



When Wicked Weather Strikes

Insights into Chesapeake Bay Weather

July 24, 2017 Annapolis, MD

Bryan A. Jackson
NWS Sterling, VA Marine Program Leader



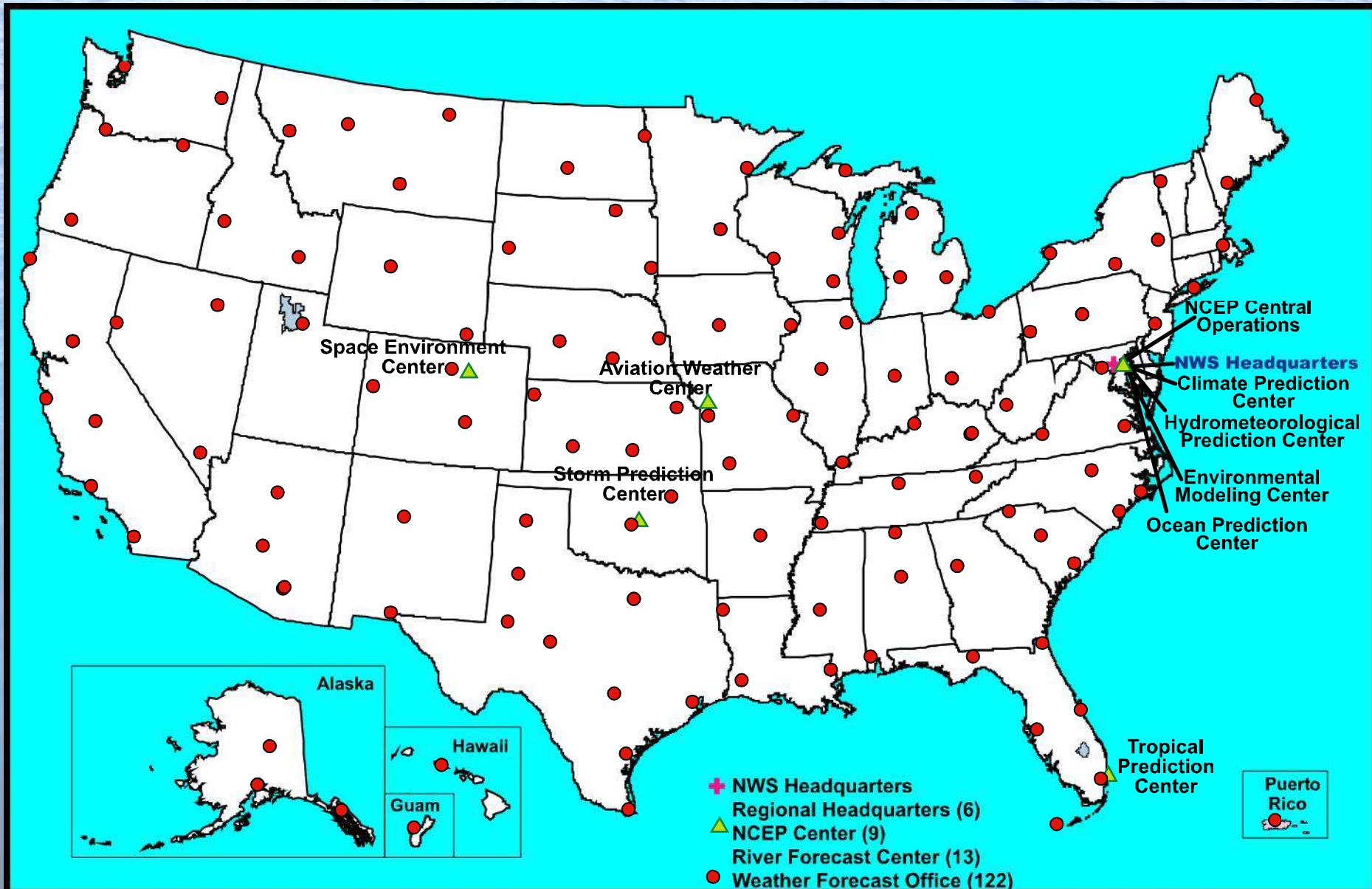
Mission of the National Weather Service



Provide climate, water,
weather forecasts and
warnings to **protect life
and property**

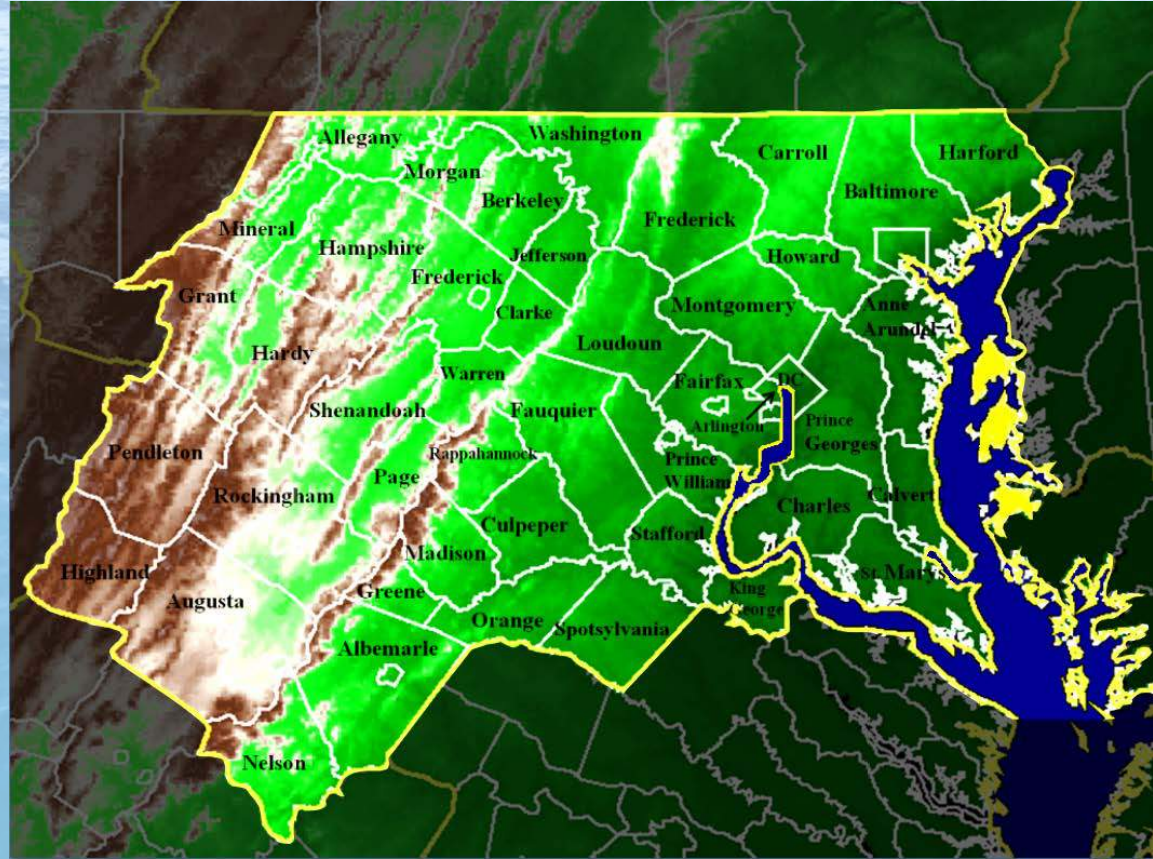


NOAA's NWS Service Delivery Facilities



Area of Responsibility

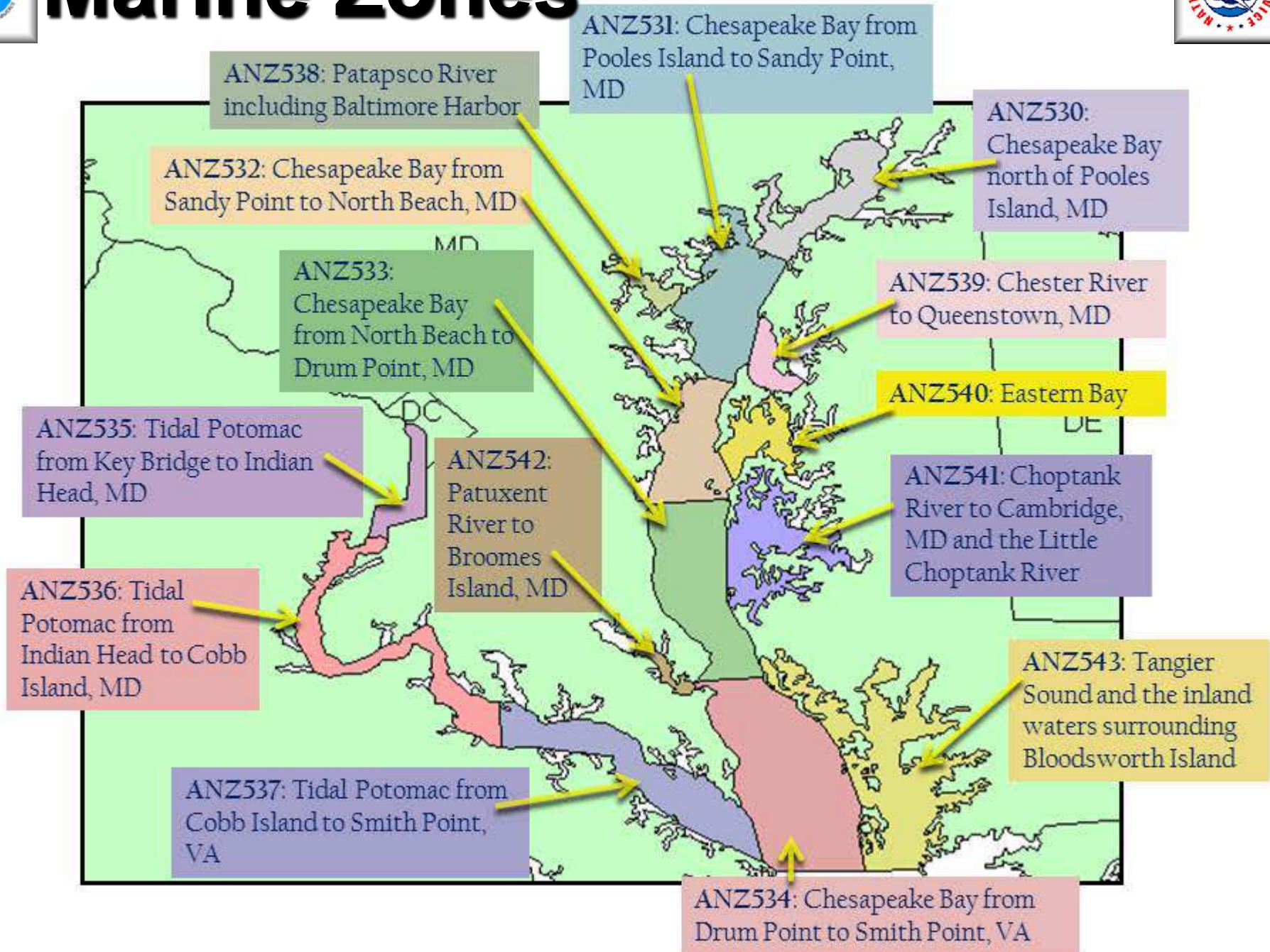
- 13 MD Counties
- 8 WV Counties
- 22 VA Counties
 - 11 Independent Cities
- District of Columbia
- The City of Baltimore



...nearly 10 million people to look out for!




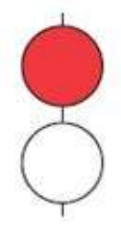

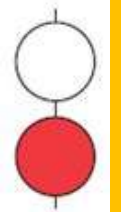
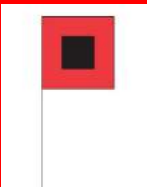
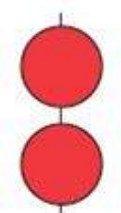
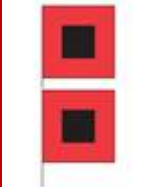
Marine Zones





Long-Fused Marine Wind Headlines



Hazard/Signal	Conditions	Night Signal
 <p>SMALL CRAFT ADVISORY</p>	<p align="center">Small Craft Advisory</p> <ul style="list-style-type: none"> Sustained winds or frequent gusts 18-33 kt 	
 <p>GALE</p>	<p align="center">Gale Warning</p> <ul style="list-style-type: none"> Sustained winds or frequent gusts 34-47 kt 	
 <p>STORM WARNING</p>	<p align="center">Storm Warning</p> <ul style="list-style-type: none"> Sustained winds or frequent gusts 48-63 kt 	
 <p>HURRICANE FORCE WARNING</p>	<p align="center">Hurricane Force Wind Warning</p> <ul style="list-style-type: none"> Sustained winds or frequent gusts ≥ 64 kt 	

Issued when expected within 36 hours

Short-Fused Marine Headlines



Special Marine Warning (< 2 hours)

- Showers/Thunderstorms with gusts \geq 34 kt
- **Waterspouts**
- **Penny Hail (or larger)**

If storms with \geq 34 kt winds will repeatedly affect waters, Gale Warning issued.

Marine Weather Statement

- Update a Special Marine Warning
- Winds or gusts of **18-33 kt** < 2 hours.
- Advance alert to warning conditions (i.e. Derecho)
- Hazards: dense fog, low water levels



Tropical and Convective Storms



Convective Watches (SPC)

Tornado Watch

(tornadoes are considered water spouts for marine areas)

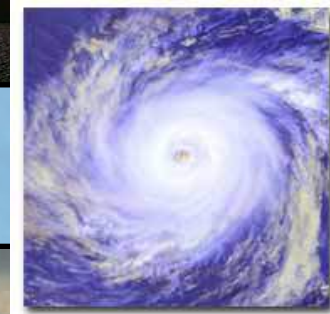
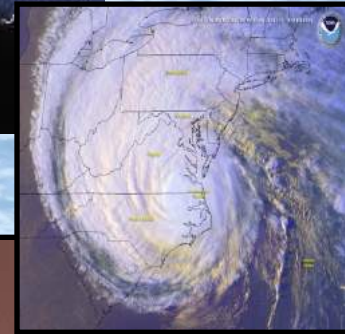
Severe Thunderstorm Watch

(note the expected wind speed in SMW; it could be ≥ 50 kt)

Tropical Watches/Warnings (NHC)

Tropical Storm (sustained winds 34 to 63 kt / 39 to 73 mph)

Hurricane (sustained winds ≥ 64 kt / ≥ 74 mph)





Coastal Waters Forecast



- Issued every 3 hours - amended as necessary
- 5 day forecast, two periods per day (6am, 6pm)



- Synopsis, Long-Fused Headlines
- Wind – from 8 compass points (knots)
- Waves – wave heights (feet)
- Weather – thunderstorms, rain, snow and fog

Sailors Summary



- **Coastal Waters Forecast:** 5 Day forecast with marine wind headlines and anticipated in the synopsis. Gusts only through Day 3.
- **Hazardous Weather Outlook:** Gale force and wind headlines and potential within 5 days as well as SMW potential Day 1



Danger!



Sudden onset of gale force winds is a leading weather-related killer in the region.

Our Goal

Have all mariners on the Chesapeake:

- **Be informed before you go out on the water**
- **Have access to weather updates while on the water**



NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

- HOME
- FORECAST
- PAST WEATHER
- SAFETY
- INFORMATION
- EDUCATION
- NEWS
- SEARCH
- ABOUT

Local forecast by "City, St" or ZIP code

Go

[Location Help](#)

News Headlines

- [SKYWARN class schedule & registration - classes late March through all of April!](#)
- [Improved Point Forecast Webpages Coming April 4th \(date change\)](#)
- [Latest Drought Information: Severe Drought Now in DC Metro](#)

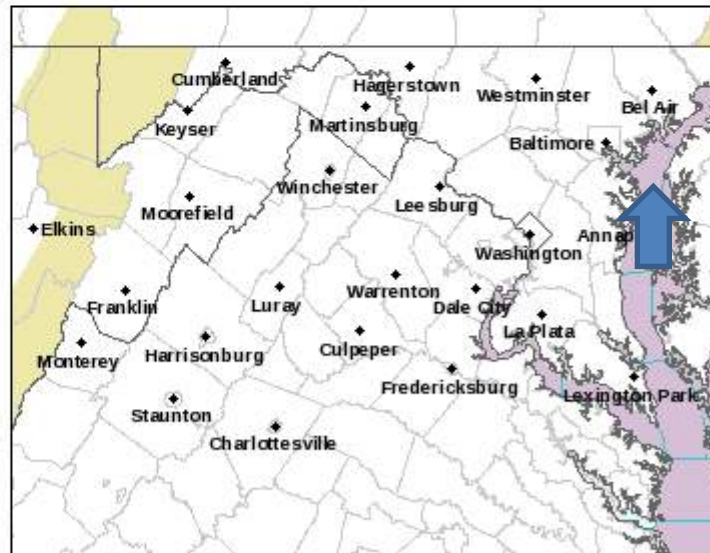
NWS Forecast Office Baltimore/Washington

[Weather.gov](#) > Sterling, VA

Sterling, VA
Weather Forecast Office

- [Current Hazards](#)
- [Current Conditions](#)
- [Radar](#)
- [Forecasts](#)
- [Rivers and Lakes](#)
- [Climate and Past Weather](#)
- [Local Programs](#)

Click a location below for detailed forecast.



[Watches, Warnings & Advisories](#)



[Small Craft Advisory](#)

[Marine Weather Statement](#)

[Hazardous Weather Outlook](#)

Last Map Update: Thu, Mar. 16, 2017 at 11:12:19 am EDT

Customize Your Weather.gov

City, ST

Enter Your City, ST or ZIP Code

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Hazardous Weather Conditions

- [Small Craft Advisory until March 17, 06:00 AM EDT](#)
- [Marine Weather Statement](#)

Marine Synopsis

Last Update: 1031 AM EDT THU MAR 16 2017

[View Nearby Observations](#)

10NM NE Annapolis MD

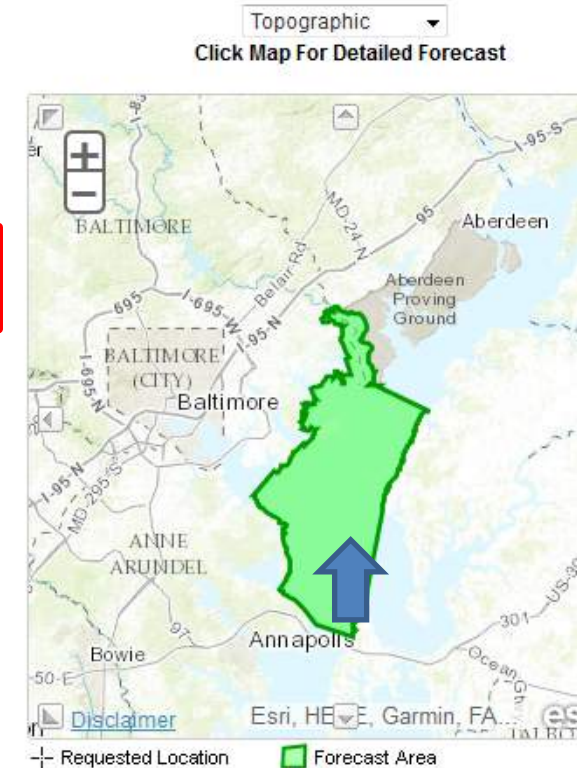
Marine Zone Forecast

FORECASTS OF WAVE HEIGHTS DO NOT INCLUDE EFFECTS OF WIND DIRECTION RELATIVE TO TIDAL CURRENTS. EXPECT HIGHER WAVES WHEN WINDS ARE BLOWING AGAINST THE TIDAL FLOW.

SMALL CRAFT ADVISORY IN EFFECT THROUGH LATE TONIGHT...

Synopsis: HIGH PRESSURE WILL BUILD TOWARD THE AREA THROUGH TONIGHT. LOW PRESSURE AND AN ASSOCIATED COLD FRONT WILL PASS THROUGH THE AREA FRIDAY INTO SATURDAY, FOLLOWED BY HIGH PRESSURE SUNDAY. THE NEXT SYSTEM WILL APPROACH ON MONDAY. SMALL CRAFT ADVISORIES MAY BE NEEDED FRIDAY NIGHT THROUGH MONDAY.

Rest Of Today	W winds 20 kt with gusts to 30 kt. Waves 3 ft.
Tonight	NW winds 15 to 20 kt...diminishing to 10 kt late. Gusts up to 25 kt. Waves 2 to 3 ft.
Fri	SW winds 5 to 10 kt. Waves 1 ft.
Fri Night	S winds 5 to 10 kt. Waves 1 ft. Rain likely.
Sat	W winds 10 to 15 kt with gusts to 20 kt. Waves 1 to 2 ft.
Sat Night	NW winds 10 to 15 kt with gusts to 20 kt. Waves 2 ft. A chance of rain or snow showers.
Sun	NW winds 10 to 15 kt. Waves 2 to 3 ft... Subsidng to 1 ft after midnight. A chance of snow showers in the morning.
Mon	SW winds 5 to 10 kt. Waves 1 ft. A chance of showers through the night.





[Associated Zone Forecast which includes this point](#)

Last Update: 11:12 am EDT Mar 16, 2017
Forecast Valid: 12pm EDT Mar 16, 2017-6pm EDT Mar 22, 2017

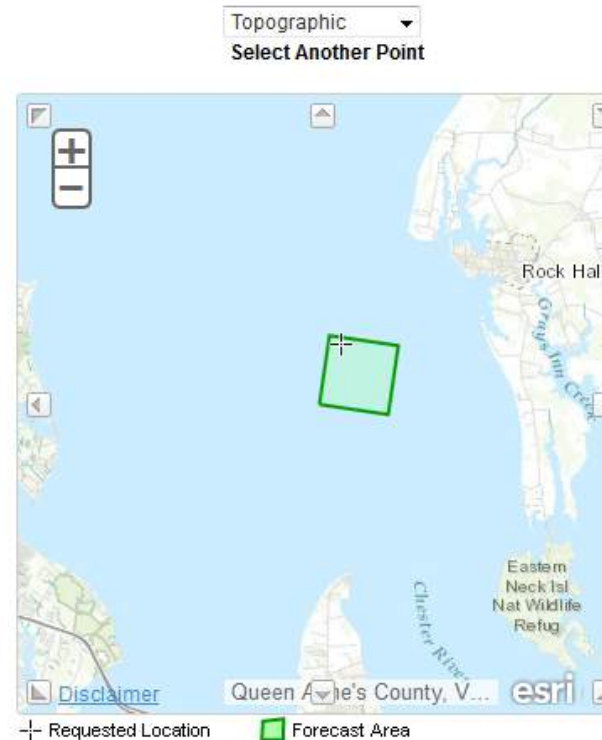
[View Nearby Observations](#)

Detailed Forecast

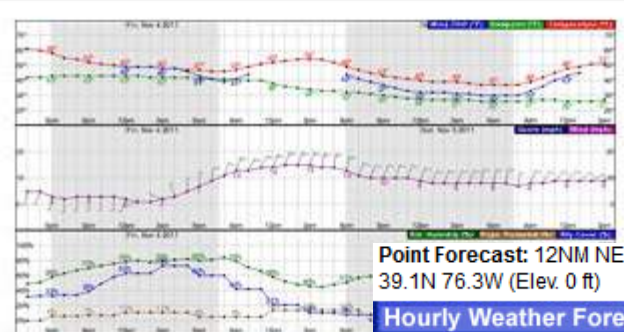
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This Afternoon	WNW wind around 20 kt, with gusts as high as 29 kt. Mostly sunny. Seas around 3 ft.
Tonight	WNW wind 11 to 16 kt, with gusts as high as 24 kt. Mostly clear. Seas 2 to 3 ft.
Friday	WNW wind around 8 kt becoming WSW in the afternoon. Increasing clouds. Seas around 1 ft.
Friday Night	S wind 7 to 9 kt. Rain likely, mainly before 1am. Seas around 1 ft.
Saturday	SSW wind 6 to 10 kt becoming WNW in the afternoon. A slight chance of showers. Seas around 1 ft.
Saturday Night	NW wind 10 to 12 kt. A chance of rain showers before 2am, then a chance of snow showers. Seas around 2 ft.
Sunday	NNW wind 12 to 15 kt, with gusts as high as 24 kt. A chance of snow showers before 8am. Seas 2 to 3 ft.
Sunday Night	NNW wind 10 to 12 kt. Mostly clear. Seas 1 to 2 ft.
Monday	NW wind around 8 kt becoming W in the afternoon. Mostly sunny. Seas around 1 ft.



HOURLY WEATHER GRAPH



Point Forecast: 12NM NE Annapolis MD
39.1N 76.3W (Elev. 0 ft)

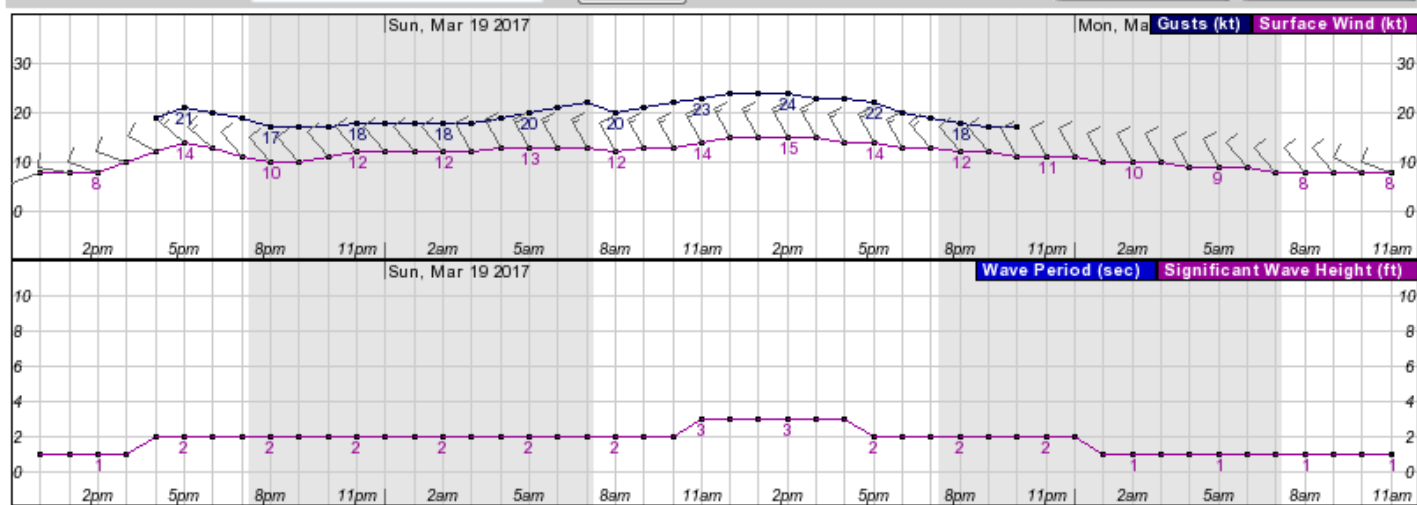
Last Update: 11:12 am EDT

Hourly Weather Forecast Graph

[\[dashes/dots\]](#) | [\[b/w\]](#) | [\[hide menu\]](#)

Weather Elements	Weather/Precipitation	Marine Weather
<input type="checkbox"/> Temperature (°F) <input type="checkbox"/> Dewpoint (°F) <input type="checkbox"/> Wind Chill (°F)	<input type="checkbox"/> Rain <input type="checkbox"/> Thunder <input type="checkbox"/> Snow <input type="checkbox"/> Freezing Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Freezing Spray <input type="checkbox"/> Fog	<input checked="" type="checkbox"/> Wave Period (s) <input checked="" type="checkbox"/> Significant Wave Height <input type="checkbox"/> Freezing Spray
<input checked="" type="checkbox"/> Surface Wind kt ▾ <input type="checkbox"/> Sky Cover (%) <input type="checkbox"/> Precipitation Potential (%) <input type="checkbox"/> Relative Humidity (%)		

48-Hour Period Starting: 12pm Sat, Mar 18 2017 ▾

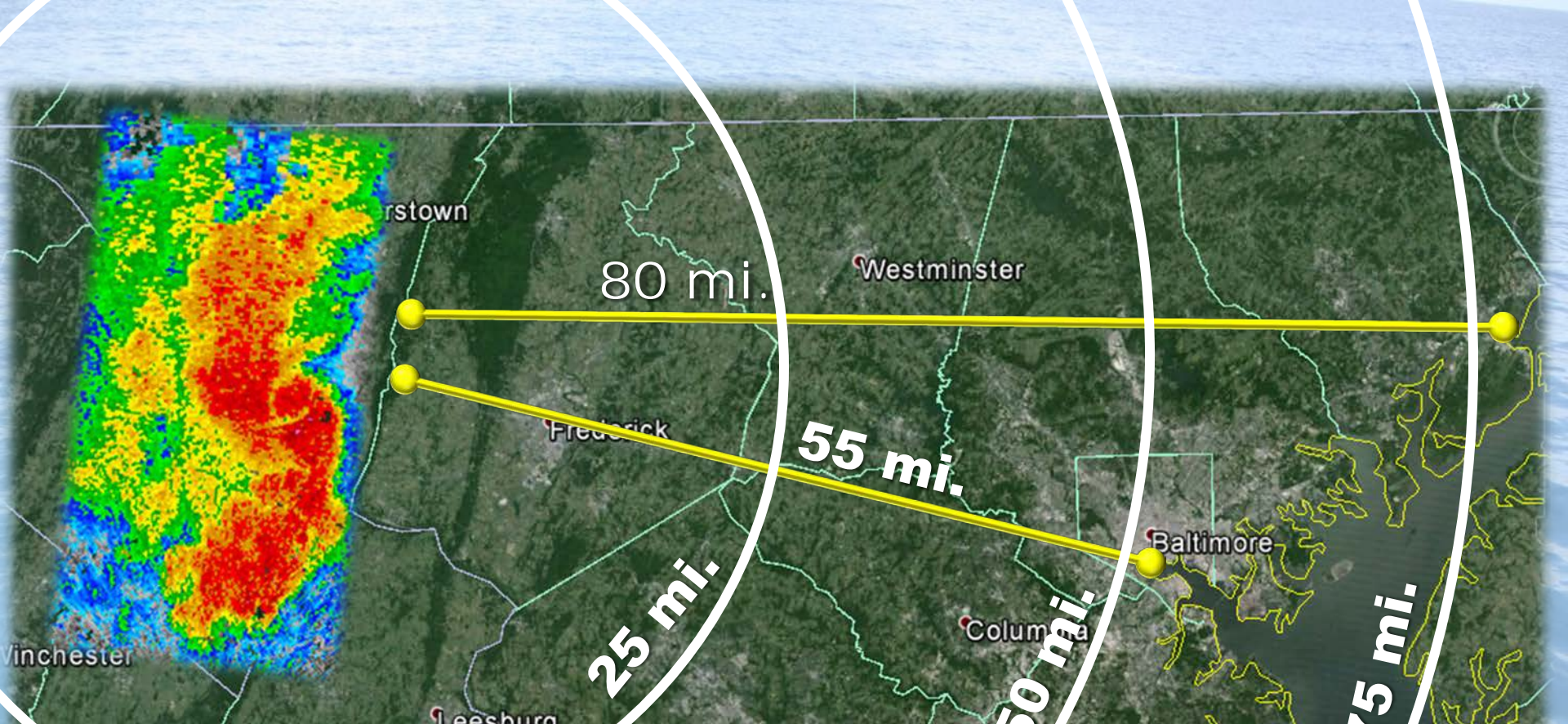


Monday, March 20 at 11am

Surface Wind: WNW 8kt
Significant Wave Height: 1ft Wave Period: N/A Wave Direction: N/A

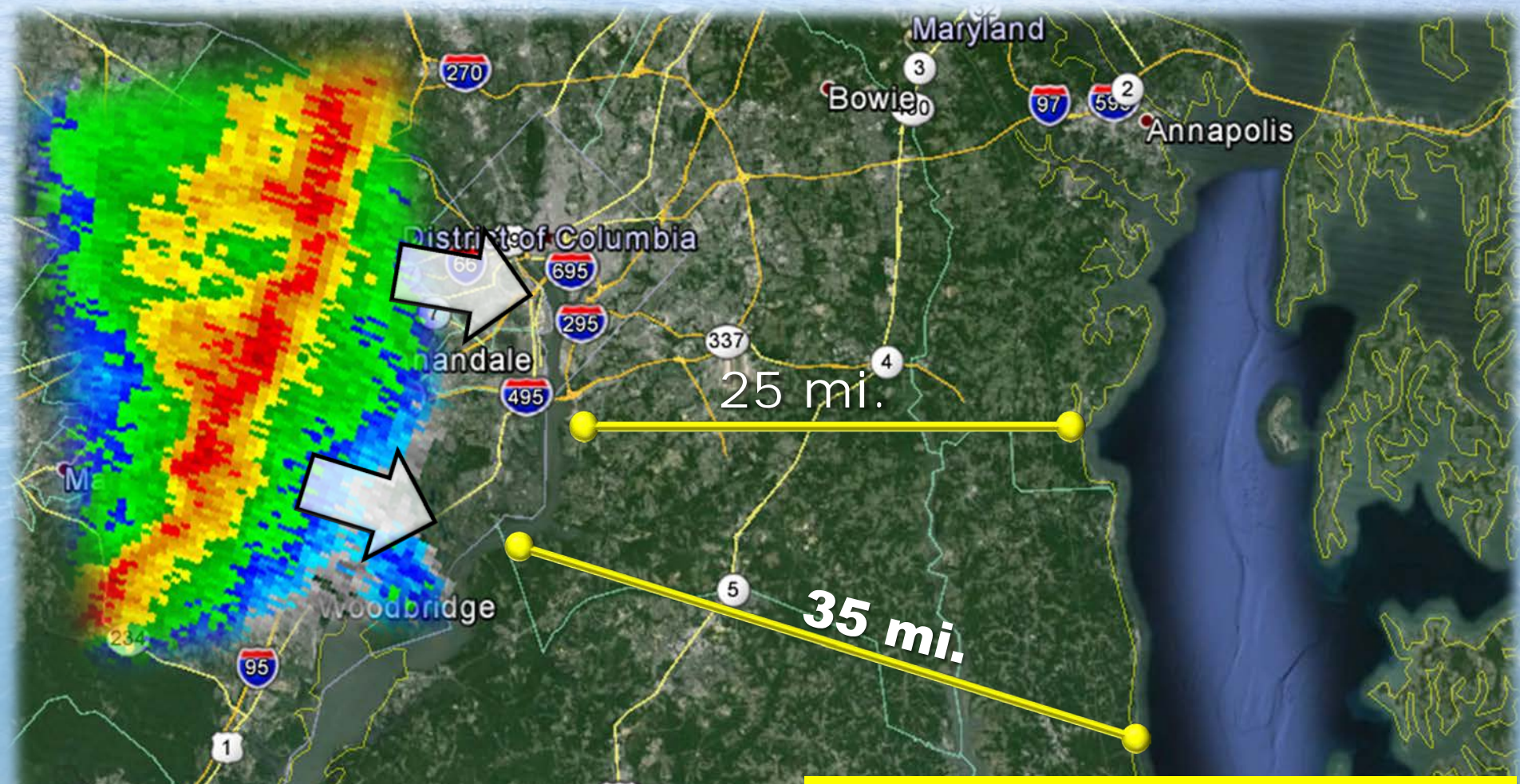


Special Marine Warnings



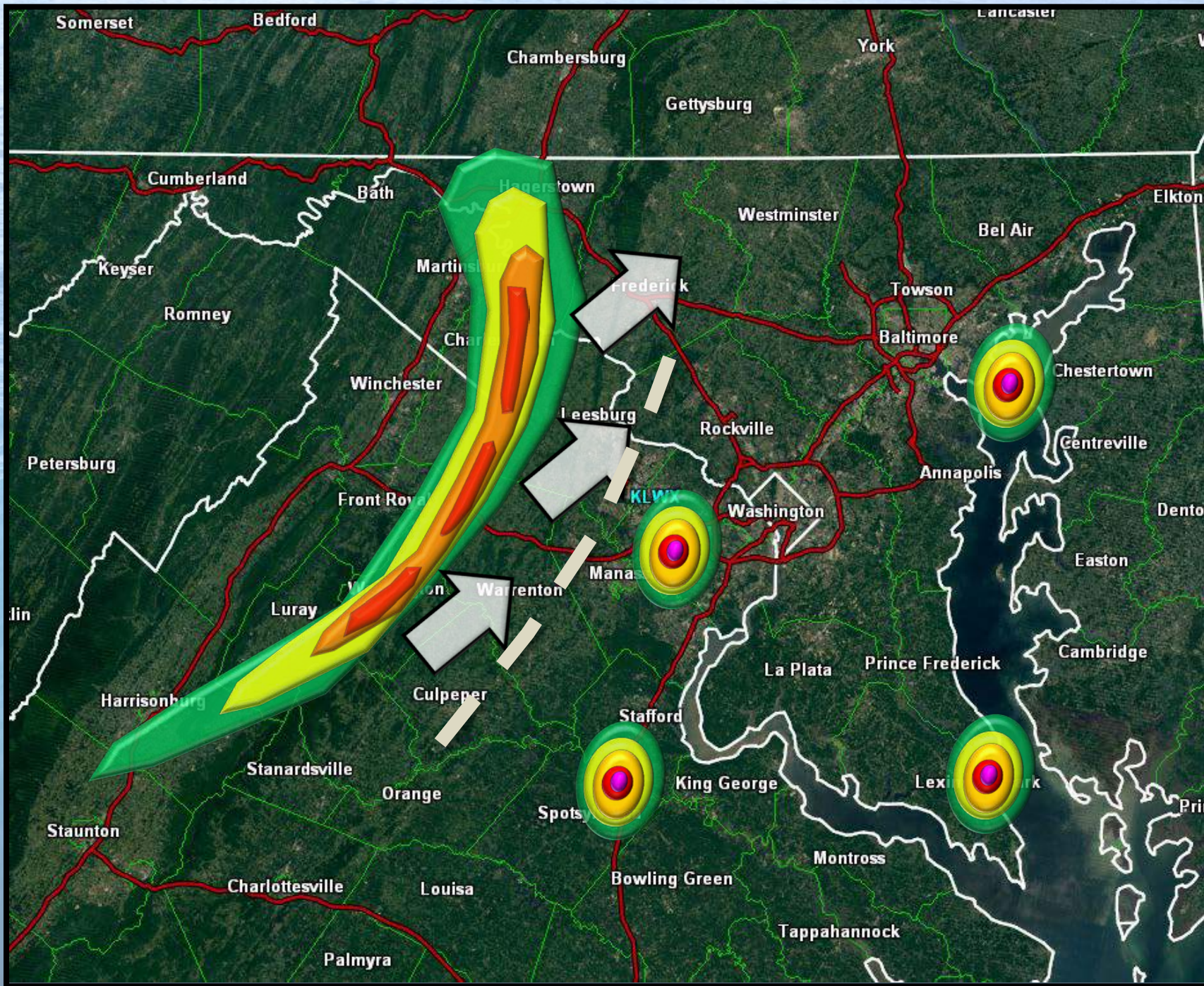
Distance (mi)	Speed (kt)	Time (min)
80	35	120
80	45	93
80	55	76
55	35	82
55	45	64
55	55	52

A squall line entering Frederick Co will reach Annapolis in about a little over an hour!



Distance (mi)	Speed (kt)	Time (min)
25	35	37
25	45	29
35	35	52
35	45	41

Decide on a new warning for the Bay before the squall reaches the Upper Tidal Potomac!



Special Marine Warning

Issuance Time

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SPECIAL MARINE WARNING
NATIONAL WEATHER SERVICE BALTIMORE MD/WASHINGTON DC
314 PM EDT FRI AUG 12 2016

Zones

THE NATIONAL WEATHER SERVICE IN STERLING VIRGINIA HAS ISSUED A
* SPECIAL MARINE WARNING FOR...
CHESAPEAKE BAY FROM POOLES ISLAND TO SANDY POINT MD...
CHESAPEAKE BAY NORTH OF POOLES ISLAND MD...
PATAPSCO RIVER INCLUDING BALTIMORE HARBOR...

Valid Time

* UNTIL 400 PM EDT

Location & Vector

* AT 314 PM EDT...A STRONG THUNDERSTORM WAS LOCATED OVER BACK RIVER... MOVING NORTHEAST AT 5 KNOTS.

Justification and source

HAZARD...WIND GUSTS 34 KNOTS OR GREATER.
SOURCE...RADAR INDICATED.

Marine Locations in Path

* LOCATIONS IMPACTED INCLUDE...
HART MILLER ISLAND...
POOLES ISLAND...
NORTH POINT STATE PARK...
AND GUNPOWDER RIVER.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

MOVE TO SAFE HARBOR IMMEDIATELY AS GUSTY WINDS AND HIGH WAVES ARE EXPECTED.

&&

LAT...LON 3935 7628 3933 7628 3927 7620 3927 7622
3923 7624 3919 7643 3921 7645 3924 7641
3928 7641 3930 7640 3932 7635 3938 7636
3939 7633 3939 7632

TIME...MOT...LOC 1914Z 246DEG 6KT 3928 7642

Hazards Summary

HAIL...0.00IN
WIND...>34KTS

\$\$



July 24, 2017 Review

Timeline

- SMW issued: 12:04am from Patapsco mouth to northern Herring Bay. Valid until 2am.
 - 34 knots and waterspouts
- MWS update: 12:49am
 - 50 knots and waterspouts
 - Greenbury Pt gust 59 knots at 1:24am
- MWS update: 1:27am
 - 65 knots and waterspouts

Hazardous Weather Outlook

510 PM EDT Sun Jul 23 2017

This Hazardous Weather Outlook is for the Maryland portion of the Chesapeake Bay, Tidal Potomac River, and adjacent counties in central Maryland and northern Virginia as well as the District of Columbia.

.DAY ONE...Tonight

Thunderstorms over central and northern Maryland, as well as the District, will be capable of producing flash flooding late this afternoon into tonight. A flash flood watch has been issued for that potential. Consult that product for more details.

Isolated damaging wind gusts are also possible across the region and over the waters.

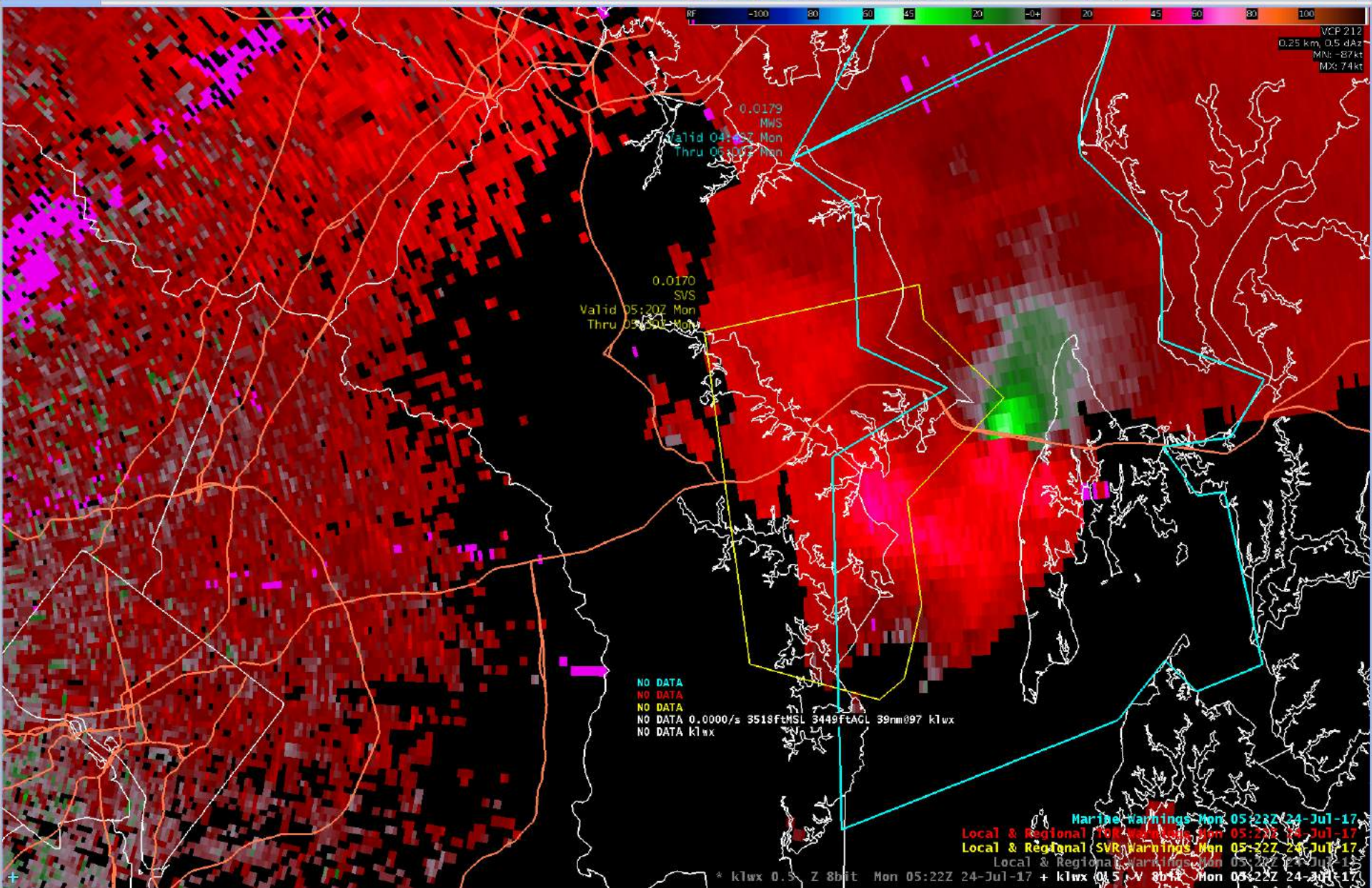
.DAYS TWO THROUGH SEVEN...Monday through Saturday

No hazardous weather is expected at this time.

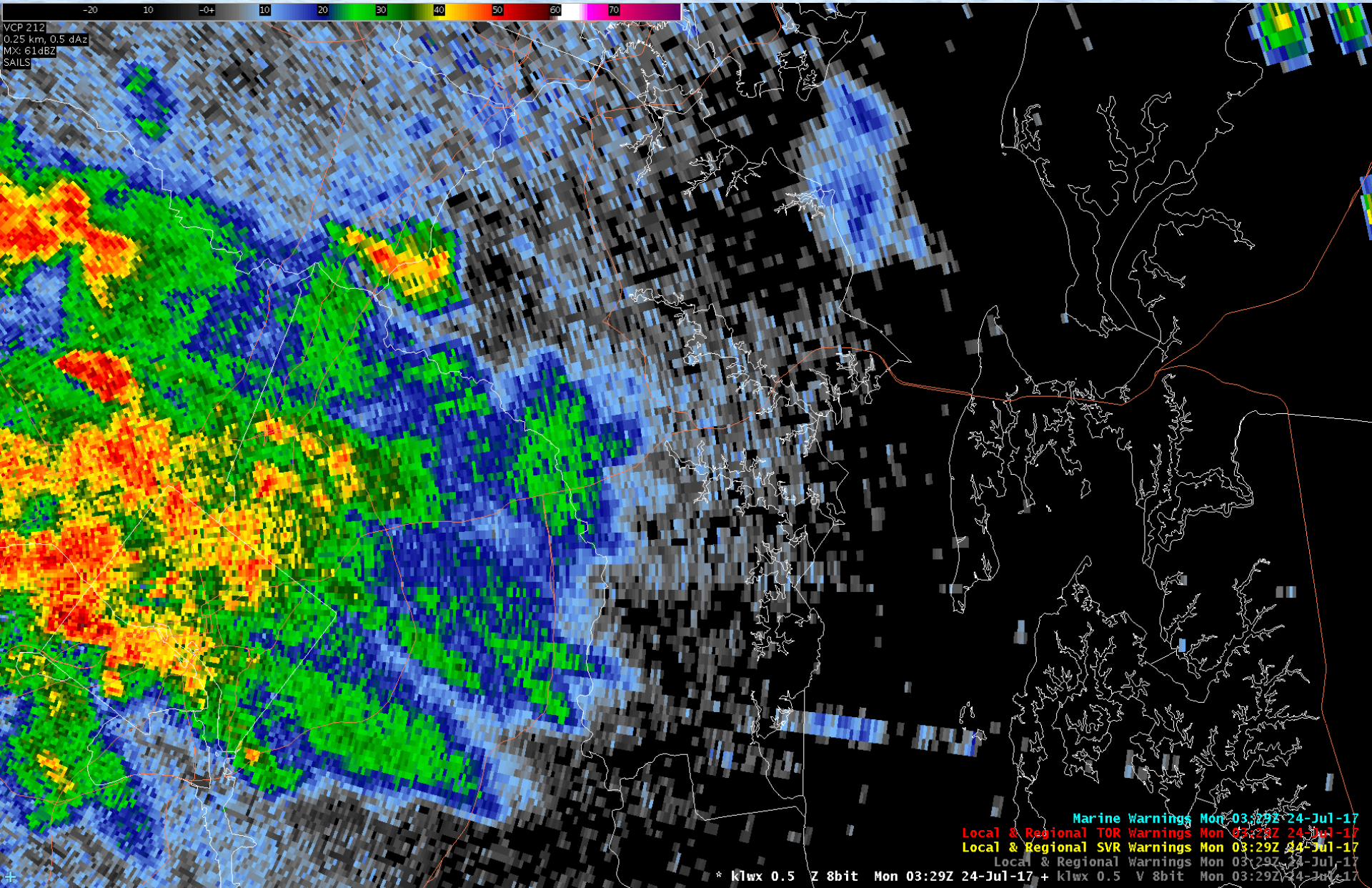
.SPOTTER INFORMATION STATEMENT...

Please forward any thunderstorm damage or heavy rain reports to the National Weather Service.

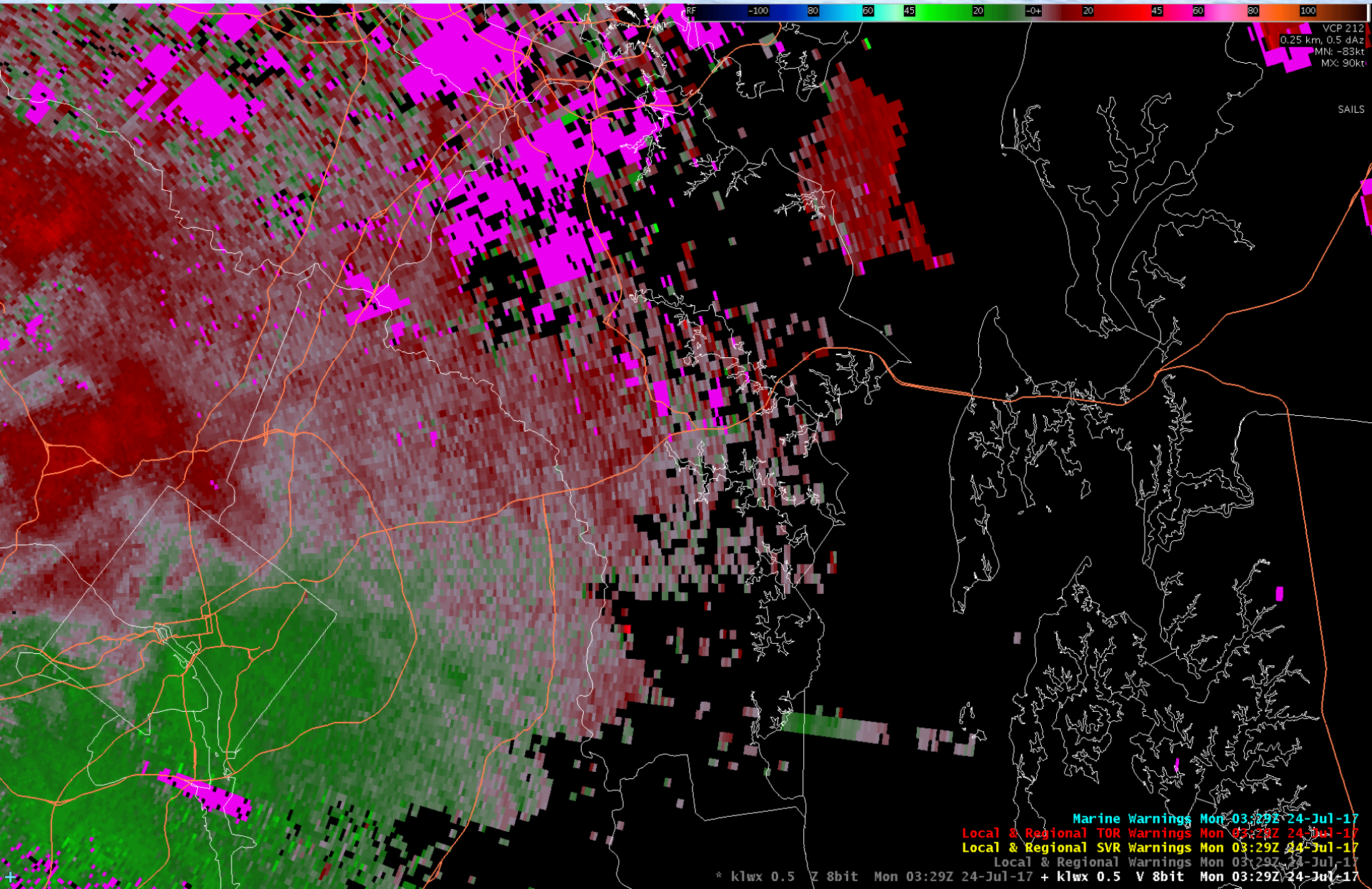
KLWX 0.5 Imagery



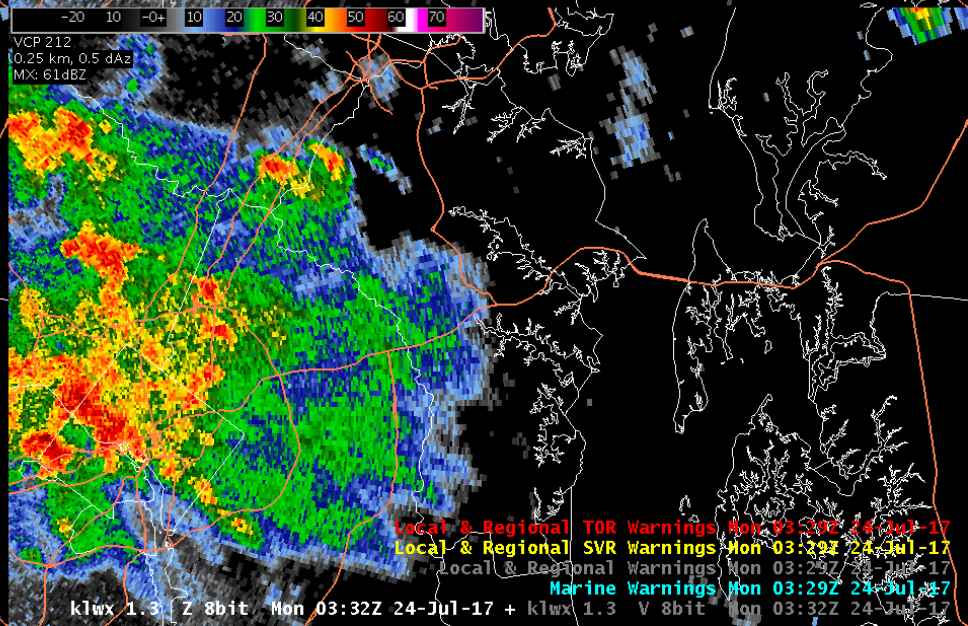
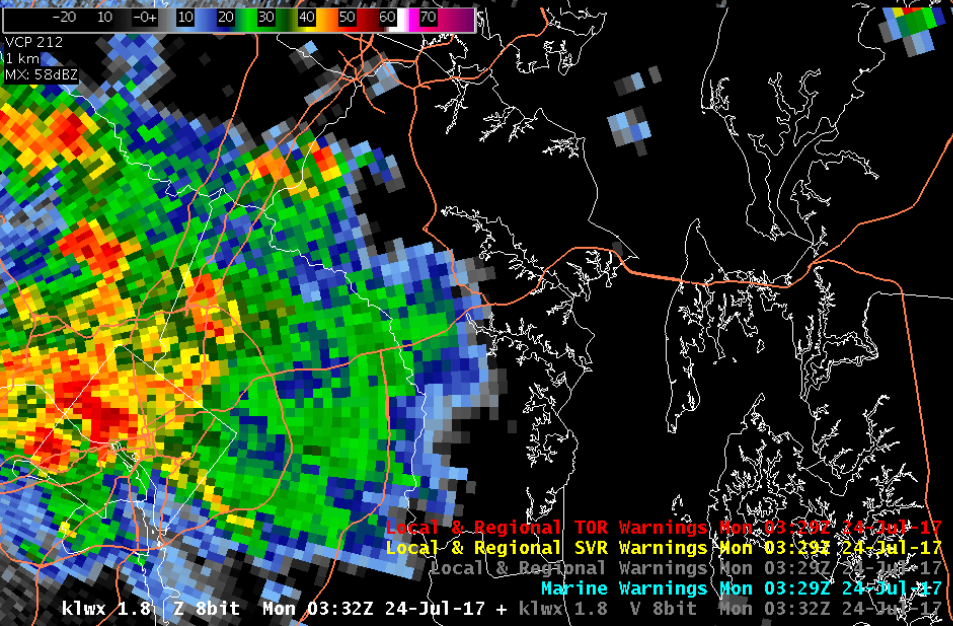
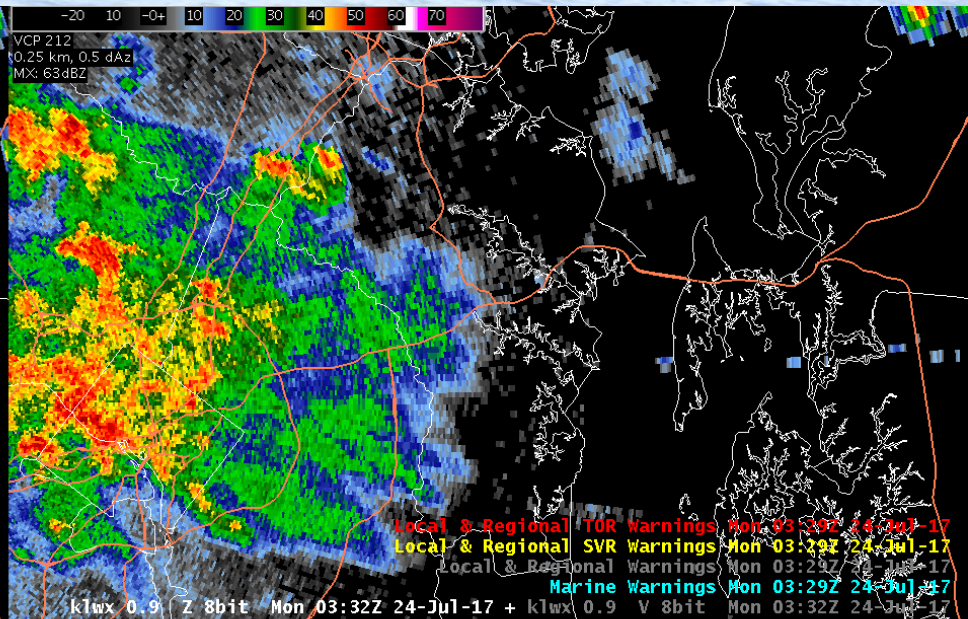
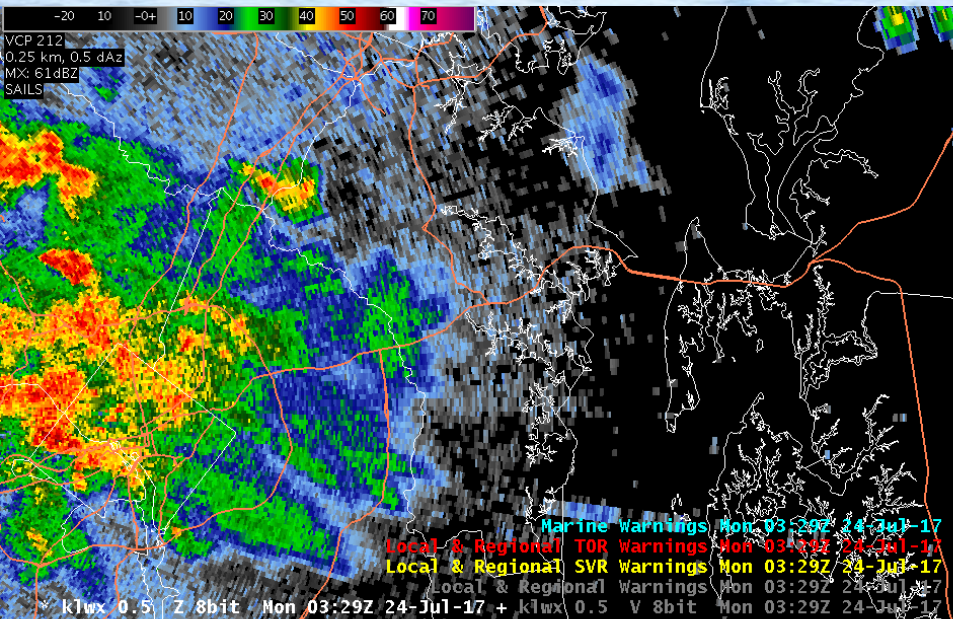
KLWX 0.5 Reflectivity Loop



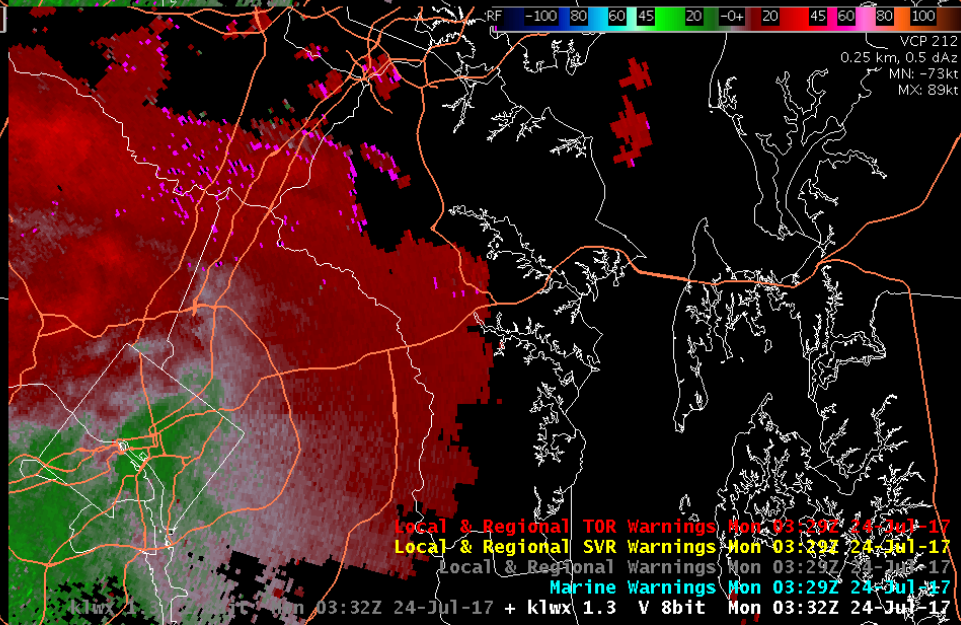
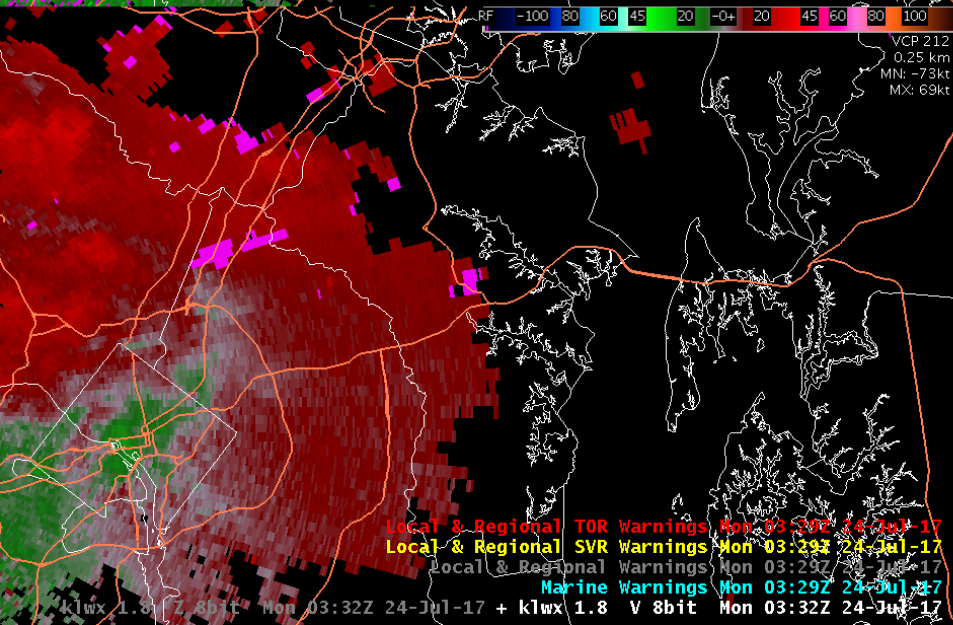
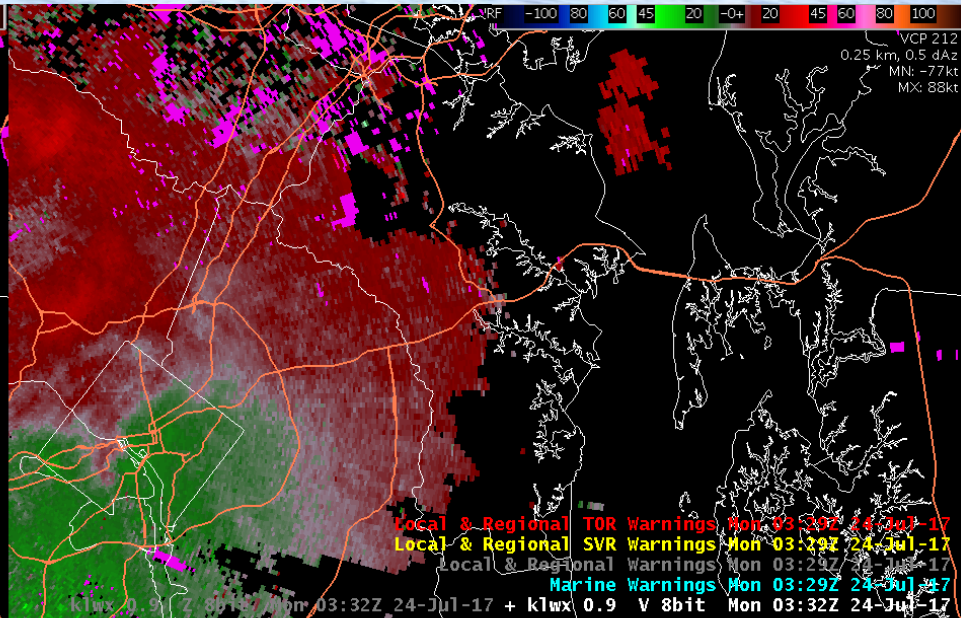
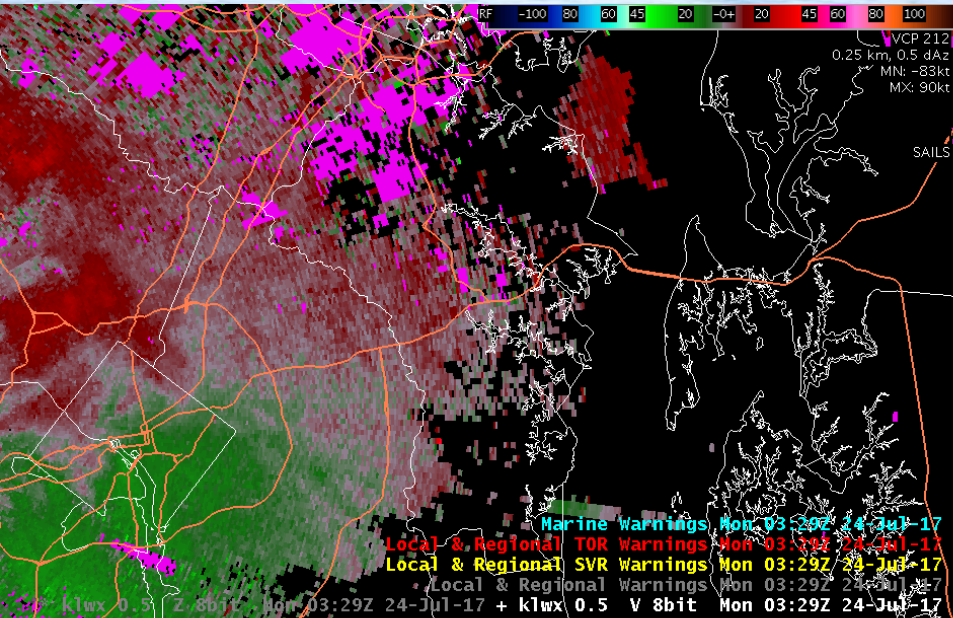
KLWX 0.5 Velocity Loop



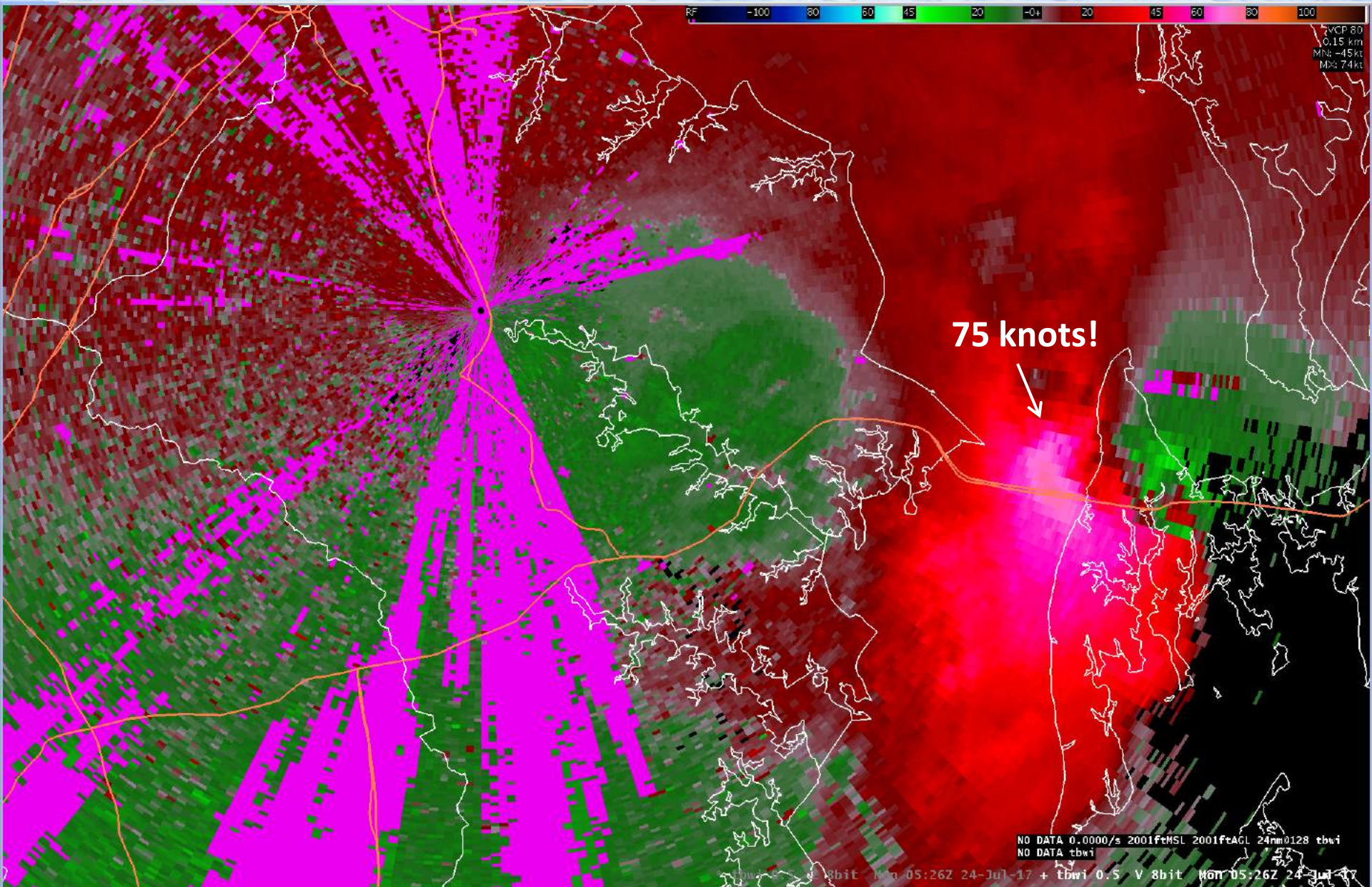
KLWX 4 Panel Reflectivity Loop



KLWX 4 Panel Velocity Loop



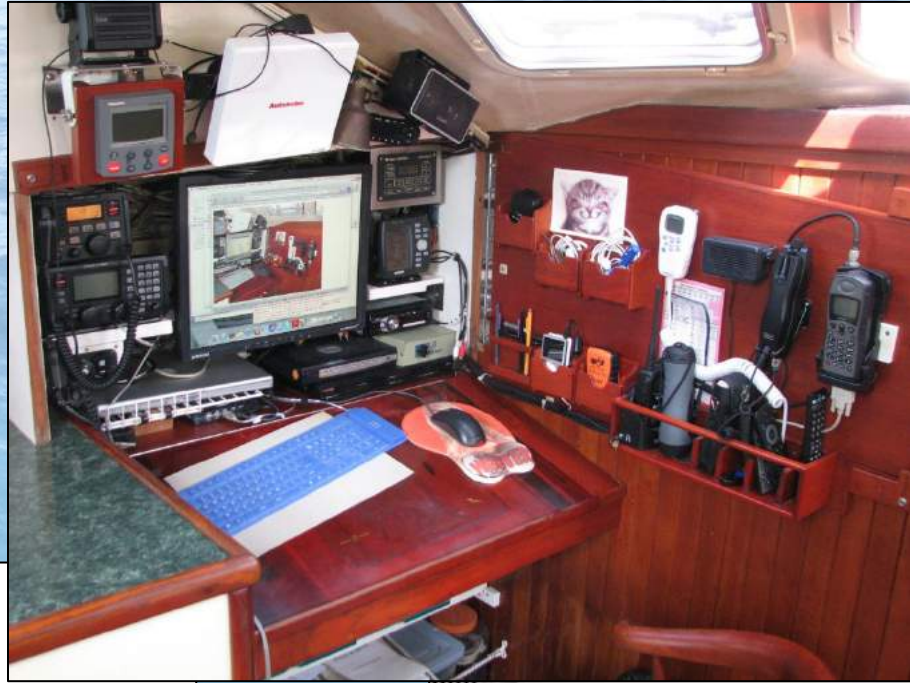
TBWI Velocity



Storm summary

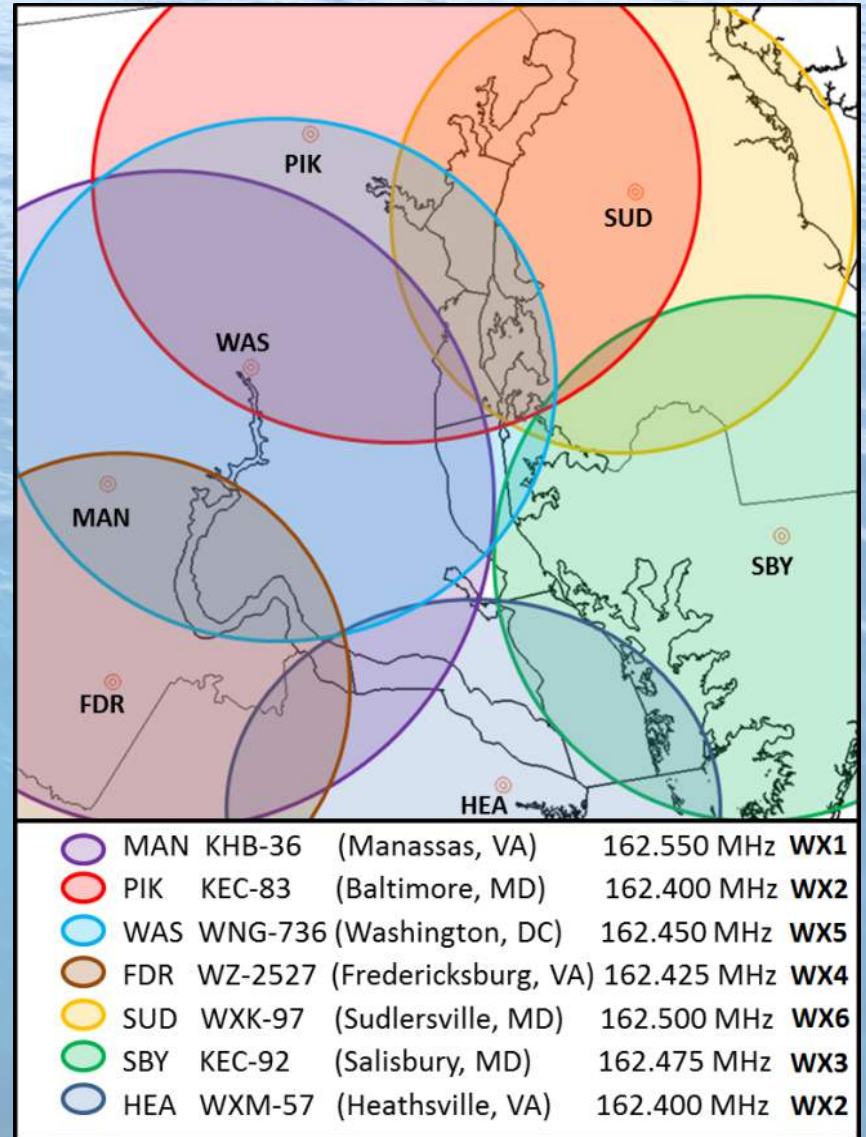
- Tornado survey today
 - Damage occurred on Kent Island.

NOAA Weather Radio



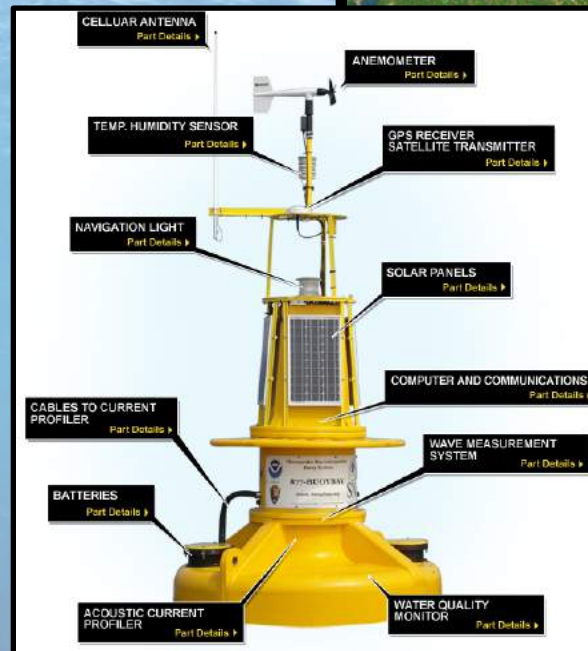
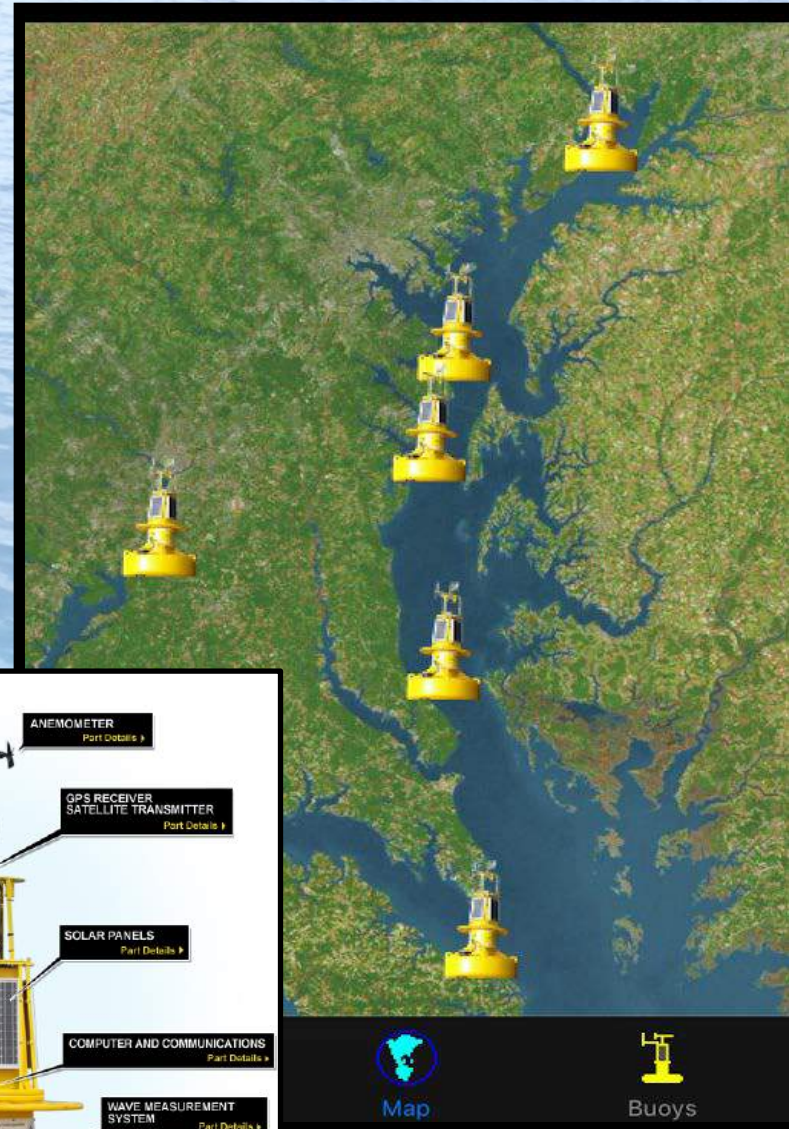
NOAA Weather Radio

- Mariners are a top NWR user group
- Seven transmitters cover our marine area
 - Tone Alert
 - Special Marine Warnings
 - Coastal Waters Forecast
 - Marine Wind Headlines
 - Observations



Buoys

- Chesapeake Bay Interpretive Buoy System (CBIBS)
 - Launched 2007-2010
- The only wave sensors on the Bay
- Access Data at buoybay.noaa.gov
- Dial-A-Buoy
 - 877-BUOY-BAY
 - 877-2869-229
- “SmartBuoys” App

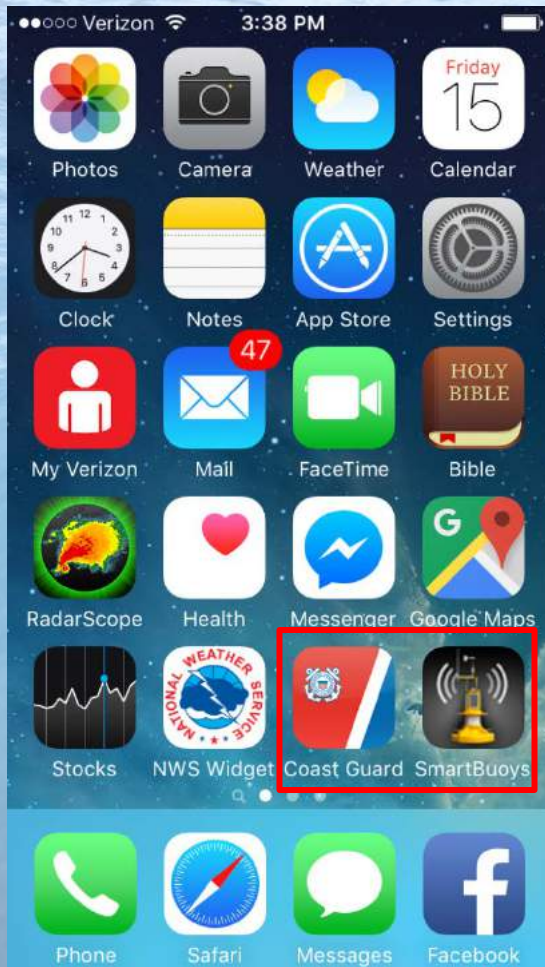


Map



Buoys

Apps for Chesapeake Mariners



- **Coast Guard App**



- Click on “NOAA Buoys” option
 - “Closest Buoy” offers data from nearest marine observation

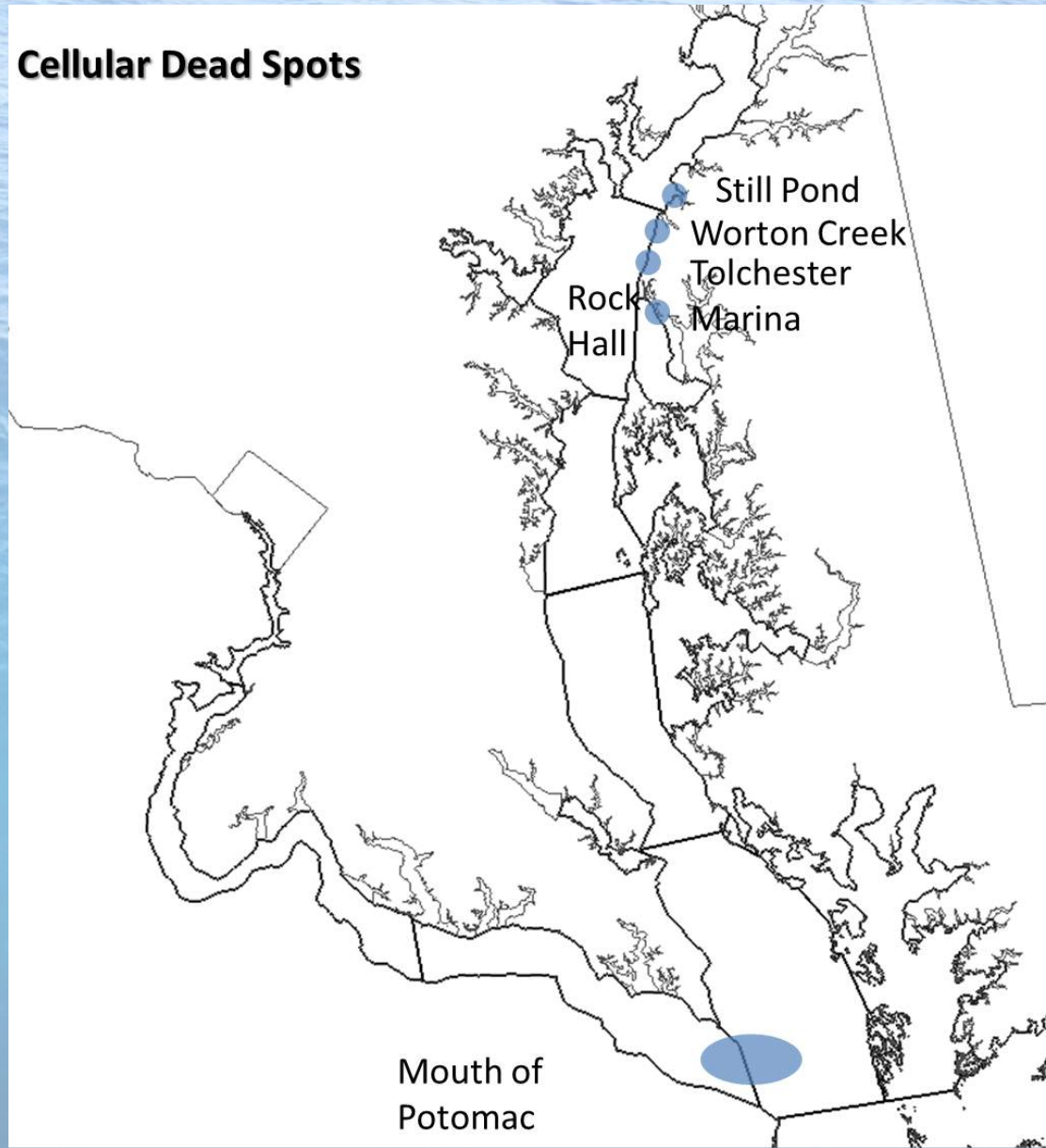
- **Smart Buoys App**



- Chesapeake Bay Interpretive Buoy System (CBIBS)
 - Click on “View Buoy Data”
 - Live data from several CBIBS

Survey

Have you found any cellular data deadspots on the Chesapeake Bay?



Open Forum

Contact Me...

Bryan.Jackson@noaa.gov
Marine Program Leader

Marine Reports:
1-800-253-7091



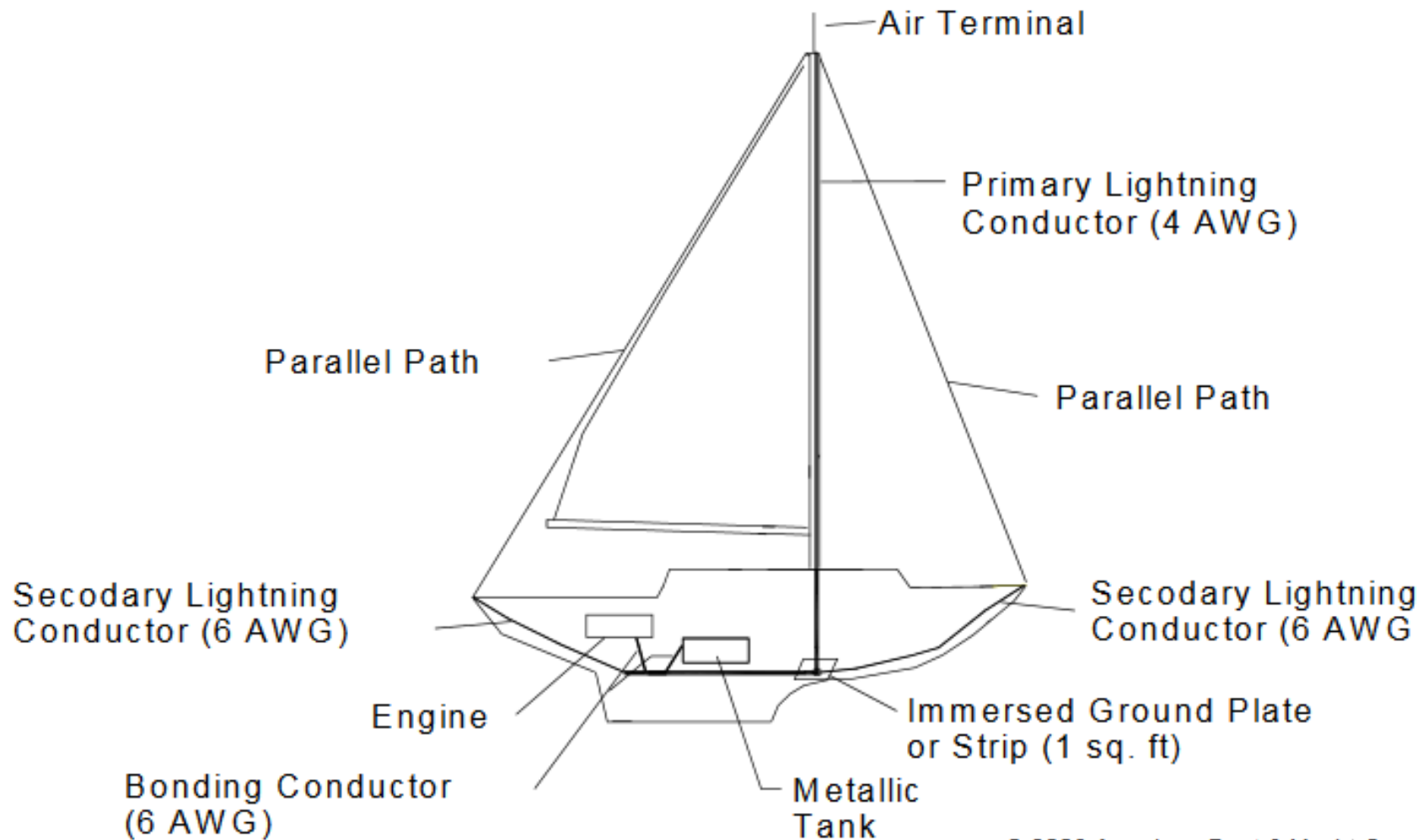
The background of the slide is a high-resolution photograph of the ocean's surface. The water is a deep, clear blue, and the surface is covered in fine, rhythmic ripples that catch the light, creating a shimmering effect. The perspective is from a slightly elevated angle, looking out over the water towards the horizon.

Maritime Safety in Severe Weather



Before the strike

Lightning Protective Systems



Boating and severe thunderstorms

- Get out of boats and away from water. Move to a sturdy building or car.
- DO NOT take shelter in small sheds, under isolated trees, or in convertible automobiles. If no shelter is available, find a low spot away from trees and fences
- If you can not get to shore before the thunderstorm reaches your area, put on your personal flotation device and prepare for wind and rough waters. Stay below deck (if possible), and keep away from metal objects that are not grounded to the boat's protection system.



Wave Forecasting on Chesapeake Bay

Marine Forecast Grids

- We forecast for 10-meter (33') wind & wind gust
- Nearshore Wave Prediction System (NWPS)
 - State of the art wave forecast model
 - High resolution shoreline, bathymetry
 - Implemented in March 2015
 - Graphically shows wave heights
 - Our marine webpage:
[www.weather.gov /washington /marine](http://www.weather.gov/washington/marine)

Grid Manager

Today	Tonight	Tomorrow	Tomorrow Night
Mar 15 (Wed)	Mar 16 (Thu)	Mar 17	
06 12 18	06 12 18	06	

Wind SFC Fcst (LWX)

WindGust SFC Fcst (LWX)

WaveHeight SFC Fcst (LWX)

Wx SFC Fcst (LWX)

Hazards SFC Fcst (LWX)

LWXWaveHeight SFC Fcst (LWX)

NWPSwind SFC Fcst (LWX)

Vsby SFC Fcst (LWX)

hazGLW SFC Fcst (LWX)

hazMAS SFC Fcst (LWX)

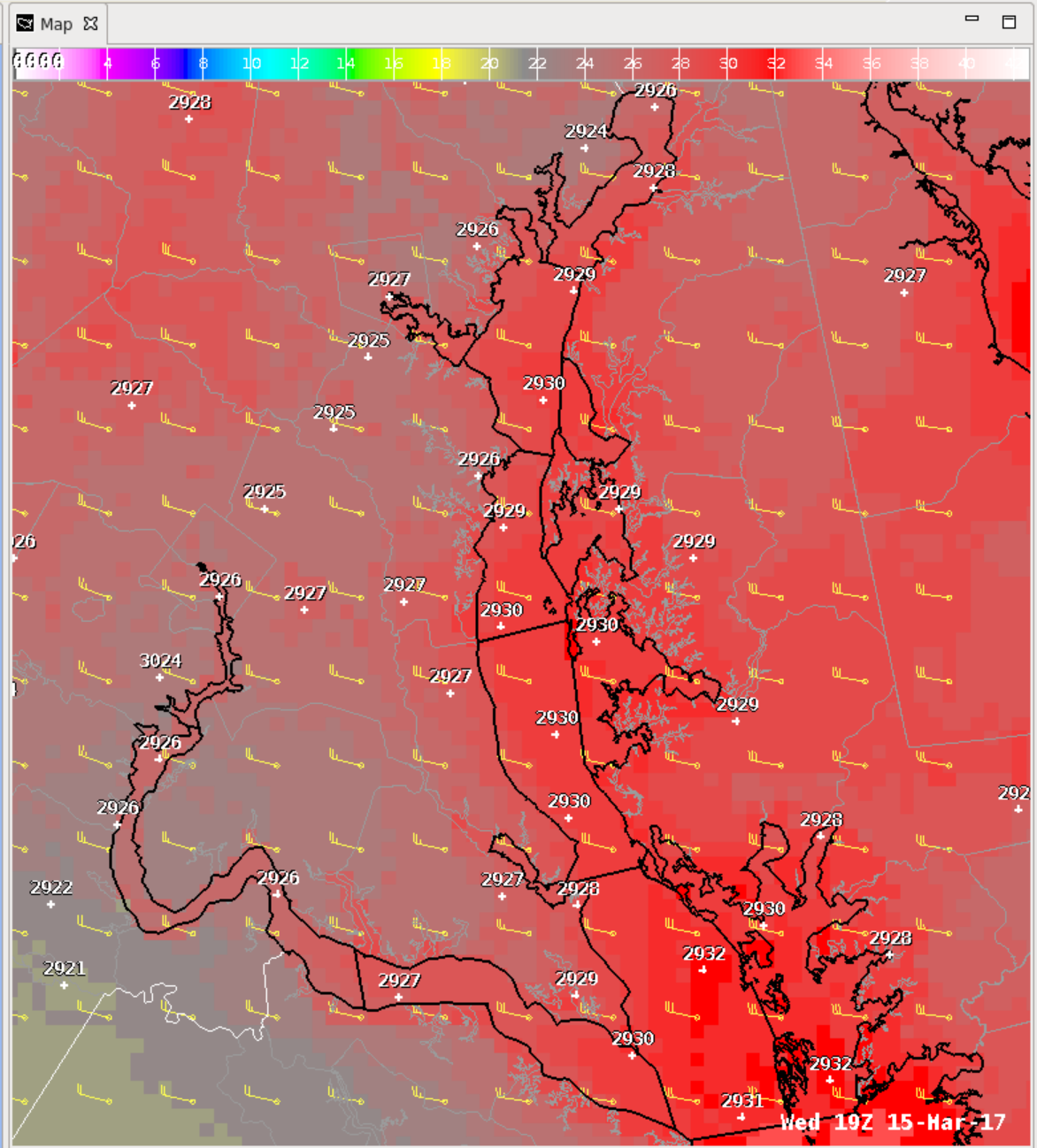
hazSCY2 SFC Fcst (LWX)

hazWCY SFC Fcst (LWX)

hazWIY SFC Fcst (LWX)

WaveHeight SFC nwsCG1LWX_1515 (LWX)

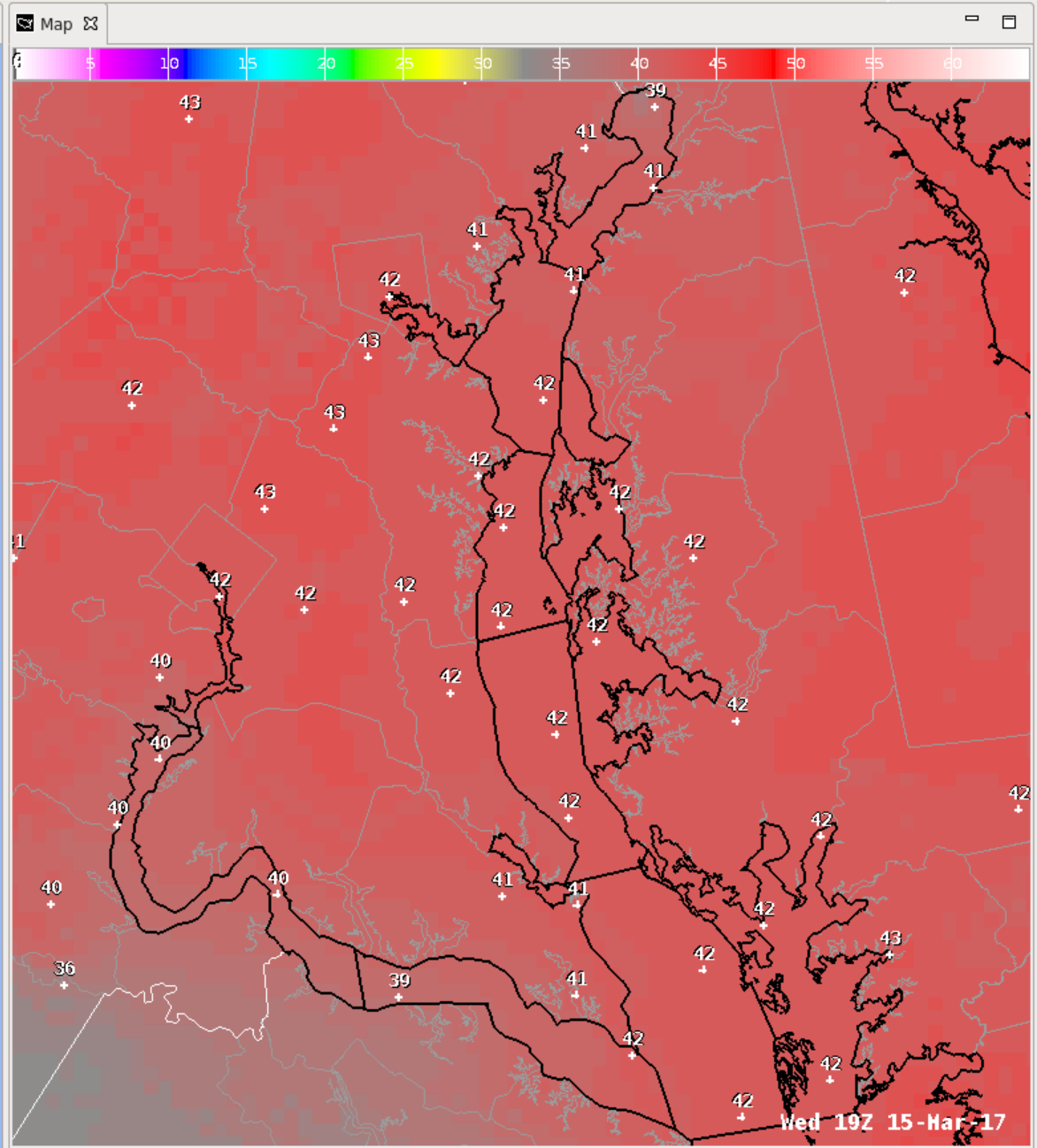
Sustained Wind W 26-32 knots



Grid Manager

Today		Tonight		Tomorrow		Tomorrow Night	
Mar 15 (Wed)		Mar 16 (Thu)		Mar 17			
06	12	18	06	12	18	06	
Wind SFC Fcst (LWX)							
WindGust SFC Fcst (LWX)							
WaveHeight SFC Fcst (LWX)							
Wx SFC Fcst (LWX)							
Hazards SFC Fcst (LWX)							
LWXWaveHeight SFC Fcst (LWX)							
NWPSwind SFC Fcst (LWX)							
Vsby SFC Fcst (LWX)							
hazGLW SFC Fcst (LWX)							
hazMAS SFC Fcst (LWX)							
hazSCY2 SFC Fcst (LWX)							
hazWCY SFC Fcst (LWX)							
hazWIY SFC Fcst (LWX)							
WaveHeight SFC nwpsCG1LWX_1515 (LWX)							

Wind Gusts 39-42 knots



Grid Manager

-----Today-----Tonight-----Tomorrow-----Tomorrow Night-----

Mar 15 (Wed)	Mar 16 (Thu)	Mar 17
06 12 18	06 12 18	06

Wind SFC Fcst (LWX)

WindGust SFC Fcst (LWX)

WaveHeight SFC Fcst (LWX)

Wx SFC Fcst (LWX)

Hazards SFC Fcst (LWX)

LWXWaveHeight SFC Fcst (LWX)

NWPSwind SFC Fcst (LWX)

Vsby SFC Fcst (LWX)

hazGLW SFC Fcst (LWX)

hazMAS SFC Fcst (LWX)

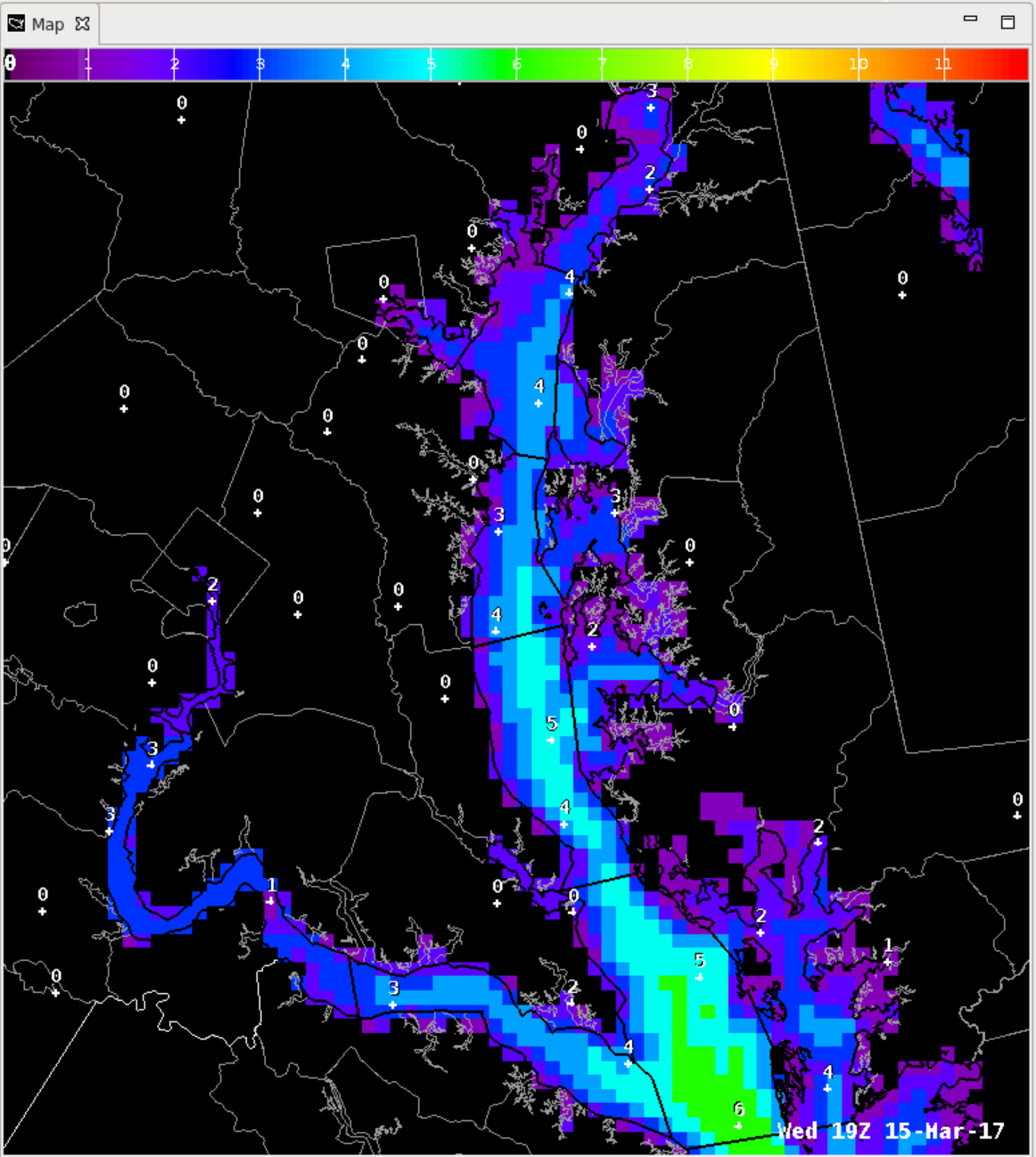
hazSCY2 SFC Fcst (LWX)

hazWCY SFC Fcst (LWX)

hazWIY SFC Fcst (LWX)

WaveHeight SFC nwsCG1LWX_1515 (LWX)

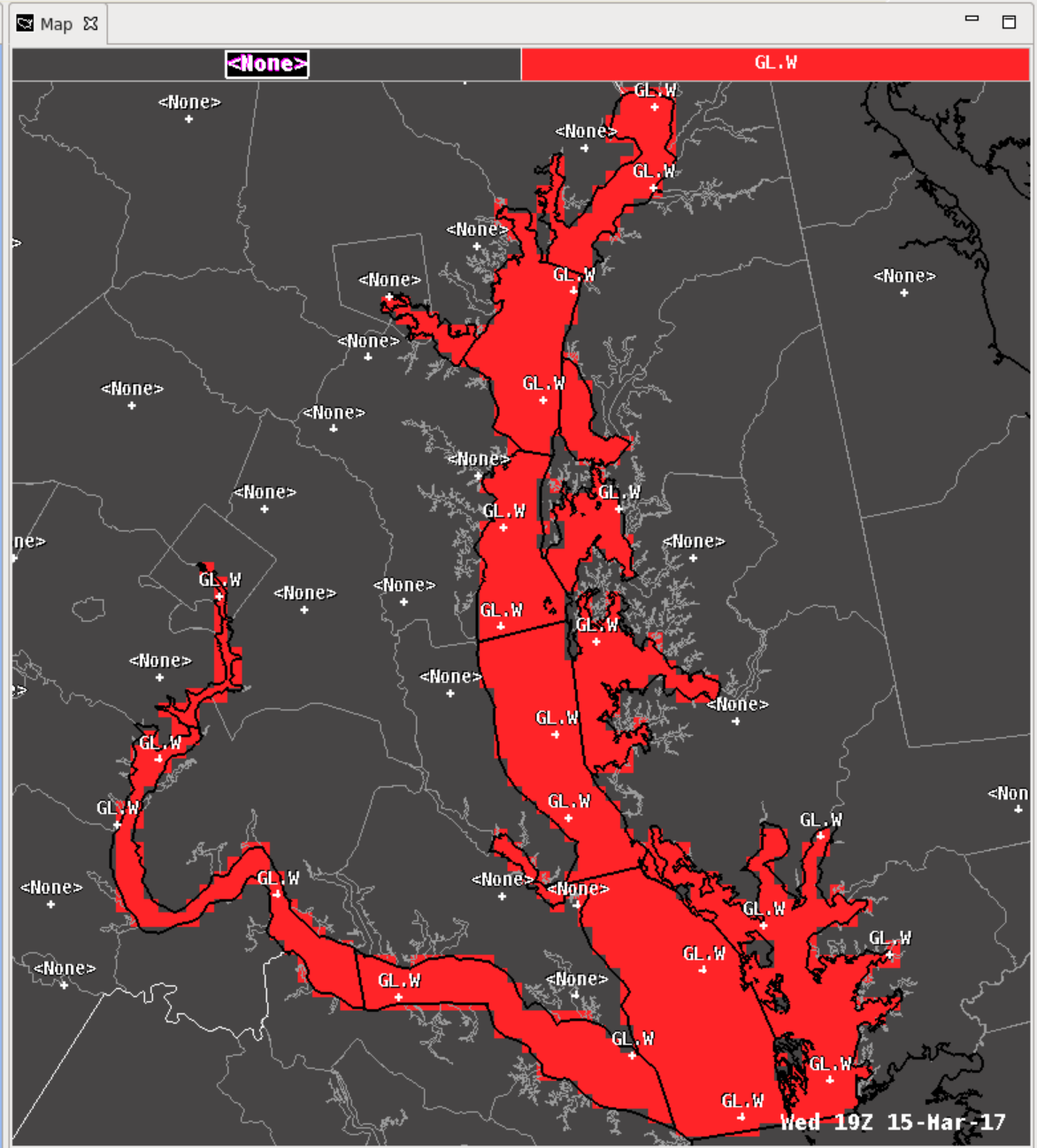
Wave Height 2 to 6 feet



Grid Manager

	Today			Tonight			Tomorrow			Tomorrow Night		
	Mar 15 (Wed)			Mar 16 (Thu)			Mar 17					
	06	12	18	06	12	18	06	12	18	06	12	18
<input type="checkbox"/> Wind SFC Fcst (LWX)	2	2	2	2	2	2	2	2	2	2	2	2
<input type="checkbox"/> WindGust SFC Fcst (LWX)	22	22	22	22	22	22	22	22	22	22	22	22
<input type="checkbox"/> WaveHeight SFC Fcst (LWX)	17	14	11	8	5	5	5	5	5	5	5	5
<input type="checkbox"/> Wx SFC Fcst (LWX)	14h	11h	8h	2h46	2h29	2h29	2h29	2h29	2h29	2h29m	2h29m	20h
<input type="checkbox"/> Hazards SFC Fcst (LWX)												
<input type="checkbox"/> LWXWaveHeight SFC Fcst (LWX)	17	14	11	8	5	5	5	5	5	5	5	5
<input type="checkbox"/> NWPSwind SFC Fcst (LWX)												
<input type="checkbox"/> Vsby SFC Fcst (LWX)	10	11	11	10	8	8	5	5	5	5	5	5
<input type="checkbox"/> hazGLW SFC Fcst (LWX)												
<input type="checkbox"/> hazMAS SFC Fcst (LWX)												
<input type="checkbox"/> hazSCY2 SFC Fcst (LWX)												
<input type="checkbox"/> hazWCY SFC Fcst (LWX)												
<input type="checkbox"/> hazWIY SFC Fcst (LWX)												
<input type="checkbox"/> WaveHeight SFC nwsCG1LWX_1515 (LWX)												

Gale Warning



December 18 Summary

- Cold front crossed the Chesapeake on the Sunday afternoon (KNAK first gust 2:10pm)
 - South winds had eased before frontal passage
 - Temperatures reached the upper 60s prior to front
 - 15 degrees above normal
 - Sudden onset of gale force winds with the front
 - Front had little (if any) precipitation and was hard to see in reflectivity products on radar.

Wind Gusts 34 knots or greater

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KNAK : PK WND 40 at 2016-12-18 19:10:00
GBY : 7G35 at 2016-12-18 19:14:00
GBY : 34G43 at 2016-12-18 19:19:00
SPT : 21G34 at 2016-12-18 19:21:00
GBY : 32G38 at 2016-12-18 19:24:00
HRB : 28G35 at 2016-12-18 19:25:00
TOL : 31G41 at 2016-12-18 19:26:00
GBY : 28G35 at 2016-12-18 19:29:00
HRB : 29G38 at 2016-12-18 19:30:00
TOL : 31G37 at 2016-12-18 19:31:00
GBY : 29G37 at 2016-12-18 19:39:00
TOL : 27G34 at 2016-12-18 19:41:00
GBY : 26G34 at 2016-12-18 19:44:00
TOL : 28G35 at 2016-12-18 19:46:00
TOL : 28G35 at 2016-12-18 19:51:00
GBY : 31G37 at 2016-12-18 19:54:00
GBY : 28G34 at 2016-12-18 19:59:00
TPLM2 : 26G44 at 2016-12-18 20:00:00
TOL : 28G35 at 2016-12-18 20:01:00
GBY : 29G35 at 2016-12-18 20:04:00
GBY : 27G38 at 2016-12-18 20:09:00
TOL : 28G35 at 2016-12-18 20:11:00
TOL : 31G38 at 2016-12-18 20:16:00
TOL : 32G41 at 2016-12-18 20:21:00
TOL : 27G36 at 2016-12-18 20:26:00
GBY : 28G35 at 2016-12-18 20:34:00
TOL : 26G35 at 2016-12-18 20:36:00
TOL : 27G34 at 2016-12-18 20:46:00
GBY : 25G34 at 2016-12-18 20:49:00
TPLM2 : 26G40 at 2016-12-18 21:00:00
```

**Gusts 34-44 knots
2:10pm to 3:50pm
in Sandy Point to
North Beach zone**

An aerial photograph of the ocean surface, showing a vast expanse of blue water with small, rhythmic waves. The perspective is from a high angle, looking down at the water. The text 'Radar Summary' is centered in the middle of the image.

Radar Summary

