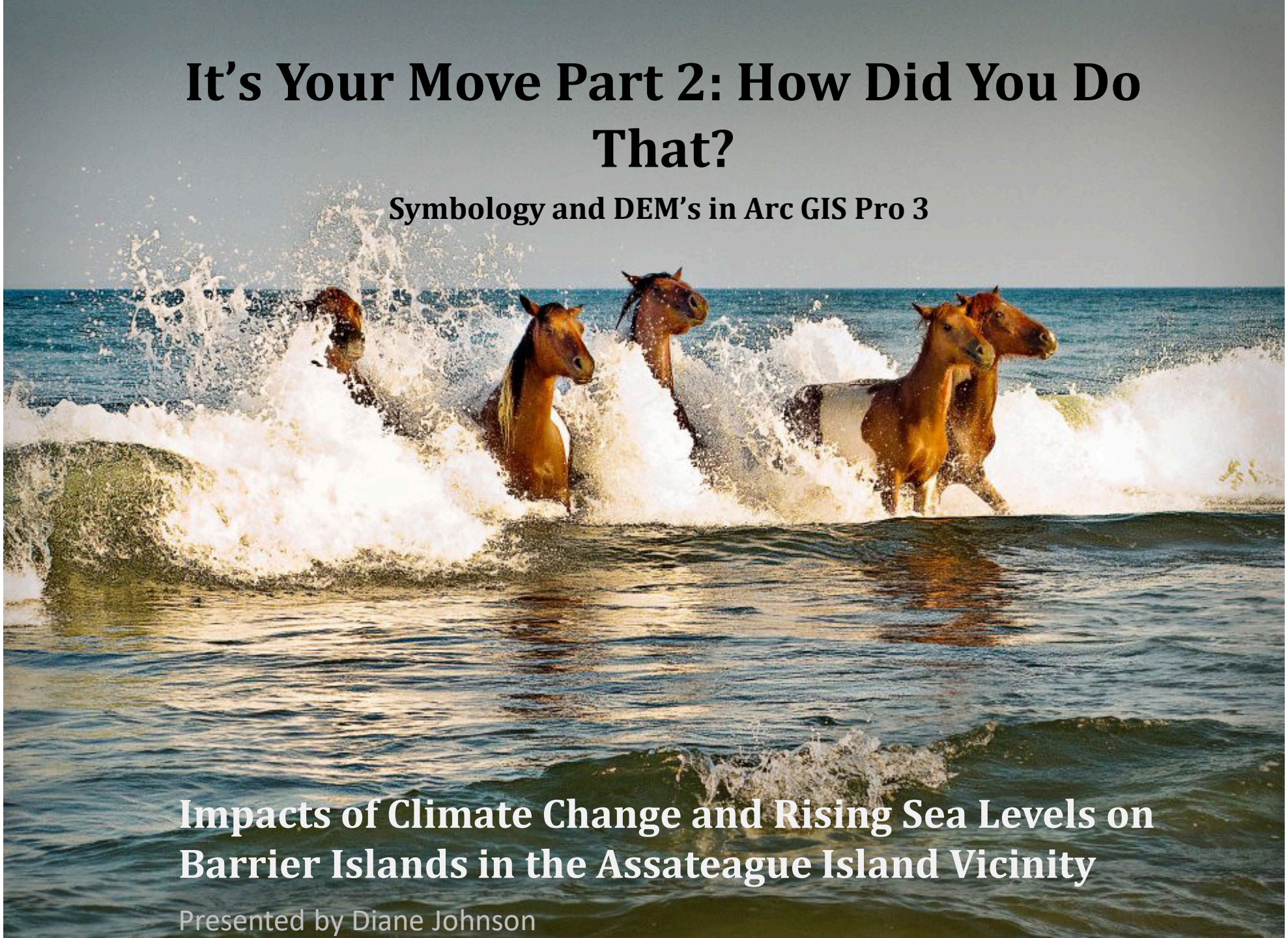
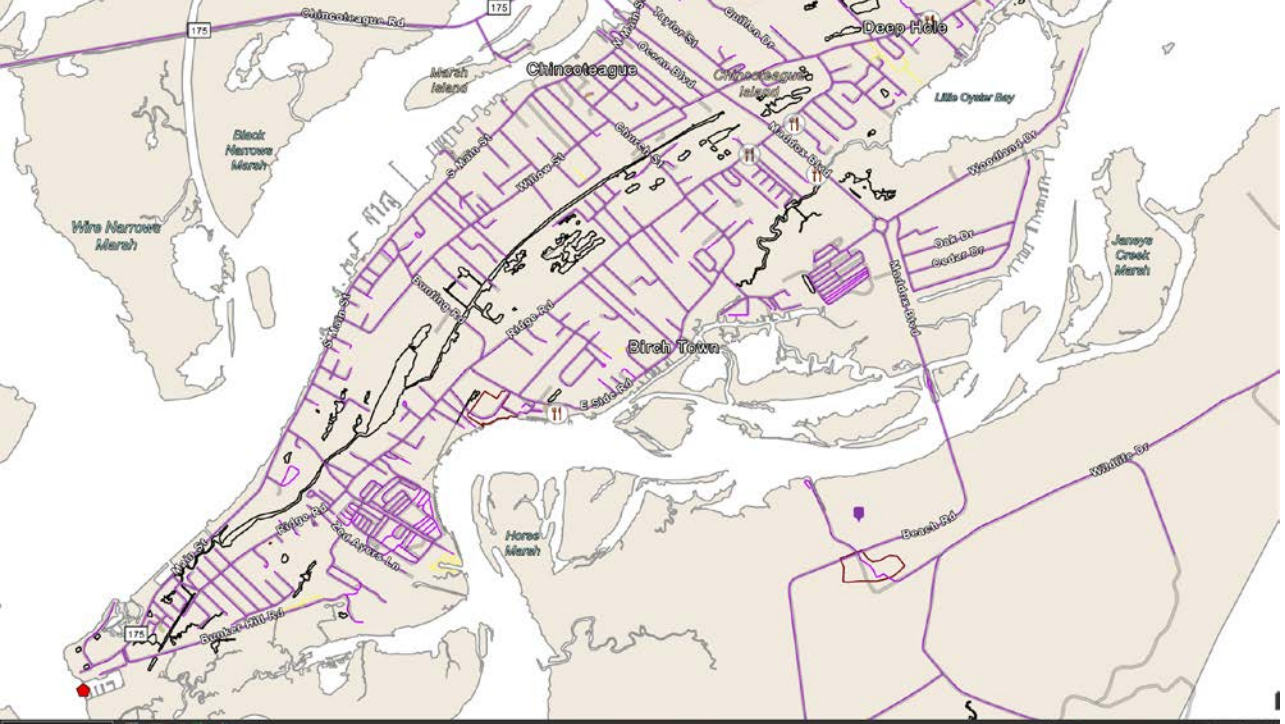
It's Your Move Part 2: How Did You Do That?

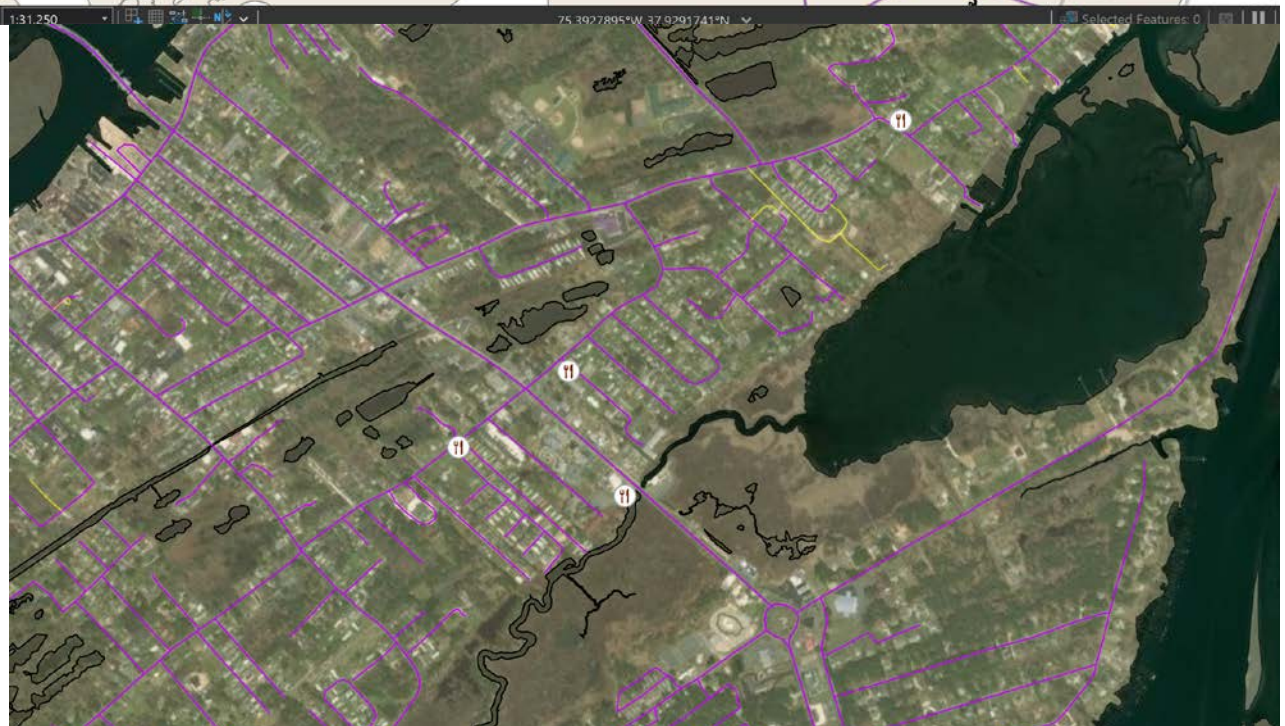
Symbology and DEM's in Arc GIS Pro 3



Impacts of Climate Change and Rising Sea Levels on Barrier Islands in the Assateague Island Vicinity

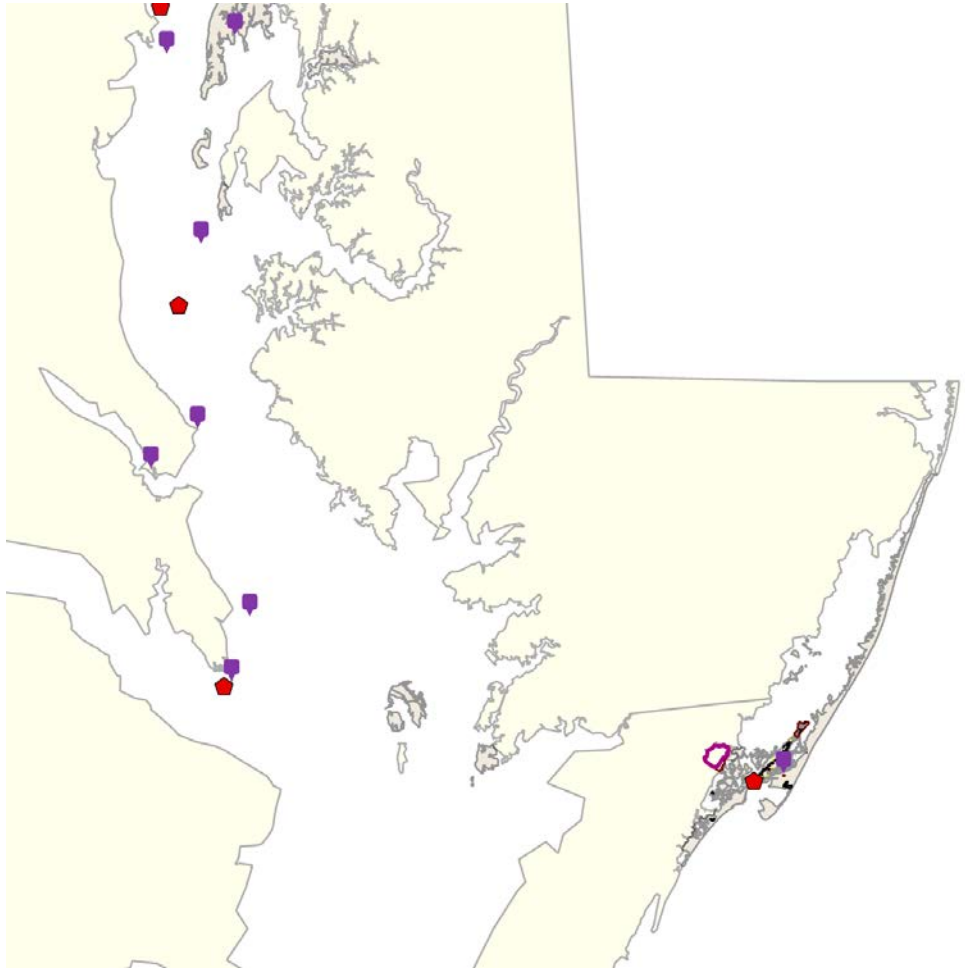
Presented by Diane Johnson



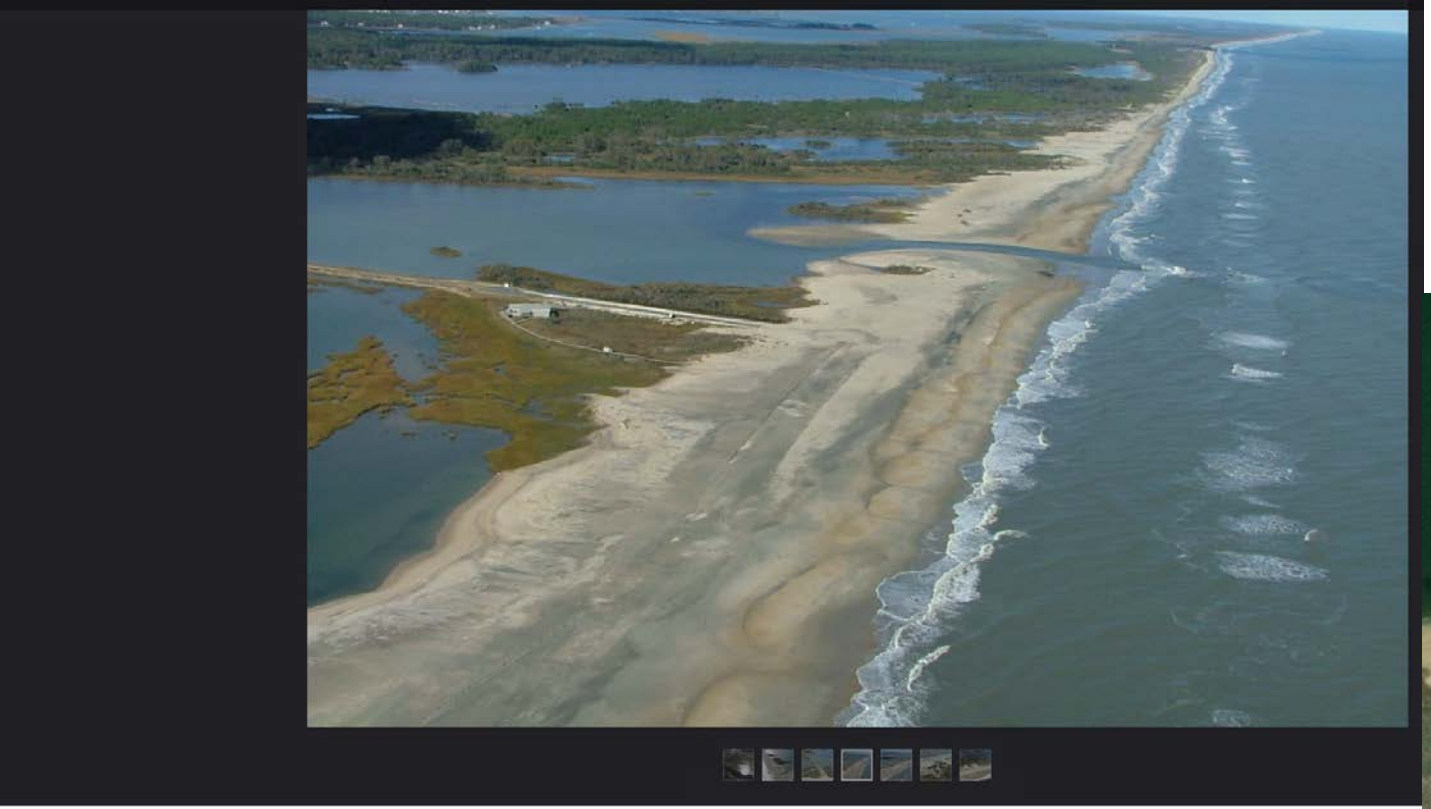


Creating a map of Chincoteague Island, Virginia for a friend and digitizing the Chesapeake Bay...

The following observations are my own. Scientific data regarding the area can be found at the following websites: noaa.gov; fema.gov; nasa.gov; usgs.gov; Chincoteague-va.gov; www.chesapeakebay.net.



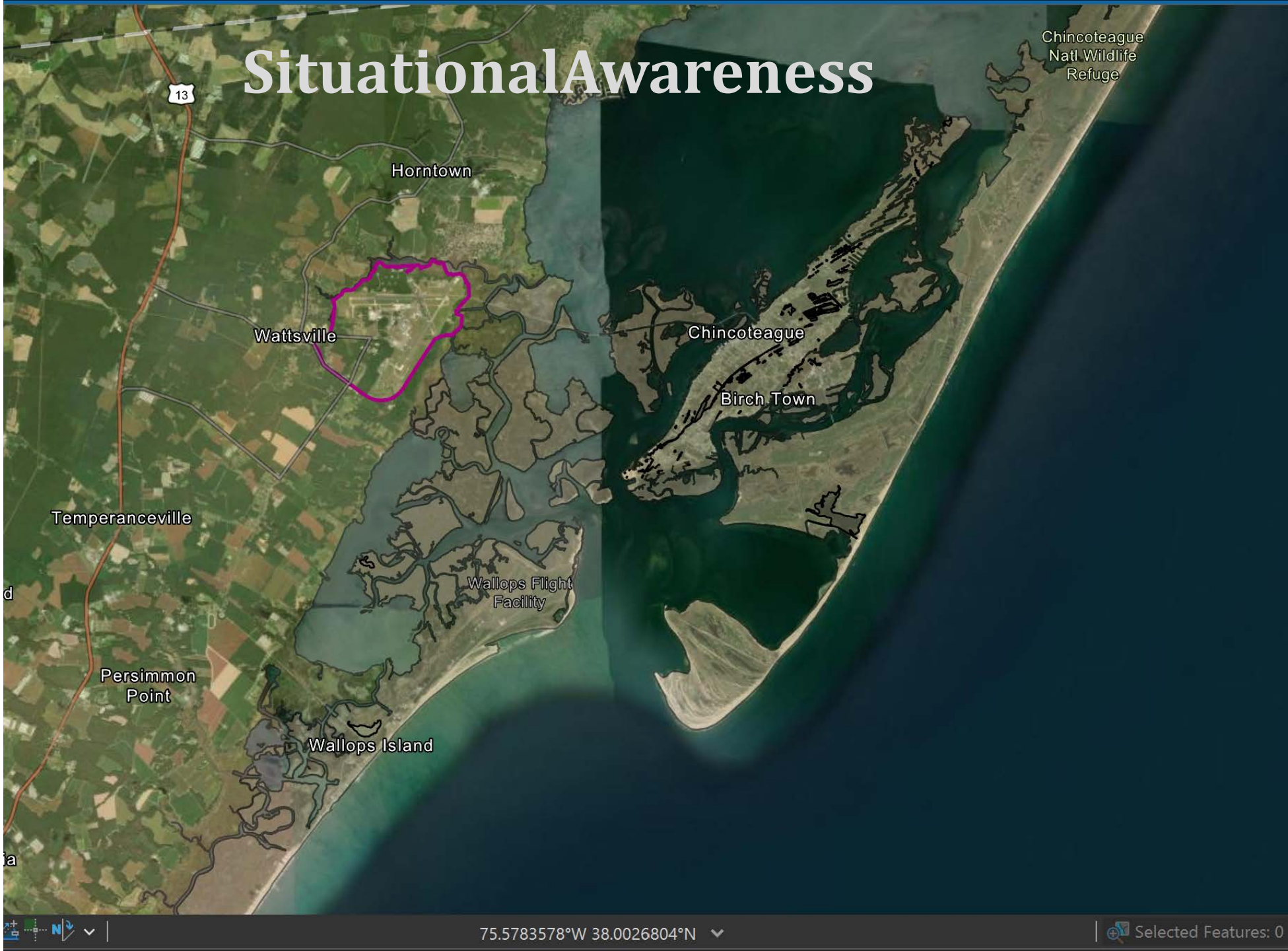
Assateague Island is a barrier island that faces the Atlantic Ocean and protects the east coasts of Maryland and Virginia

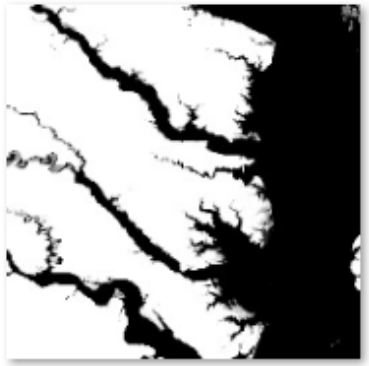


Washover from a storm surge. The ArcGIS satellite imagery on the right shows another washover, which could be from a high wave rather than storm surge. I created the maps using ArcGIS Pro 3.

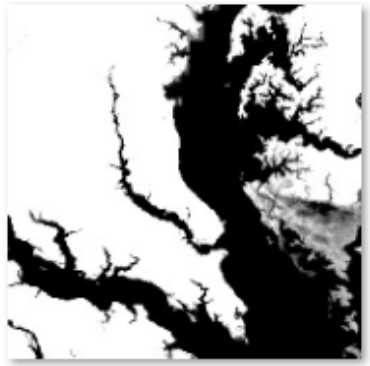
- area of NASA's Wallops Island Flight Facilities will bear the brunt of the Atlantic Ocean when or if the dune is breached.

- Chincoteague Island will experience major flooding as it has in the past during hurricanes.





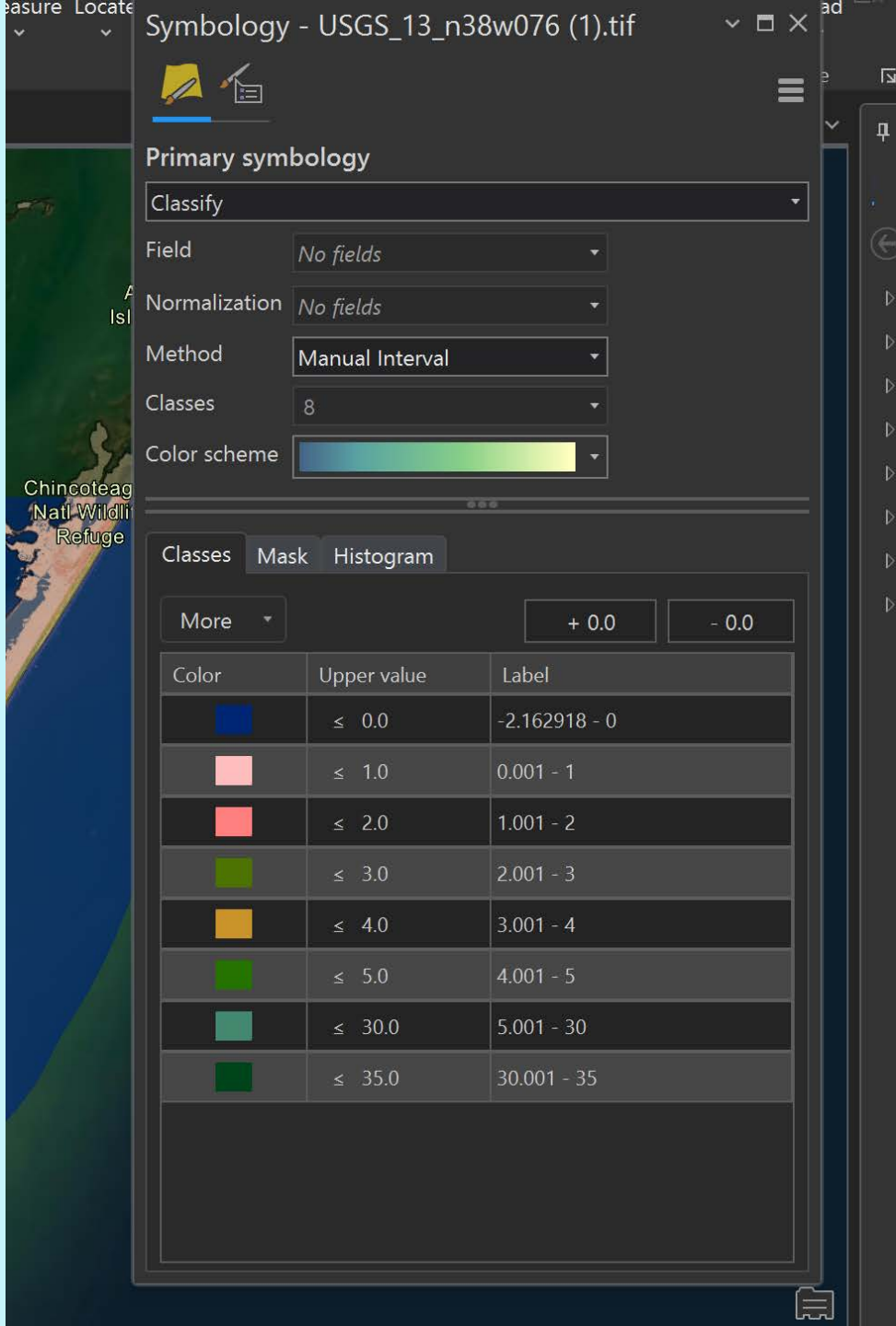
USGS_13_n38w077_20220713 (1)



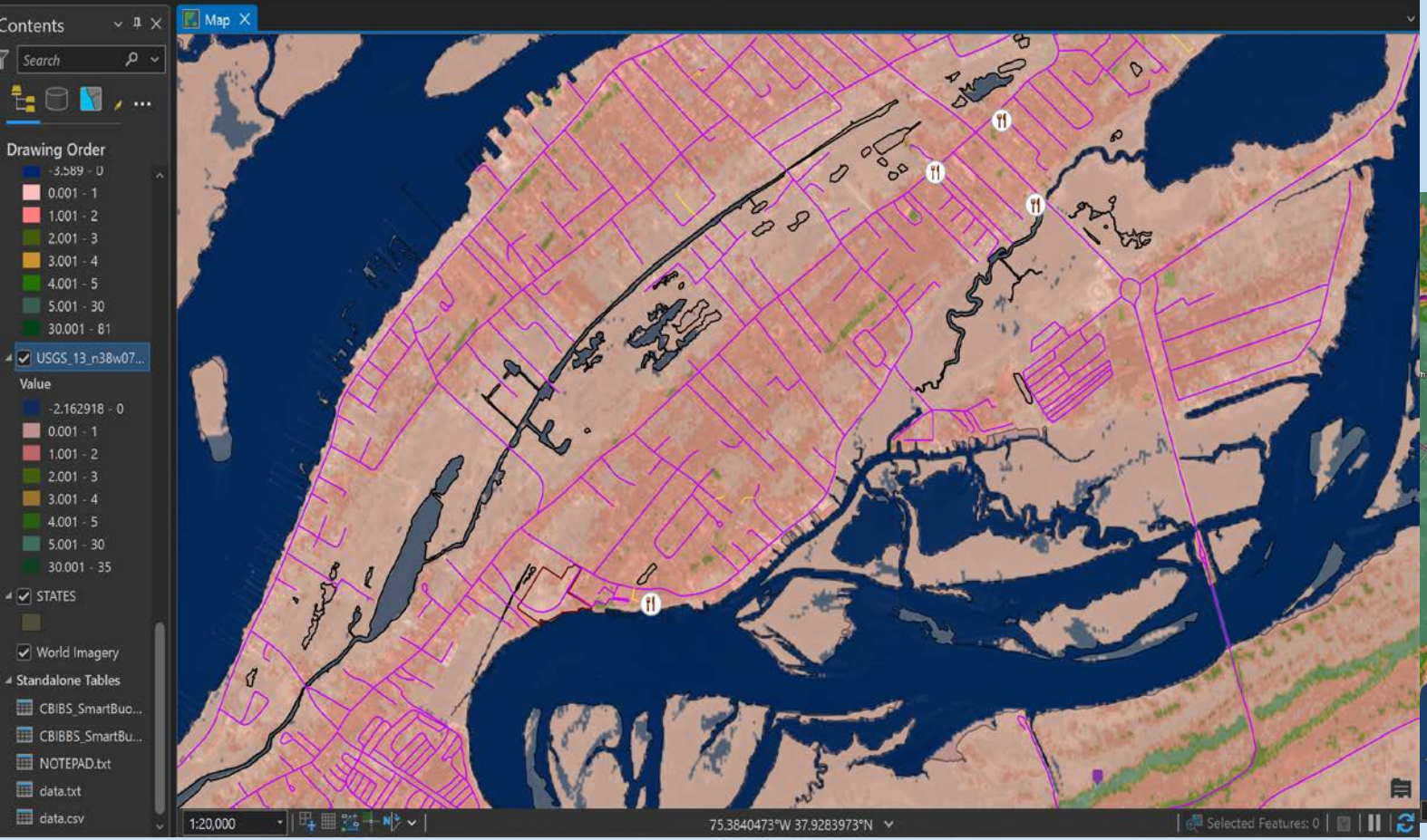
USGS_13_n39w077_20220713

Determining Elevation

- Download DEM's from the National Map Viewer and add to map.
- Highlight DEM, scroll to Symbology and select classify, Manual Interval, and choose 8 classes.
- Select colors that contrast significantly with water.
- I set upper limits in increments of below sea level to 1 meter increments. If you are working with inland DEM's, such as Oklahoma, set the increments to your needs and specifications.
  All measurements are in meters.



Presenting and Emphasizing Data



- Chincoteague Island is nearly entirely 2 meters or less above sea level.
- Population of approximately 2,000 people. https://www.cdc.gov
- Assateague Island is home to roughly 150 wild ponies, the
- Herbert H. Bateman Educational and Administrative Center and a lighthouse.
- Tourism, the famous wild ponies, and the seafood industry drive the economy https://chincoteague.com
- other factors: the continual cost of mitigation, recovery from floods, and sustainability

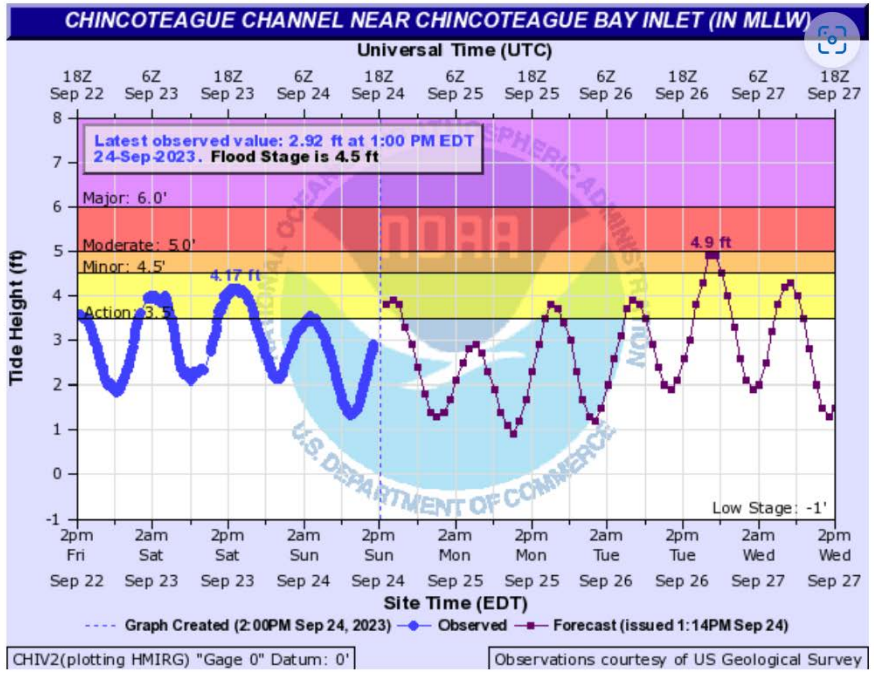
Chincoteague Causeway to Assateague, Virginia after hurricane damage. Taken 11/01/2012.

Photo by US Fish and Wildlife Service
Flickr.com/photos/usfwsnortheast/8145401453

Downtown Annapolis tidal flooding in Anne Arundel County, MD. October 29, 2021

Photo courtesy of the Chesapeake Bay Program

Station operated by U.S. Geological Survey (USGS)



Latitude: 37.9023 **Longitude:** -75.4078

NWS ID: CHIV2 **USGS ID:** 01484746

Click the appropriate station ID above to view real-time water level on either the National Weather Service (NWS) Advanced Hydrologic Prediction Service (AHPS) website or the U.S. Geological Survey (USGS) National Water Information System (NWIS) website (if available)

Chincoteague Channel flood stage is 4.5 feet. (1.372 meters)

Date of graph: 09/24/23

NATIONAL DATA BUOY CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME | OBSERVATIONS | INFORMATION | EDUCATION | NEWS | SEARCH | ABOUT

Station ID Search [ ] Go Station List

View the latest observations near Atlantic Tropical Storm Jose, Atlantic Hurricane Franklin and Atlantic Post-Tropical Cyclone Idalia.

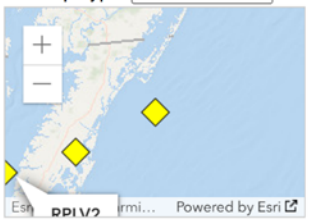
Station 44089 - Wallops Island, VA (224)

Owned and maintained by U.S. Army Corps of Engineers
Data provided by Scripps Institution of Oceanography
Waverider Buoy
37.754 N 75.325 W (37°45'15" N 75°19'30" W)

Site elevation: sea level
Sea temp depth: 0.46 m below water line
Water depth: 16.4 m

Right whales are active off VA from November to April. Speed restrictions of 10 knots apply to vessels 65 feet or greater in specific areas along the mid-Atlantic coast. To learn more about right whales and rules protecting them, go to: http://www.nmfs.noaa.gov/pr/shipstrike

Map Type: Oceans

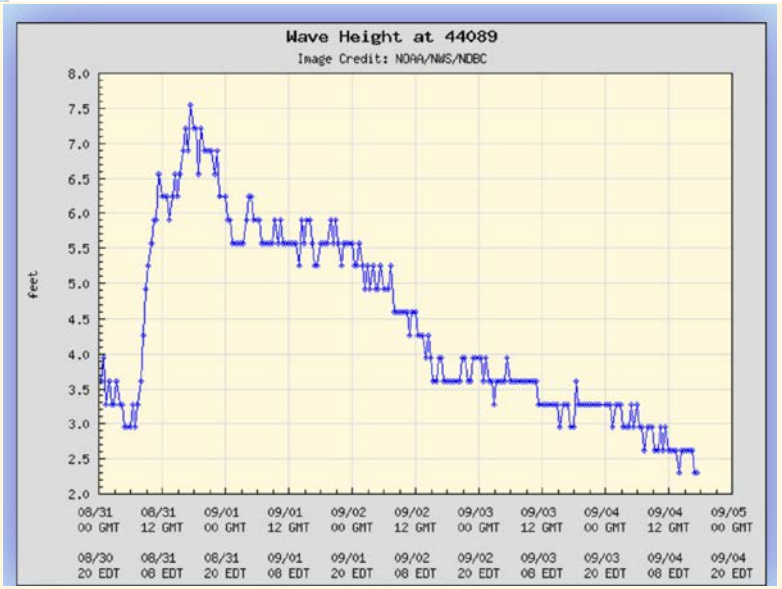


Large icon indicates selected station. Disclaimer
◇ Stations with recent data
◆ Stations with no data in last 8 hours
(24 hours for tsunami stations)

Latest NWS Marine Forecast

Search And Rescue (SAR) Data

Meteorological Observations from Nearby Stations and Ships



Conditions at 44089 as of (4:56 pm EDT) 2056 GMT on 08/31/2023:

Unit of Measure: Imperial Time Zone: Station Local Time Select

Click on the graph icon in the table below to see a time series plot of the last five days of that observation.

Wave Height (WVHT):	6.9 ft
Dominant Wave Period (DPD):	7 sec
Average Period (APD):	5.0 sec
Mean Wave Direction (MWD):	ENE (62 deg true)
Water Temperature (WTMP):	71.8 °F

TIME (EDT)	WDIR	WSPD kts	GST kts	WVHT ft	DPD sec	APD sec	MWD	PRES in	PTDY in	ATMP °F	WTMP °F	DEWP °F	SAL psu	VIS nmi	TIDE ft
2023-08-31 04:26 pm	-	-	-	6.9	7	5.0	ENE	-	-	-	71.8	-	-	-	-
2023-08-31 03:56 pm	-	-	-	6.9	7	5.1	ENE	-	-	-	71.8	-	-	-	-
2023-08-31 03:26 pm	-	-	-	7.2	7	5.0	ENE	-	-	-	71.6	-	-	-	-
2023-08-31 02:56 pm	-	-	-	6.6	7	4.9	ENE	-	-	-	71.6	-	-	-	-
2023-08-31 02:26 pm	-	-	-	7.2	7	5.2	ENE	-	-	-	71.6	-	-	-	-
2023-08-31 01:56 pm	-	-	-	7.2	6	5.1	ENE	-	-	-	71.2	-	-	-	-
2023-08-31 01:26 pm	-	-	-	7.5	7	5.1	ENE	-	-	-	71.1	-	-	-	-
2023-08-31 12:56 pm	-	-	-	6.9	7	5.0	ENE	-	-	-	70.9	-	-	-	-
2023-08-31 12:26 pm	-	-	-	7.2	7	5.0	ENE	-	-	-	70.9	-	-	-	-
2023-08-31 11:56 am	-	-	-	6.9	5	4.9	NE	-	-	-	71.1	-	-	-	-
2023-08-31 11:26 am	-	-	-	6.6	6	5.0	NE	-	-	-	71.4	-	-	-	-
2023-08-31 10:56 am	-	-	-	6.2	6	4.9	ENE	-	-	-	71.2	-	-	-	-
2023-08-31 10:26 am	-	-	-	6.6	6	5.0	ENE	-	-	-	71.2	-	-	-	-

Buoy, Ship, and Meteorological Observations

These wave measurements were taken by NOAA/U.S. Army Corps of Engineers Smart Buoys on August 31, 2023, in the wake of Hurricane Franklin and Hurricane/Tropical Storm Idalia.

https://www.sustainability.gov/pdfs/nasa-2021-cap.pdf

Center/Facility	Impact/Response Type	Year of Climate Impact/Recovery	Approximate Cost ($millions)
Johnson Space Center	Hurricane	2008	50.0
Johnson Space Center & Kennedy Space Center	Hurricane	2017	81.3
Kennedy Space Center	Hurricane	2004	126.0
	Structural Hardening	2018	25.0
	Hurricane	2017	74.7
	Dunes	2009–2019	100.0
		2012	18.0
		2019	11.4
Kennedy Space Center & Wallops Flight Facility	Dunes	2012	4.0
Langley Research Center*	Hurricane / Flooding	2003	146.0
		2004	5.0
		2009	44.0
Michoud Assembly Facility	Hurricane	2005	120.0
	Tornado	2017	109.0
	Hurricane	2020	152.0
Stennis Space Center	Hurricane	2005	205.0
	Hurricane	2020	22.3
Wallops Flight Facility	Dunes	2011–2012	43.0
		2012	11.0
	Flooding	2012	1.6
	Shoreline Stabilization	2020	23.7

*Includes funding for recovery at Langley Air Force Base

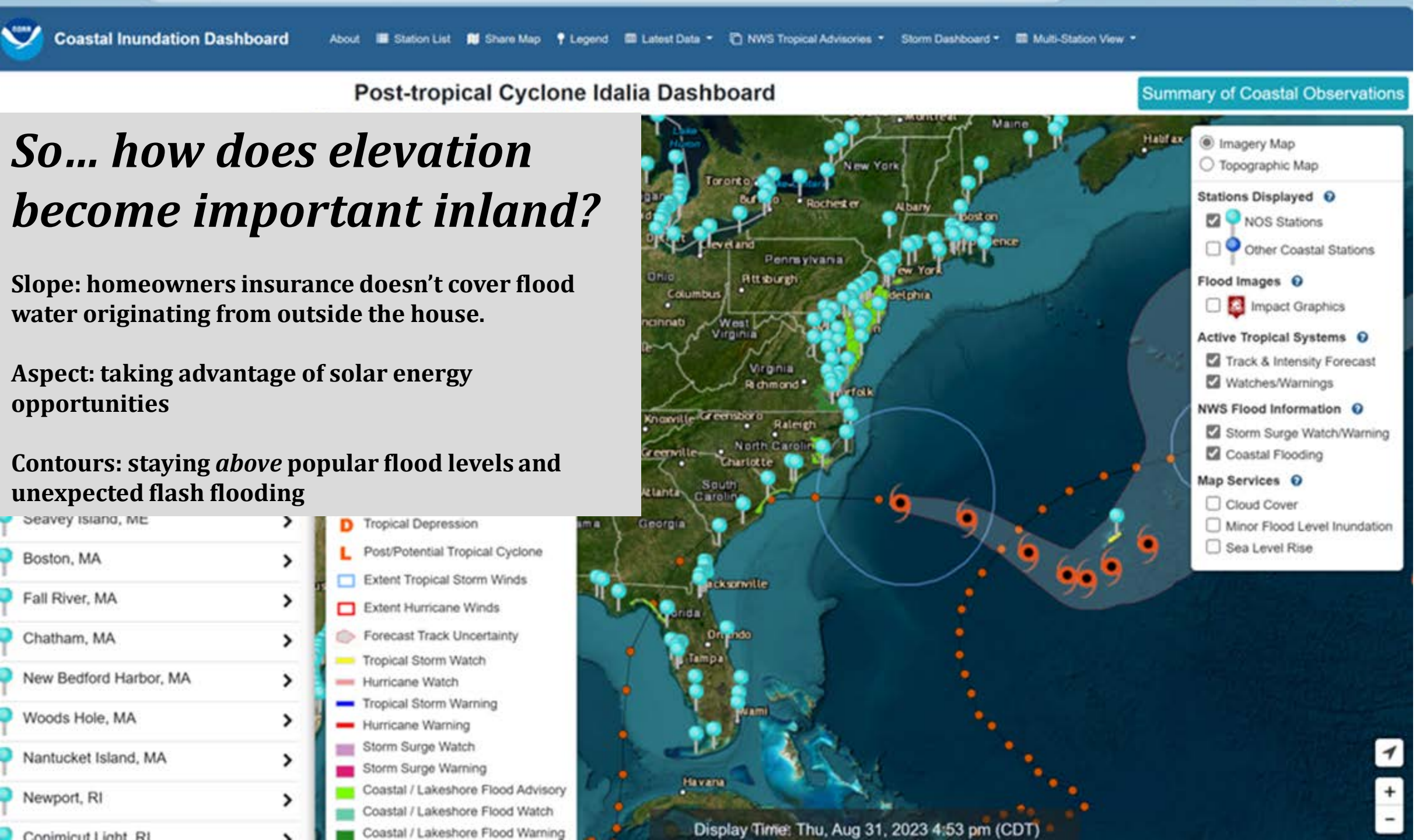
Table 1. NASA Disaster Recovery Expenditures (2003–2020)

The Cost

Sea-level rise in Somerset County, MD., on Smith Island –August 2, 2020. Elevation at high tide is 0.

Photo credit: Carlin Stiehl | Chesapeake Bay Program

Blue Crabs in Somerset County, MD.
Photo credit: Will Parsons | Chesapeake Bay Program


Coastal Inundation Dashboard
About
Station List
Share Map
Legend
Latest Data
NWS Tropical Advisories
Storm Dashboard
Multi-Station View
Post-tropical Cyclone Idalia Dashboard
Summary of Coastal Observations
So… how does elevation become important inland?
Slope: homeowners insurance doesn't cover flood water originating from outside the house.
Aspect: taking advantage of solar energy opportunities
Contours: staying above popular flood levels and unexpected flash flooding
Imagery Map
Topographic Map
Stations Displayed
NOS Stations
Other Coastal Stations
Flood Images
Impact Graphics
Active Tropical Systems
Track & Intensity Forecast
Watches/Warnings
NWS Flood Information
Storm Surge Watch/Warning
Coastal Flooding
Map Services
Cloud Cover
Minor Flood Level Inundation
Sea Level Rise
Seavey Island, ME
Boston, MA
Fall River, MA
Chatham, MA
New Bedford Harbor, MA
Woods Hole, MA
Nantucket Island, MA
Newport, RI
Tropical Depression
Post/Potential Tropical Cyclone
Extent Tropical Storm Winds
Extent Hurricane Winds
Forecast Track Uncertainty
Tropical Storm Watch
Hurricane Watch
Tropical Storm Warning
Hurricane Warning
Storm Surge Watch
Storm Surge Warning
Coastal / Lakeshore Flood Advisory
Coastal / Lakeshore Flood Watch
Coastal / Lakeshore Flood Warning
Display Time: Thu, Aug 31, 2023 4:53 pm (CDT)

Live Demonstration