GUI
- Additional SAFESEAS/Fog Monitor enhancements approved:
  - Improved cursor sampling in table
  - Inclusion of gage depth values.
  - Inclusion of point observations in Fog Monitor (step toward becoming a general visibility monitor).
  - Implementation of statistical calculations in Fog Monitor
  - Observed vs forecast value comparisons??

# SAFESEAS Overview

## *Future Projects*

Visibility

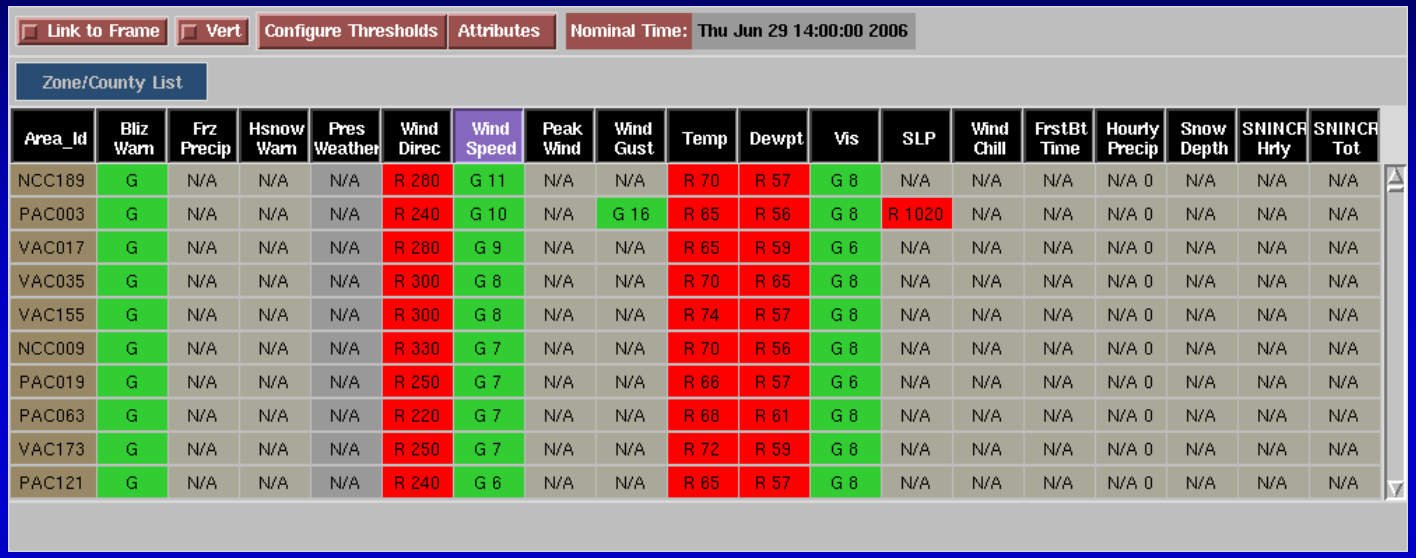
Fire Weather

Blizzards and
Ice Storms

Rip Currents

# SAFESEAS Overview

## *SNOW – SAFESEAS for Winter Weather*



Link to Frame | Vert | Configure Thresholds | Attributes | Nominal Time: Thu Jun 29 14:00:00 2006

Zone/County List

| Area_Id | Bliz Warn | Frz Precip | Hsnow Warn | Pres Weather | Wind Direc | Wind Speed | Peak Wind | Wind Gust | Temp | Dewpt | Vis | SLP | Wind Chill | FrstBt Time | Hourly Precip | Snow Depth | SNINCR Hrly | SNINCR Tot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NCC189 | G | N/A | N/A | N/A | R 280 | G 11 | N/A | N/A | R 70 | R 57 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| PAC003 | G | N/A | N/A | N/A | R 240 | G 10 | N/A | G 16 | R 65 | R 56 | G 8 | R 1020 | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| VAC017 | G | N/A | N/A | N/A | R 280 | G 9 | N/A | N/A | R 65 | R 59 | G 6 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| VAC035 | G | N/A | N/A | N/A | R 300 | G 8 | N/A | N/A | R 70 | R 65 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| VAC155 | G | N/A | N/A | N/A | R 300 | G 8 | N/A | N/A | R 74 | R 57 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| NCC009 | G | N/A | N/A | N/A | R 330 | G 7 | N/A | N/A | R 70 | R 56 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| PAC019 | G | N/A | N/A | N/A | R 250 | G 7 | N/A | N/A | R 66 | R 57 | G 6 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| PAC063 | G | N/A | N/A | N/A | R 220 | G 7 | N/A | N/A | R 68 | R 61 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| VAC173 | G | N/A | N/A | N/A | R 250 | G 7 | N/A | N/A | R 72 | R 59 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |
| PAC121 | G | N/A | N/A | N/A | R 240 | G 6 | N/A | N/A | R 65 | R 57 | G 8 | N/A | N/A | N/A | N/A 0 | N/A | N/A | N/A |

- **System for Nowcasting of Winter Weather.**
  - Using SAFESEAS approach for winter weather problems.
  - Shut down and removed from D-2D menu with a few quick steps!

# SAFESEAS Overview

## *Future Projects – Rip Current Monitor*

Rip Currents

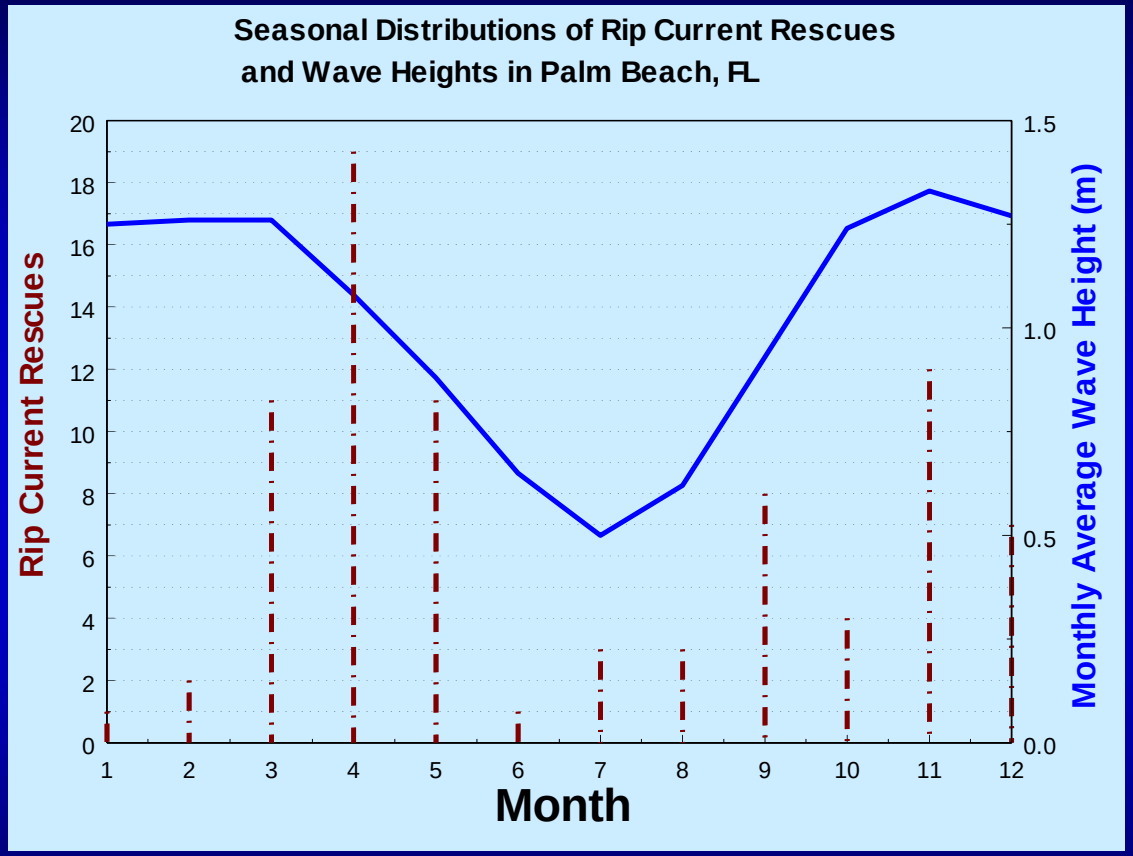
Contributing Factors :

1. On-shore wave characteristics
2. Water levels
3. Surf zone bathymetry

Source: www.ripcurrents.noaa.gov

# SAFESEAS Overview

## *Future Projects – Rip Current Monitor(2)*




Sources: Dr. C.S. Wu (NWS) & Prof. Robert Dean (University of Florida), 2003

# SAFESEAS Overview

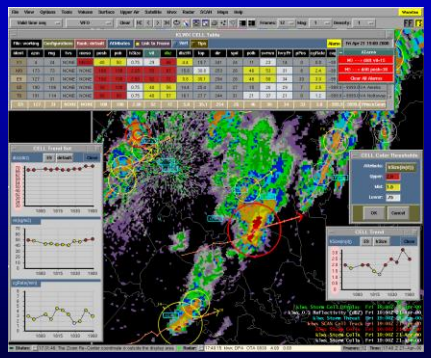
## *The future of SAFESEAS*

Visibility (enhanced Fog Monitor)

Fire Weather

"Obs Monster?"

Blizzards and Ice Storms (SNOW)



SAFESEAS

Rip Currents

# SAFESEAS Overview

July, 2006

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