

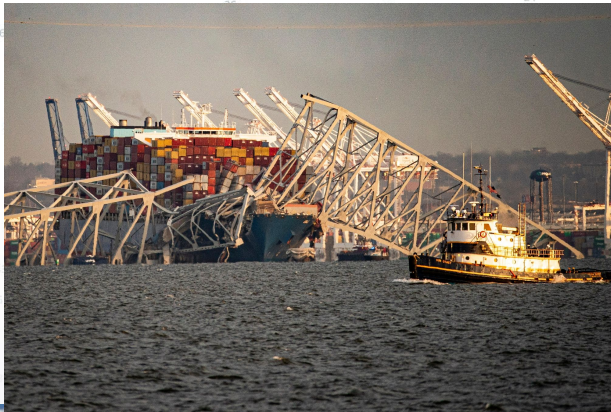
# NOS Response to FSK Bridge

Ms. Rachael Dempsey  
Rear Admiral Benjamin Evans  
Dr. Marian Westley  
Dr. Shachak Pe'eri



HYDROGRAPHIC SERVICES REVIEW PANEL

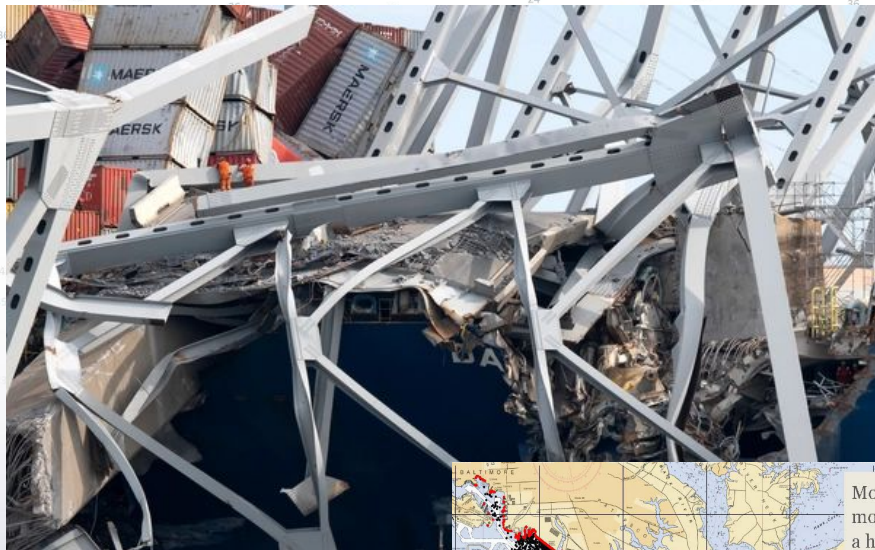
# Incident Background



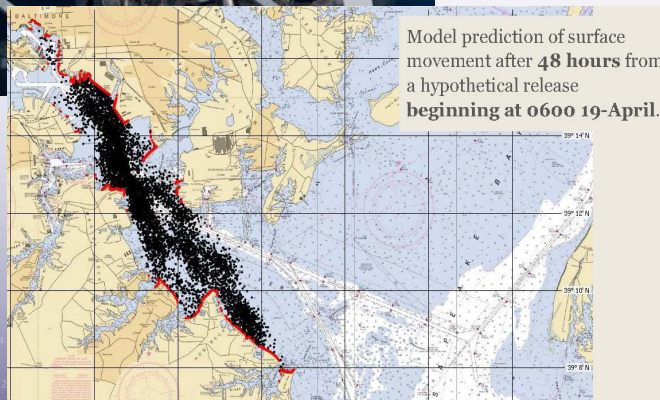
- March 26, 2024, M/V DALI allided with the Francis Scott Key Bridge near Baltimore, MD.
- Tragic loss of six construction workers
- Large sections of the bridge's structure lay across the main shipping channel closing the deepest shipping lane in and out of the port.
- The blocked shipping lane resulted in an estimated loss of \$200 million in daily economic activity for the area, idled thousands of workers, and bottled up several of the U.S. Navy's sealift and logistics vessels.



# OR&R - Pollution Support



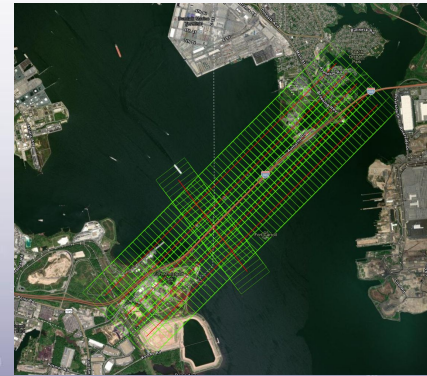
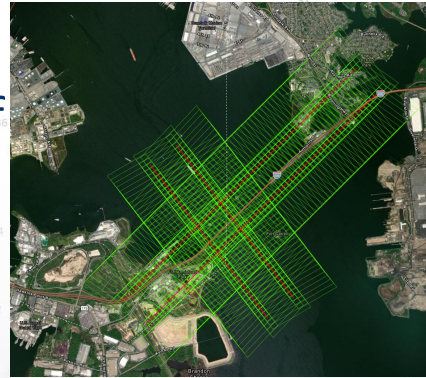
- Scientific Support Coordinator
- HAZMAT: Crushed dangerous goods container guidance
- OIL: Trajectory and fate modeling for potential Dali fuel spill until transit to terminal



# Coastal Mapping Survey Updates

## NOAA King Air N68RF

- Operating in St. Croix at the time of the collapse
- On site ~48 hrs after the accident
- Imagery was collected 3/28-29
- Images collected on the 28th were mapped on the 29th and delivered to OCS that same day to update NOAA ENC of the port
- First vessel passed through the alternate channel on 01 APR



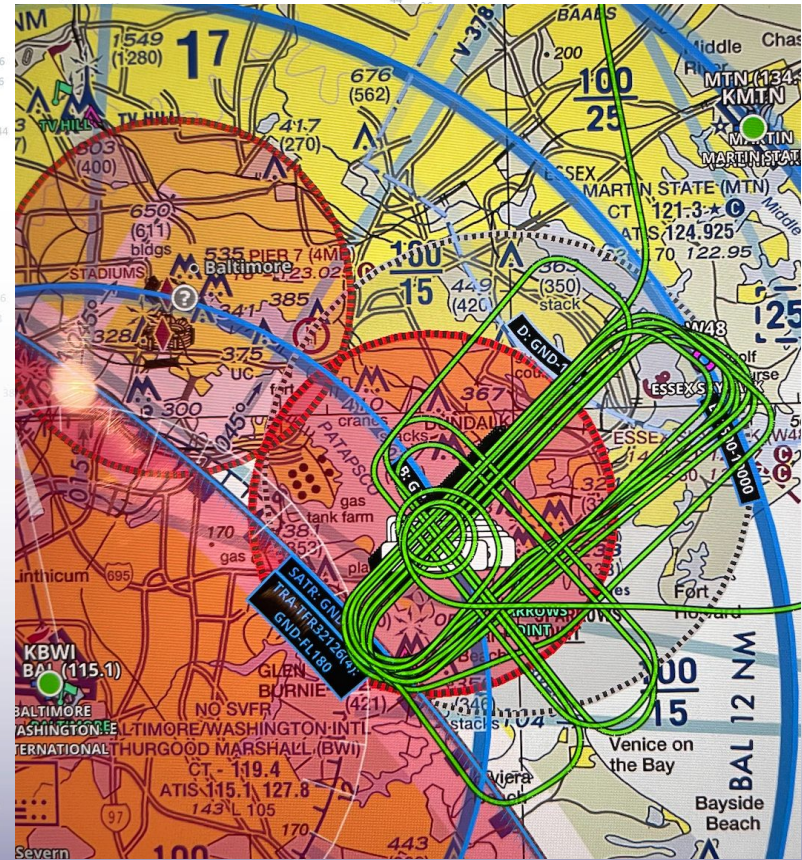
HYDROGRAPHIC SERVICES REVIEW



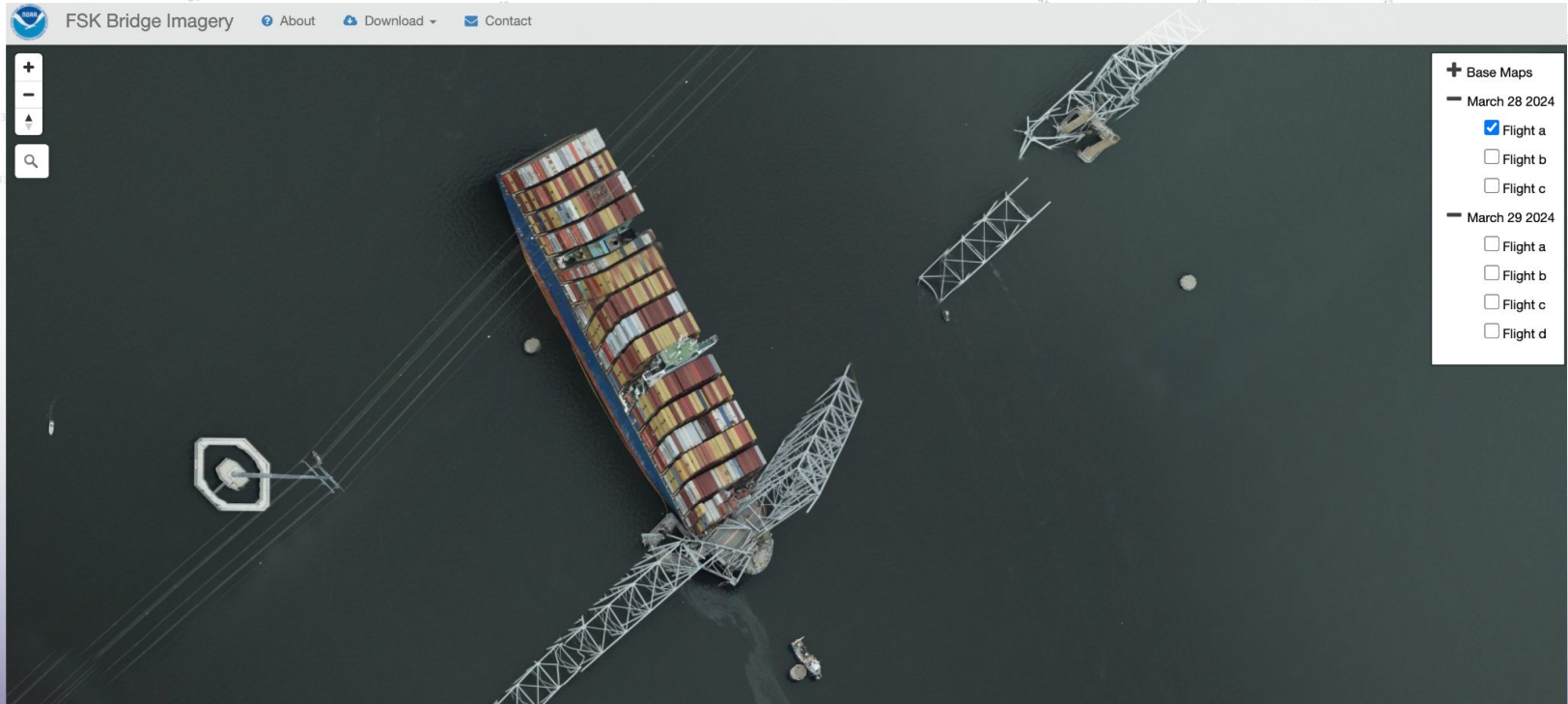
# Access Challenges

## Airspace

- Temporary Flight Restriction (TFR) 3nm radius around the impact site
- Unified Command- Maryland State Police was the TFR controlling agency
- Baltimore Orioles opening day TFR
- Washington DC Special Flight Rules Area (SFRA) overlying
- BWI class B surface area immediately adjacent the impact site



# Imagery available online (~2 hours after landing)



[https://storms.ngs.noaa.gov/storms/fskb\\_2024/index.html#15.87/39.217509/-76.528448](https://storms.ngs.noaa.gov/storms/fskb_2024/index.html#15.87/39.217509/-76.528448)



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# [https://storms.ngs.noaa.gov/storms/fskb\\_2024/index.html#](https://storms.ngs.noaa.gov/storms/fskb_2024/index.html#)

FSK Bridge Imagery About Download Contact

March 28 2024 Flight 1	(TIF)	(RAW JPEG)
March 28 2024 Flight 2	(TIF)	(RAW JPEG)
March 28 2024 Flight 3	(TIF)	(RAW JPEG)
March 29 2024 Flight 1	(TIF)	(RAW JPEG)
March 29 2024 Flight 2	(TIF)	(RAW JPEG)
March 29 2024 Flight 3	(TIF)	(RAW JPEG)
March 29 2024 Flight 4	(TIF)	(RAW JPEG)

Base Maps

- Streets
- Satellite
- Roads & Labels

March 28 2024

- Flight a
- Flight b
- Flight c

March 29 2024

- Flight a
- Flight b
- Flight c
- Flight d

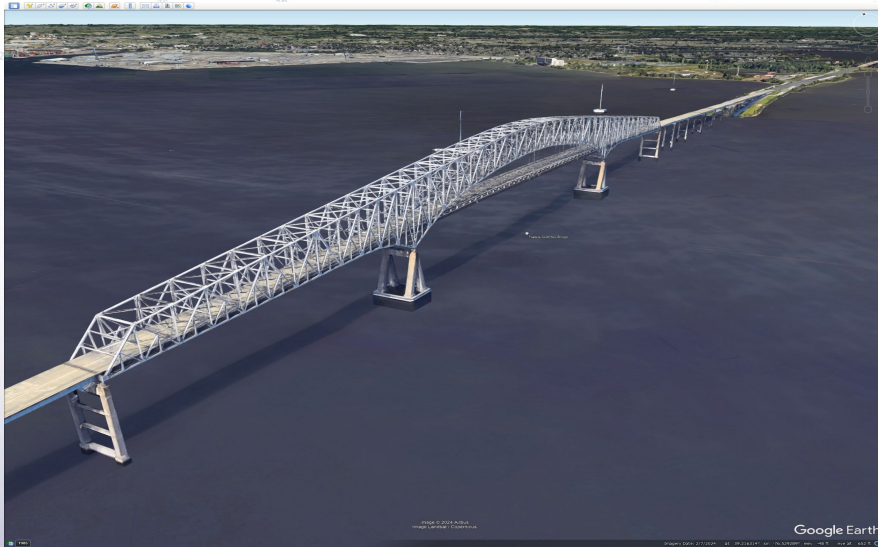
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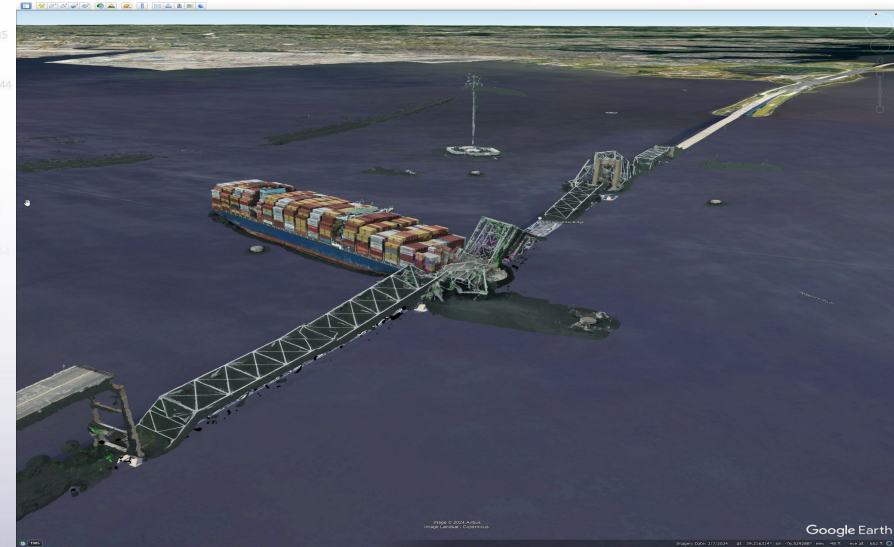


## HYDROGRAPHIC SERVICES REVIEW PANEL

# 3D Models (SfM) developed from the imagery



Pre-event



Post-event



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# Real Time Data



## Lost Equipment (2 stations):

- Francis Scott Key Bridge Air Gap Station
- NE Tower Meteorological Station

## Response:

- Deployed Currents Real-Time Buoy (CURBY) on April 4, 2024 to provide current measurements during salvage operations.
- Installed the temporary “Hawkins Point Wind” station on June 4, 2024 and operationalized on June 10, 2024.
- Both temporary stations will be removed by the end of September 2024.

## CURBY Data Types:

- Current profiles
- Surface conductivity
- Water & air temperature
- Wind speeds
- Barometric pressure

## Forecast Guidance:

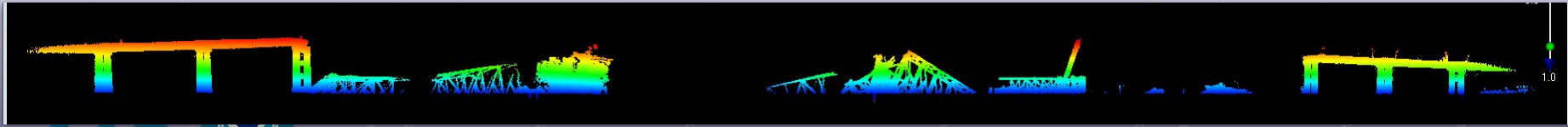
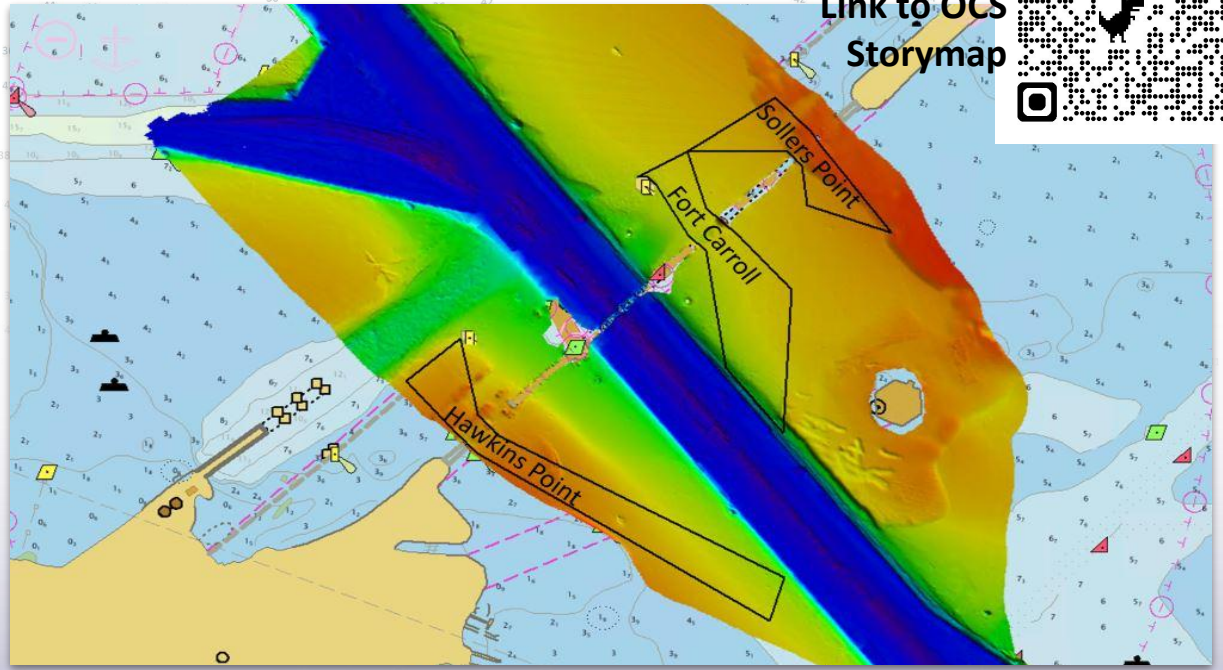
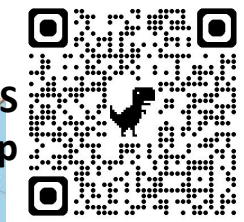
- Provided nowcast guidance for water levels and currents based on output from Chesapeake Bay OFS
- Real time data available via CO-OPS API and [tidesandcurrents.noaa.gov](https://tidesandcurrents.noaa.gov)



# NRT Response



Link to OCS  
Storymap



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# Common Operating Picture



## Key Bridge Response Common Operating Picture (Public...)

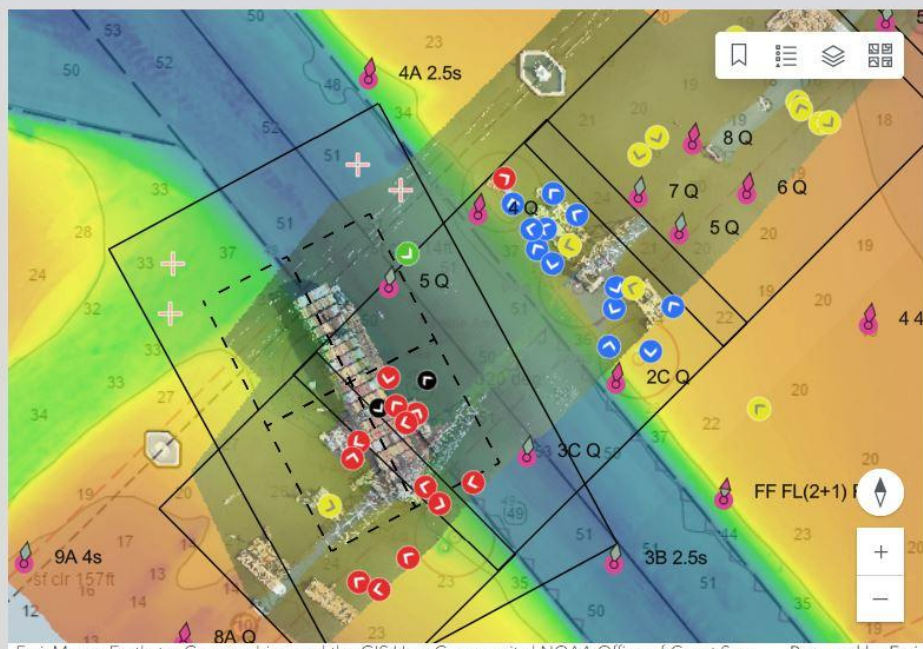
Search by Vessel:  
All Vessels

Wind  
**0.8 kts**  
from 210 ° T

Curtis Bay Ent  
Wx buoy  
Last update: 2 minutes

Air Temp  
**63°F**

Curtis Bay Ent  
Wx buoy  
Last update: 2 minutes



AIS with  
Joined Data  
(sanitized for  
public)

Response Ve:  
by Contrator

- DONJON
- RESOLVE
- SKANSKA
- Governme  
Vessel
- Non-Resp  
Vessels

SAFETY ZONE

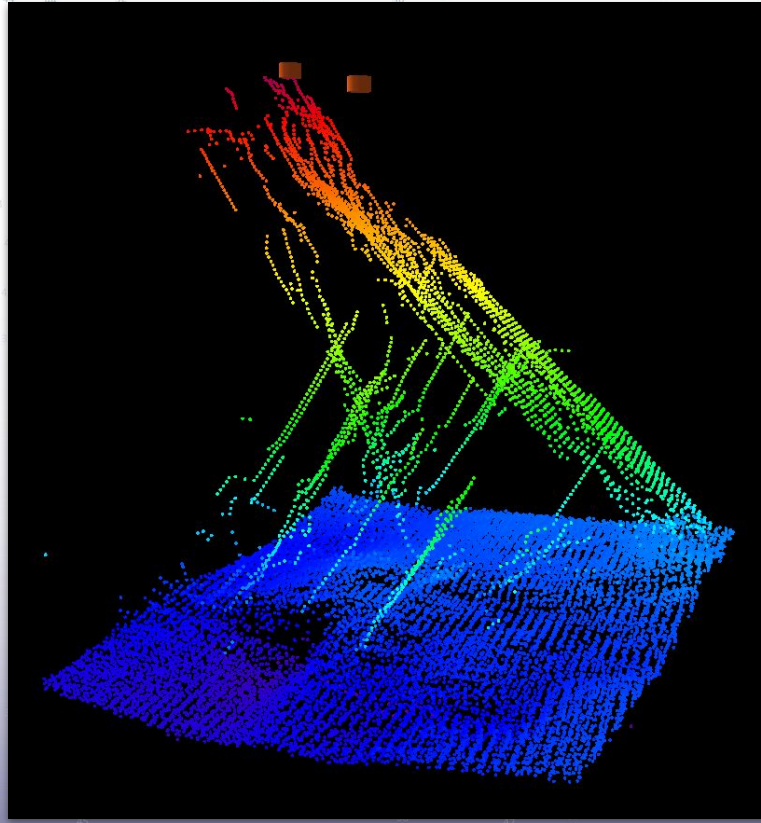
**Imagery**  
**updated: 23**  
**Apr**

Esri, Maxar, Earthstar Geographics, and the GIS User Community | NOAA Office of Coast Surv... Powered by Esri

COP      NWS Weather Threat



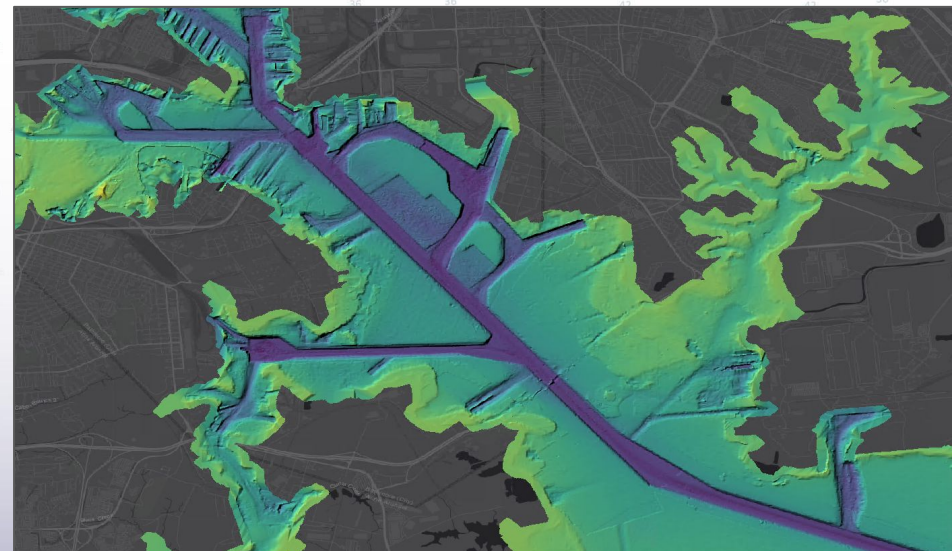
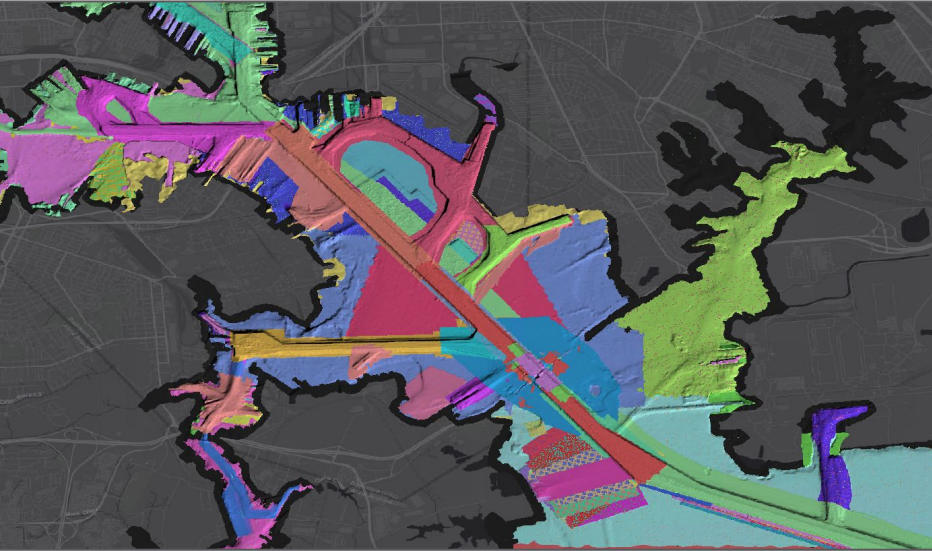
# Salvage Operations



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# National Bathymetric Source

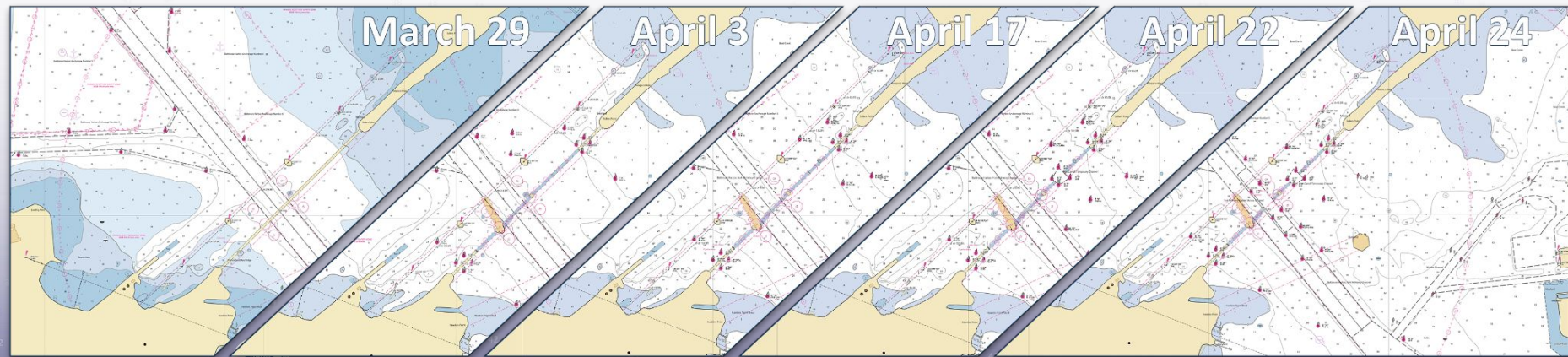
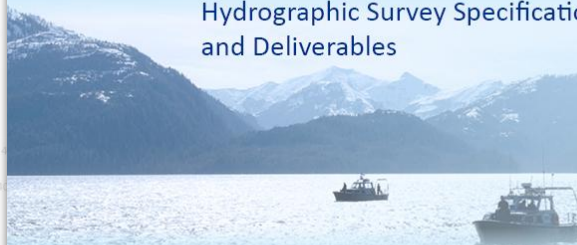


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# Rapid Nautical Chart Updates

Office of Coast Survey  
Hydrographic Surveys Division

Hydrographic Survey Specifications  
and Deliverables



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# By the Numbers

- The Port of Baltimore lost **\$15.2 BILLION** in goods moving in and out of port.
  - Workers idled,
  - Extended routes for trucking,
- 38 existing PORTS - serving **50% of the top 175 U.S. seaports**
- **19** operational air gap systems
- Valuation of the ENC is between **\$2-3.5 billion** annually
- NOAA Nav Obs Positioning Positioning FY24 Budget: **\$134M**

## How Could Nav Services Better Support Ports in the Face of Threats?

- Enhanced **rapid response capabilities**
- **Densification of observations** (NWLON, PORTS, geodetic controls)
- **New types of observations** (waves, fog, webcams)
- More **frequent surveys** (hydro & shoreline & tidal current surveys)
- Improved **model forecasts** of oceanographic conditions in seaport areas
- Info relevant to **long-term port resilience** due to sea level change
- **Standardized one-stop destination for all relevant NOAA decision support information**



# Lessons Learned

- The U.S. MTS is not adequately prepared for incidents of this magnitude.
- Major security threat



NOAA

HYDROGRAPH

E



# Of larger concern...

## 8 major bridges at risk of suffering Baltimore-style disaster

- Tacoma Narrows Bridge, WA
- Lewis and Clark Bridge, OR-WA
- St. Johns Bridge, OR
- Golden Gate Bridge, CA
- San Francisco-Oakland Bay Bridge, CA
- George Washington Bridge, NJ - NY
- Verrazzano-Narrows Bridge, NY
- Chesapeake Bay Bridge, MD

<https://www.the-sun.com/news/10973051/urgent-warning-major-us-bridges-risk-baltimore-style-disaster/>

There are **4,207 bridges** in the U.S. that allow ships to pass under them, according to the [National Bridge Inventory](#). Of those, only 36% are described as having functional pier protection — and that included the Key Bridge.

NY Times review identified **193 bridges that each carry 10,000 vehicles** or more a day that have **no protections installed**.

<https://www.nytimes.com/interactive/2024/04/06/us/bridge-collapse-protections-baltimore.html>



H Y D R O G R A P H I C S E R V I C E S R E V I E W P A N E L

# Many Thanks to:

- U.S. Coast Guard
- U.S. Army Corps of Engineers
- NRT New London - Carly Robbins, Mark Meadows, Patrick Debrosse, Rob Mowery, Michael Bloom,
- Mid Atlantic Navigation Manager - Ryan Wartick
- OMAO - Aircraft Operations
- Marine Chart Division and NBS Team
- NGS - RSD team
- Office of Response and Restoration -
- NOS Public Affairs
- And all the other local, state, and federal partners that contributed to the swift response



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# Back Up



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# Response Timeline

- 3/26 Bridge Collapse
- 3/26 OR&R Scientific Support Coordinator and NWS Forecaster arrived on scene
- 3/28 King Air arrived from St. Croix
  - Data collection 3/28-29
- 3/28-5/18 NRT New London on scene
- 4/6 CURBY Buoy Installed
- 6/4 CO-OPS Hawkins Point Wind Installed on Bridge Remnant
- 6/12 Port of Baltimore was fully re-opened



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