https://www.flickr.com/statemaryland

Abstract:

Rising sea levels and catastrophic storms due to global climate change are forcing the relocation of inhabitants and businesses, such as NASA facilities, from low lying areas within the Chesapeake Bay Watershed. This poses a question regarding historic landmarks and traditions; where will they go?

Every year, a wild pony roundup takes place on Chincoteague Island. Ponies are herded by the "Saltwater Cowboys" on horseback to swim to a holding corral where they are later offered for auction to benefit the Chincoteague Volunteer Fire Company and reduce the herd size (Chincoteague.com). Where will the people connected to these places find a comparable space? With respect to climate change and population size, how urgent should planning be to meet these needs?

USGS DEMs were scaled to indicate elevation levels from below surface level to highest elevation for the region surrounding the Assateague and Chincoteague Islands, located off the eastern shores of Virginia and Maryland. There is little to no slope on the barrier islands and immediately to the west in the State of Virginia. The anticipated impact of climate change and catastrophic storms on the rich history and traditions of this area, as well as the economic and sociological impact is a cause of concern. Lifestyle changes, adaptation to safety precautions, and funding of mitigation measures are necessary.

Chincoteague Pony

- **Height: 13.2 to 14.2 hands weight: around 850 pounds**
- **Place of Origin: Assateague Island, VA.; Original stock likely from Spain**
- **Best suited for: pleasure riding, hunter events, driving (pony cart), trail riding, ideal first mounts for children.**
- **The Assateague herd on the Maryland side is managed by the National Park Service;**
- **The Chincoteague Volunteer Fire Company owns and maintains the Virginia herd.**

In 1922, two fires overwhelmed Chincoteague, destroying the town in both instances, because there were no firefighters on the island. Thus, the Chincoteague Volunteer Fire Company was created. Funds raised during the annual pony penning, auction, and Fire Company Carnival help to sustain and support, not only the fire company, but are also a huge stimulus to the economy of Chincoteague. In the 2015 Town of Chincoteague Comprehensive Plan, it was reported that Chincoteague tourism generates nearly 80% of Accomack County, Virginia's tax revenue contributions.

Town of Chincoteague Town Profile (https://Chincoteague-va.gov/2021-hazard-mitigation-plan)

Marguerite Henry's 1947 book, *Misty of Chincoteague,* probably plays a large part in the popularity of the island and ponies.

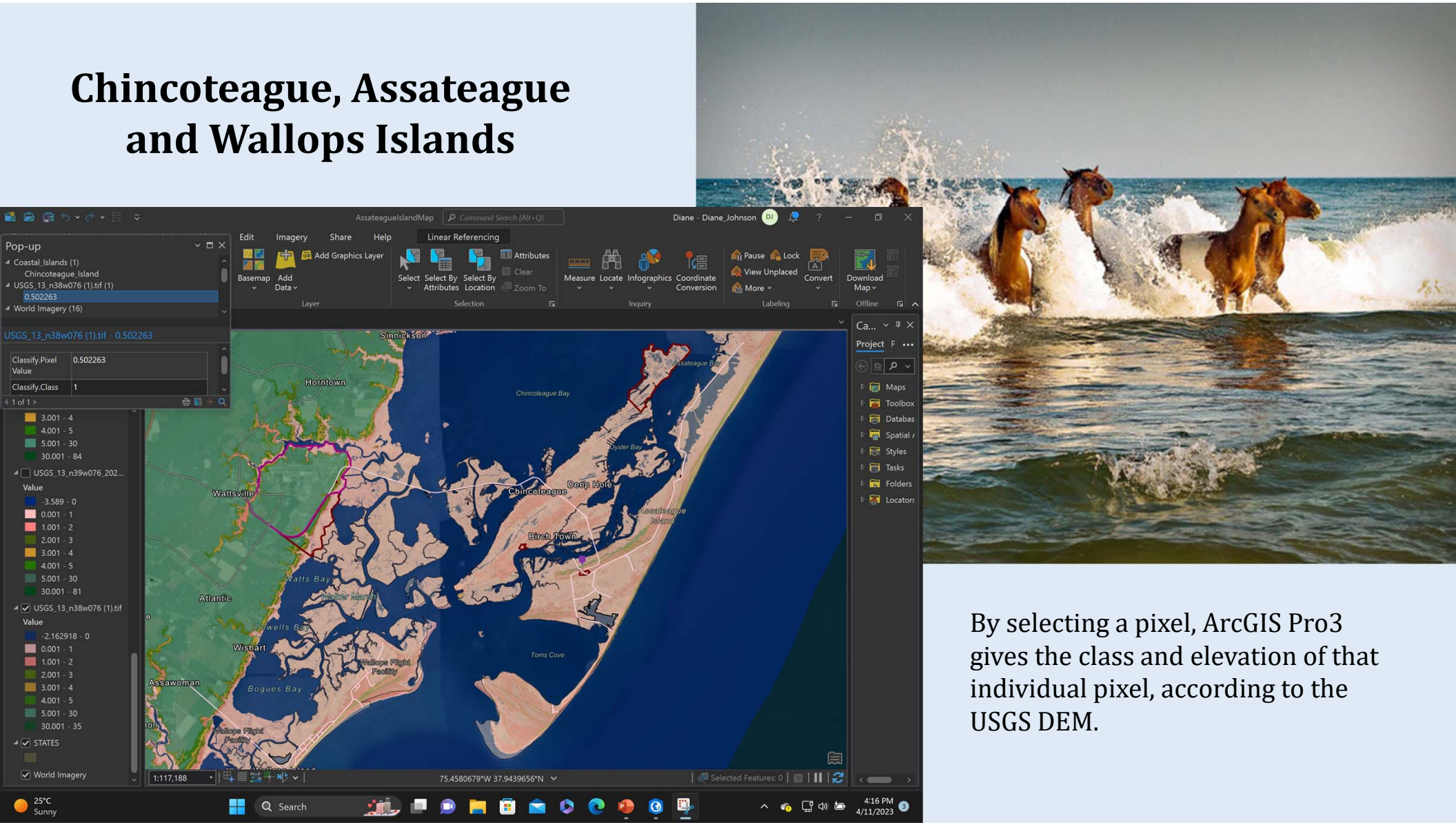
Breed Associations: National Chincoteague Pony Association https://pony-chincoteague.com
Chincoteague Pony Association https://Chincoteague-pony-association.square.site

Storey's Illustrated Guide to 96 Horse Breeds of North America by Judith Dutson; Photography by Bob Langrish D1

Slide 3

D1 Diane, 4/15/2023

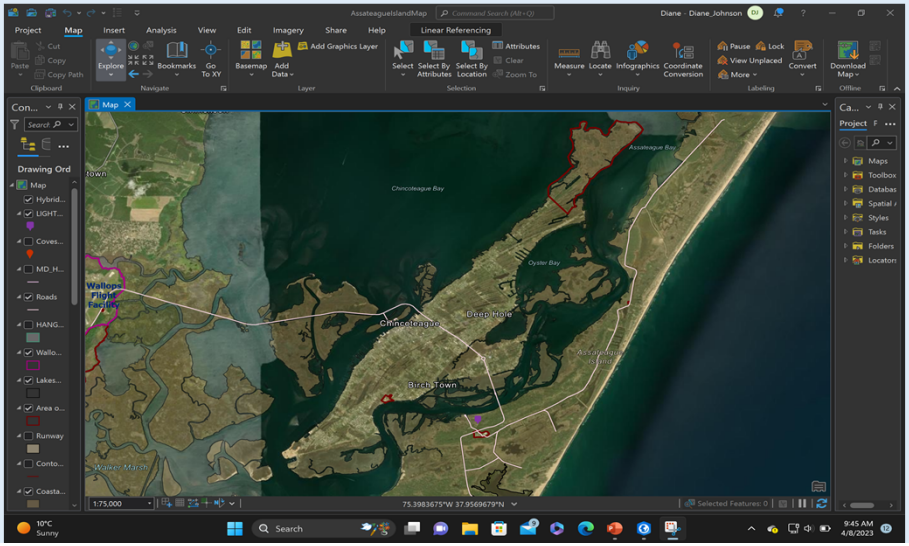
Chincoteague, Assateague and Wallops Islands



By selecting a pixel, ArcGIS Pro3 gives the class and elevation of that individual pixel, according to the USGS DEM.

Chincoteague and Assateague Islands

- **Barrier Islands located on the eastern seaward facing coast of Maryland and Virginia.**
- **Size: Assateague 37 miles long**
- **Chincoteague 37.3 square miles**
- **Tourism and the seafood industry are important to the economy**

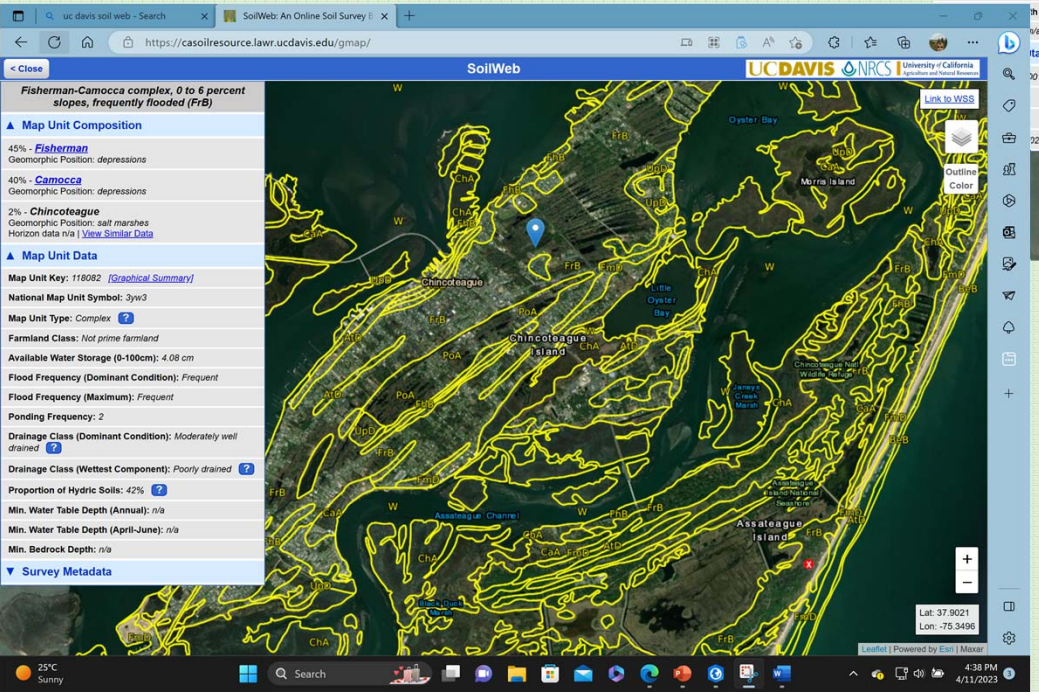


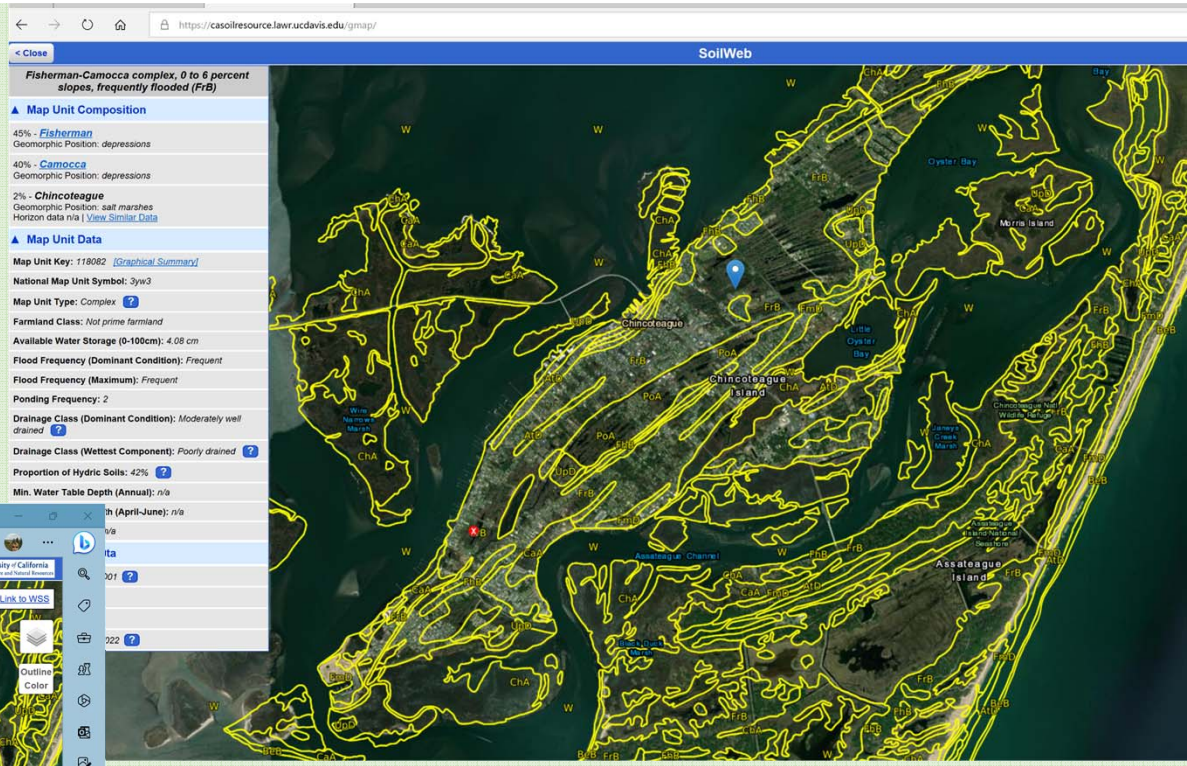
Erosion and washover by Tom's Cove
US Fish and Wildlife Service
Chincoteague National Wildlife Refuge (VA)
Photo 10/31/2012
Effects of storm surge, Chincoteague National Wildlife Ref… | Flickr

Soil Types

Composed of sand dunes, depressions, and salt marshes:

Fisherman – Comocca
Assateague fine sand
Comocca fine sand
Udorthent and Udipsamment
Fisherman Assateague
Polawana mucky sand loam
Chincoteague silt loam





Red X on Chincoteague

Red X on Assateague

[SoilWeb: An Online Soil Survey Browser | California Soil Resource Lab (ucdavis.edu)](https://casoilresource.lawr.ucdavis.edu/gmap)

https://casoilresource.lawr.ucdavis.edu/gmap

Housing Value

in Chincoteague town, Virginia

DP04

Measure	Value
Less than $50,000	15.6%
$50,000 to $99,999	1.4%
$100,000 to $149,999	0.0%
$150,000 to $199,999	8.5%
$200,000 to $299,999	19.2%
$300,000 to $499,999	44.5%
$500,000 to $999,999	10.8%
$1,000,000 or more	

Housing Occupancy

in Chincoteague town, Virginia

H1

Measure	Value
Occupied housing units	1,680
Vacant housing units	2,571

Accomack County, Virginia Population Estimates

2020: 33,388

2021: 33,364

2022: 33,191

Census.gov 2020

Climate: 30yr. average precipitation and temperatures

WALLOPS ISLAND FLIGHT FAC, VA

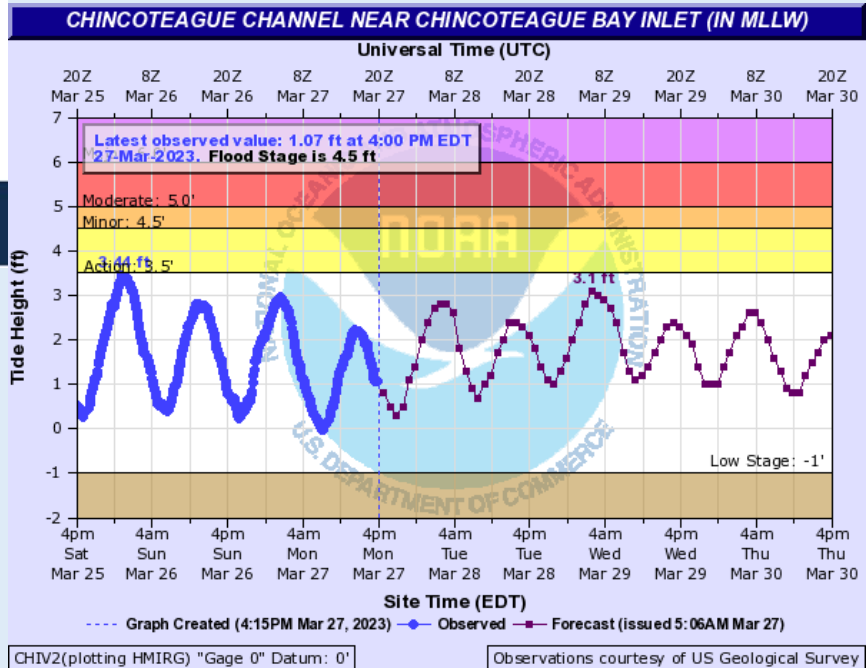
Get this data as .csv | .pdf
Station info: USW00093739

Season	MAX TEMP (°F)	MIN TEMP (°F)	AVG TEMP (°F)	PRECIP (IN)	SNOW (IN)
Annual	66.2	49.3	57.8	43.25	8.4
Winter	48.4	31.4	39.9	9.71	7.5
Spring	63.9	46.2	55.0	10.23	0.9
Summer	83.9	68.1	76.0	12.08	0.0
Autumn	68.8	51.7	60.3	11.23	0.0

National Centers for Environmental Information
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FOLLOW US

CONTACT US



Tides and Currents.noaa.gov
waterdata.usgs.gov
https://www.noaa.gov

Causes of Major Past Flooding

- **Global Sea Level Rise**
- **1880 – 2020; risen 8-9 inches**

- **Increased precipitation due to El Nino/ El Nina cycles**

- **Storm surges from catastrophic storms, such as hurricanes**

According to NOAA's Climate.gov site, high-tide flooding is now 300% to 900% more frequent than it was 50 years ago.

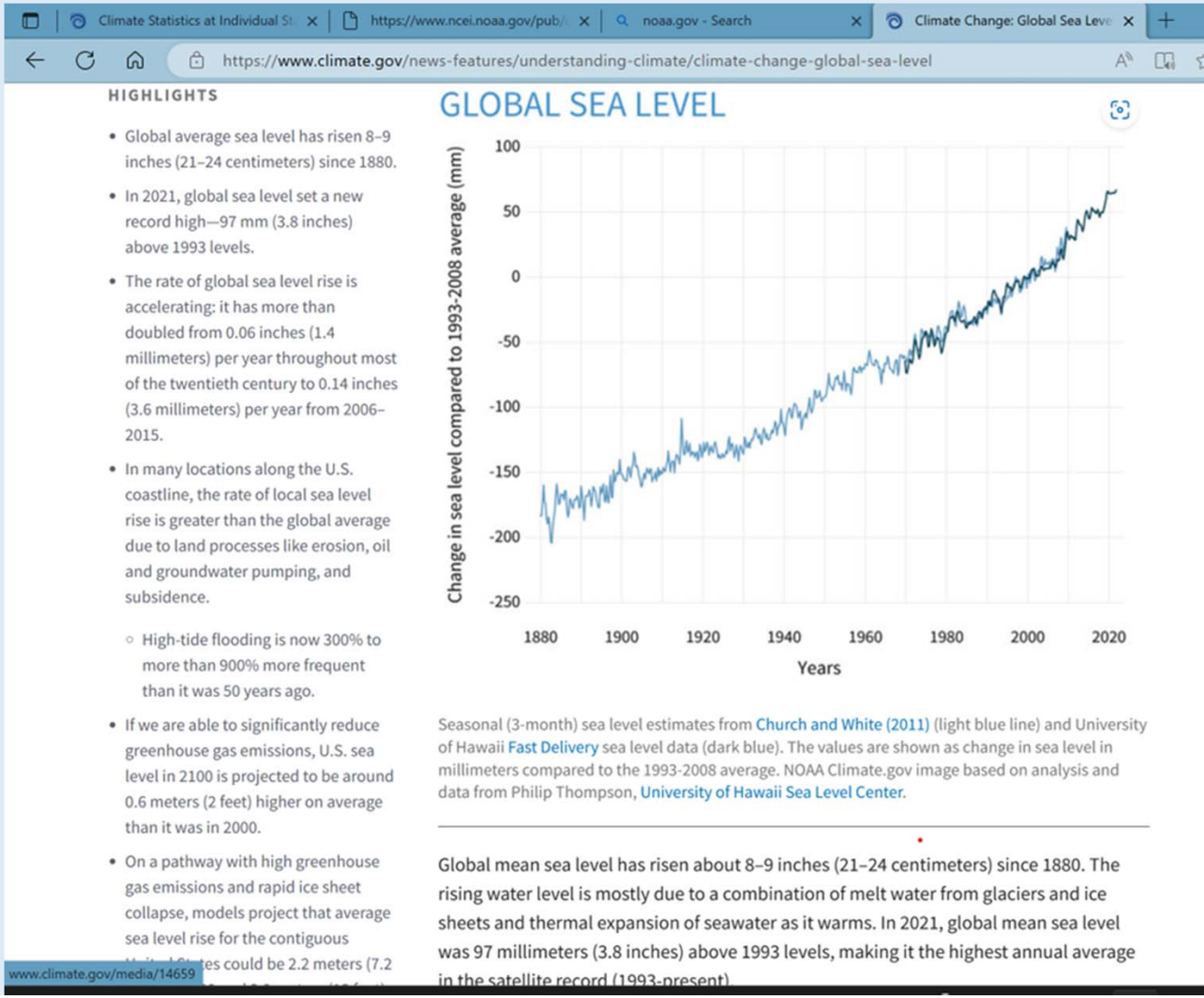
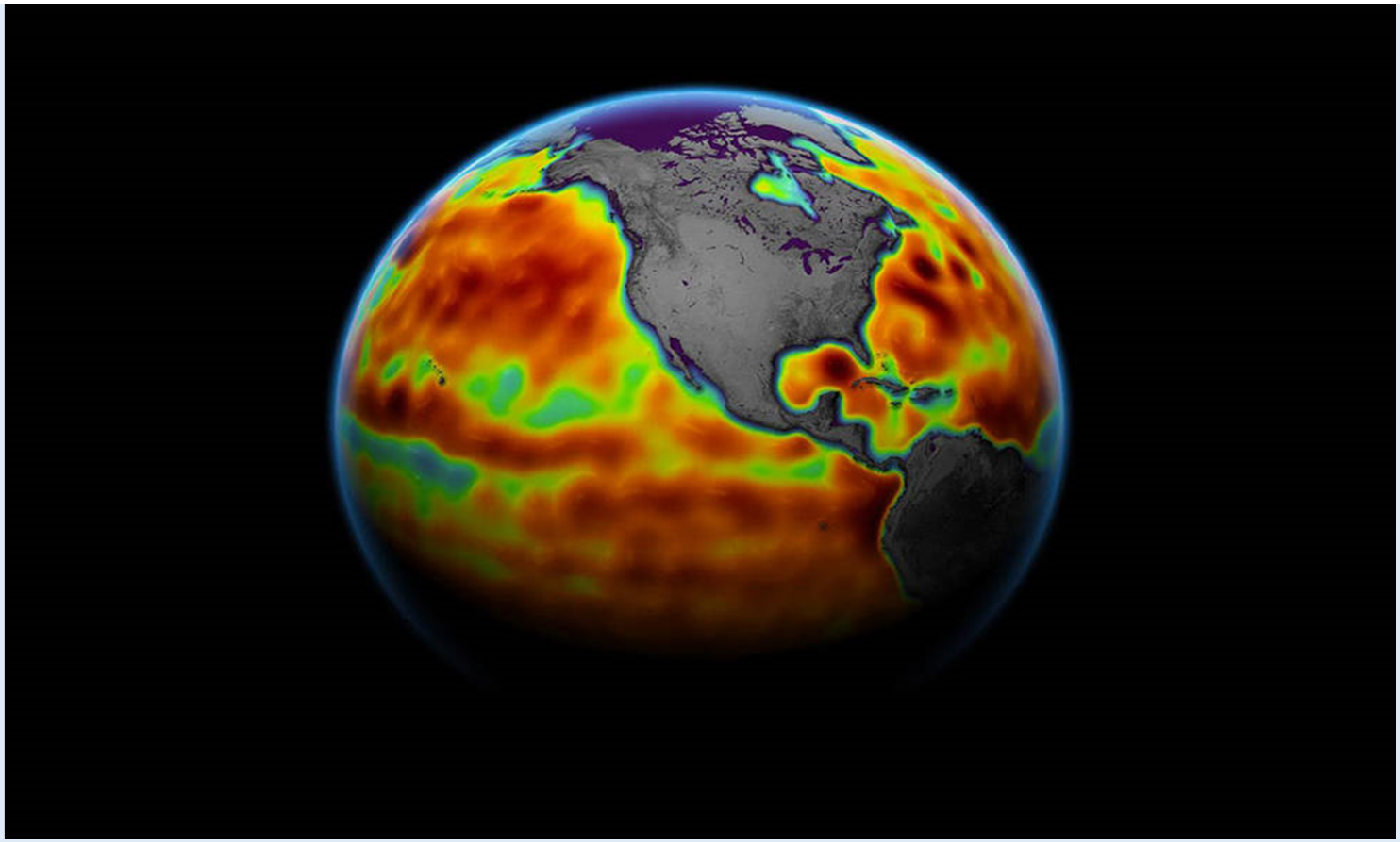


Table 3.1: Physical processes affecting U.S. coastal water levels and their temporal and spatial scale properties (modification of Sweet et al., 2017). Extreme water levels, which, as measured by tide gauges, generally exclude high-frequency wave effects, include processes between tsunami and ocean-basin variability and, to a lesser extent, low-frequency changes or trends associated with land ice melt/discharge, thermal expansion, and vertical land motion.

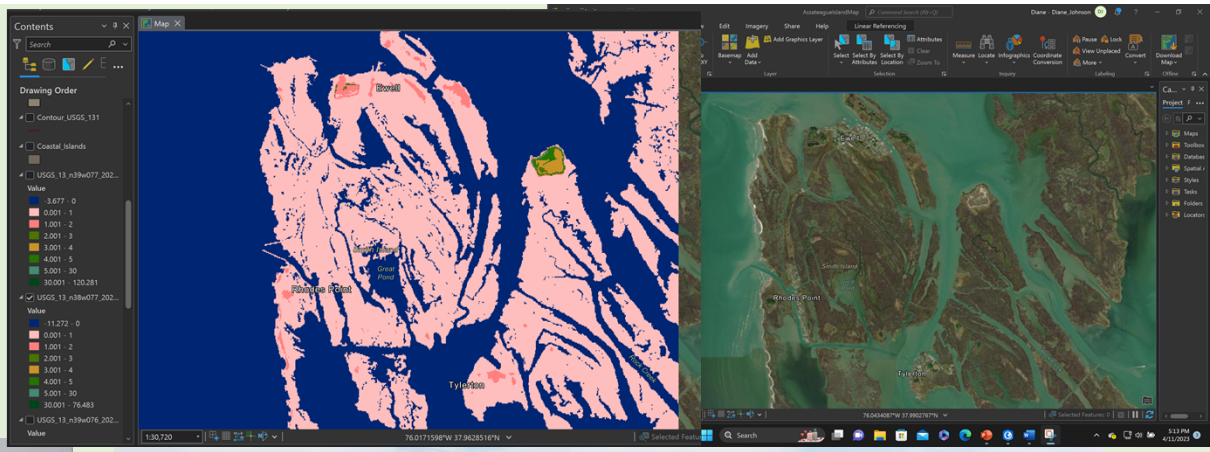
Physical Process	Spatial Scale			Temporal Scale	Potential Magnitude (yearly)
	Global	Regional	Local		
Wind Waves Effects	—	—	X	seconds to minutes	<10 m
Tsunami	—	X	X	minutes to hours	<10's of m's
Storm Surge (e.g., tropical and extra-tropical storms)	—	X	X	minutes to days	<10 m
Tides	—	X	X	hours to years	<15 m
Ocean/Atmospheric Variability (e.g., ENSO response)	—	X	X	days to years	<0.5 m
Ocean Gyre and Over-turning Variability	—	X	X	years to decades	<0.5 m
Land Ice Melt/Discharge	X	X	X	years to centuries	mm's to cm's
Thermal Expansion	X	X	X	years to centuries	mm's to cm's
Vertical Land Motion	—	X	X	minutes to centuries	mm's to m's

Recommended Citation: Sweet, W.V., B.D. Hamlington, R.E. Kopp, C.P. Weaver, P.L. Barnard, D. Bekaert, W. Brooks, M. Craghan, G. Dusek, T. Frederikse, G. Garner, A.S. Genz, J.P. Krasting, E. Larour, D. Marcy, J.J. Marra, J. Obeysekera, M. Osler, M. Pendleton, D. Roman, L. Schmied, W. Veatch, K.D. White, and C. Zuzak, 2022: Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines. NOAA Technical Report NOS 01. National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD, 111 pp. https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nostechrpt01-global-regional-SLR-scenarios-US.pdf



This image of Earth shows sea level measured by the Sentinel-6 Michael Freilich satellite in 2021. Red areas are regions where sea level is higher than normal while blue indicates where it's below normal. The satellite collects measurements for about 90% of Earth's ocean. Credit: NASA's Earth Observatory
https://sealevel.nasa.gov/

Images of flooded terrain Chesapeake Currents newsletter



Sea-level rise in Norfolk, VA 7/29/2017 Photo: Will Parsons/CBP

Smith Island at high-tide. Photo: Carlin Stiehl/CBP
https://www.flickr.com/photos/chesbayprogram/51225938614/

Cities, such as Norfolk, Virginia, located at the mouth of the Chesapeake Bay experience flood waters compounded by surface run off, riverine flooding, and subsidence.

Sea-level rise in Norfolk, Virginia. Taken on July 29, 2017

Photos: Skyler Ballard/CBP
All images used by permission from Chesapeake Bay Program.

Threat and Hazard Identification and Risk Assessment (THIRA)

- Which threats and hazards can affect our community?
- If they occurred, what impacts would those threats and hazards have on our community?
- Based on those impacts, what capabilities should our community have in place?

Conservating habitats within sustainable swaths of healthy, interconnected lands and waters, including, when feasible, relocating populations of species to more habitable locations based on changing conditions over time.
Climate Change Adaptation | U.S. Fish & Wildlife Service (fws.gov)

Credit: FEMA Resources for Climate Resilience

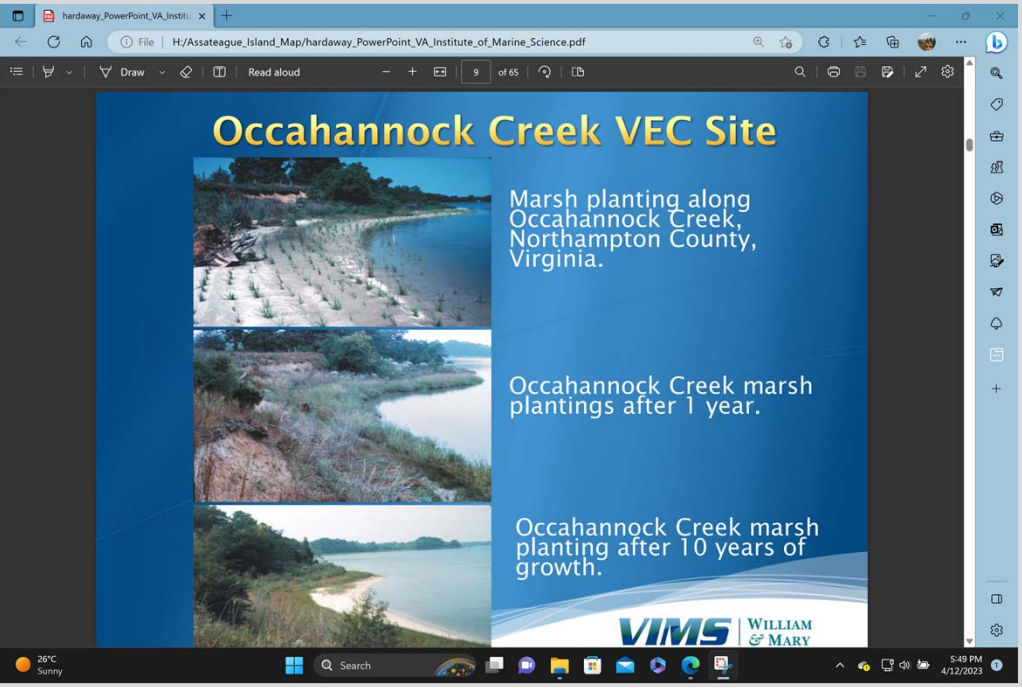
Poplar Island mitigation efforts provide nesting habitat for the American Black Duck and other bird species.

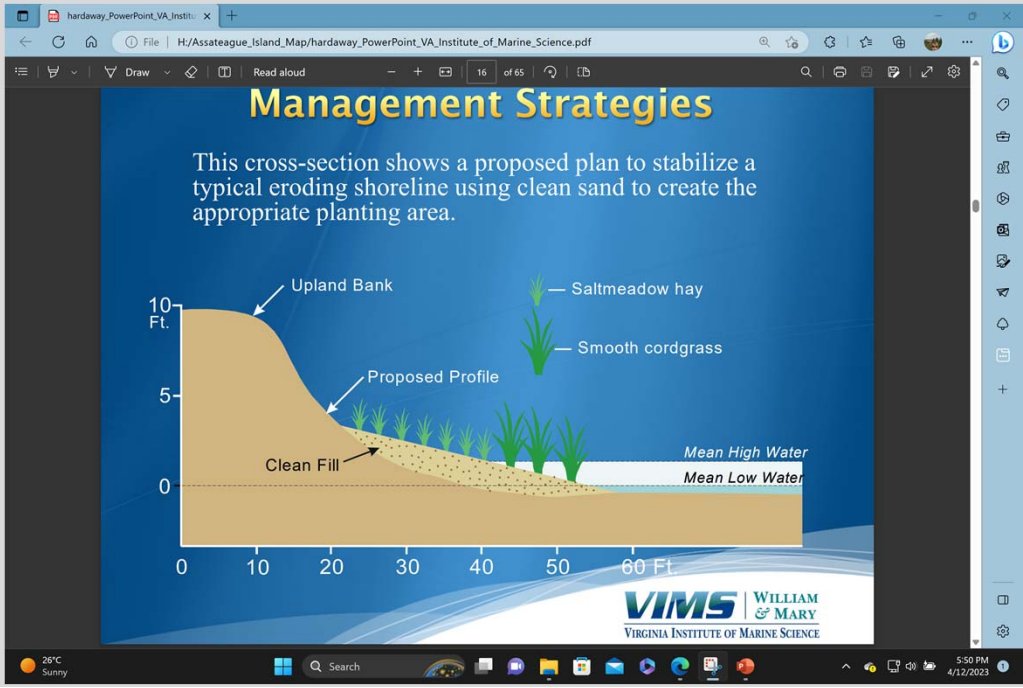
Poplar Island Photo: Will Parsons/CBP with aerial support by Southwings

Living shorelines, a historical perspective from Chesapeake Bay Virginia Institute of Marine Science

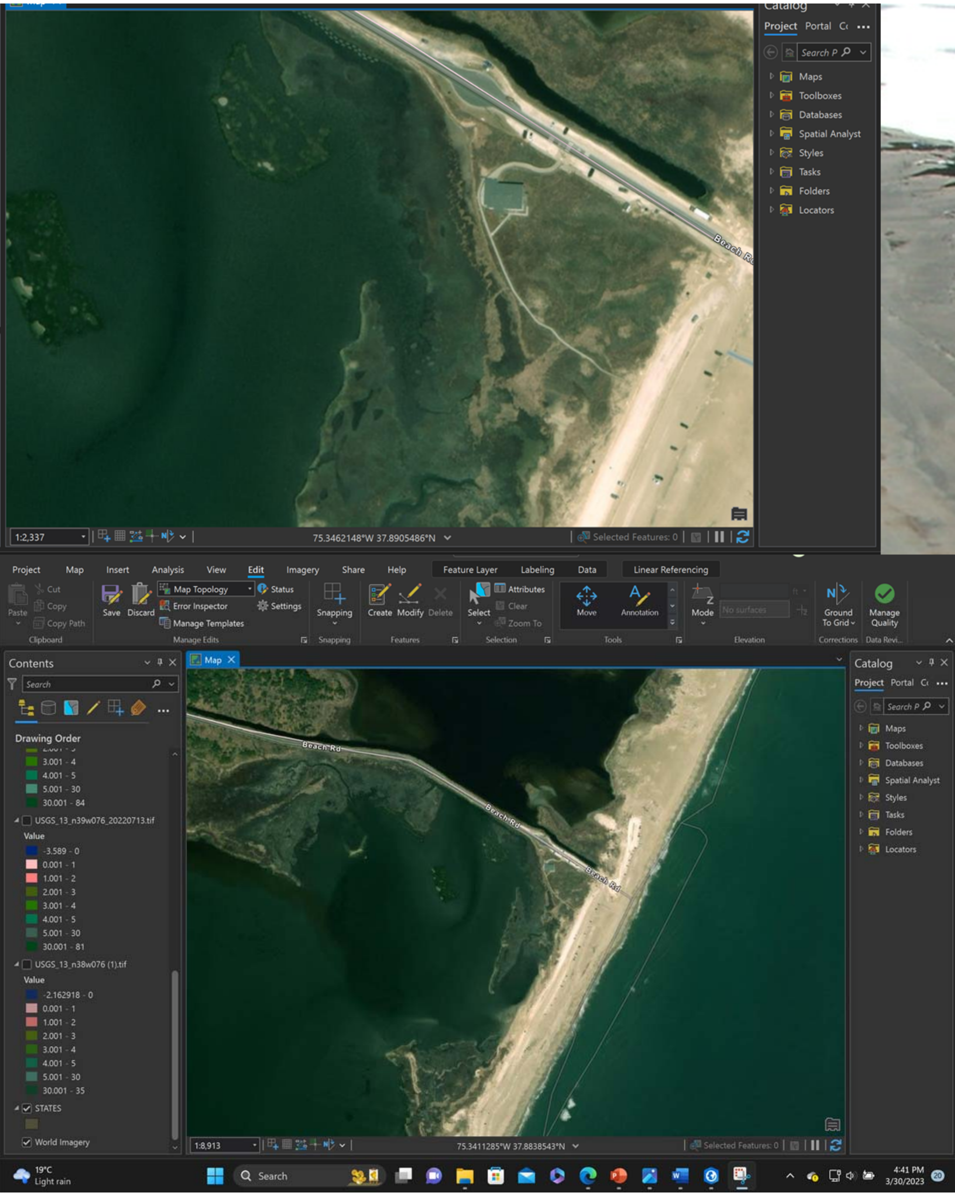
An example of "building community resilience with nature based solutions."

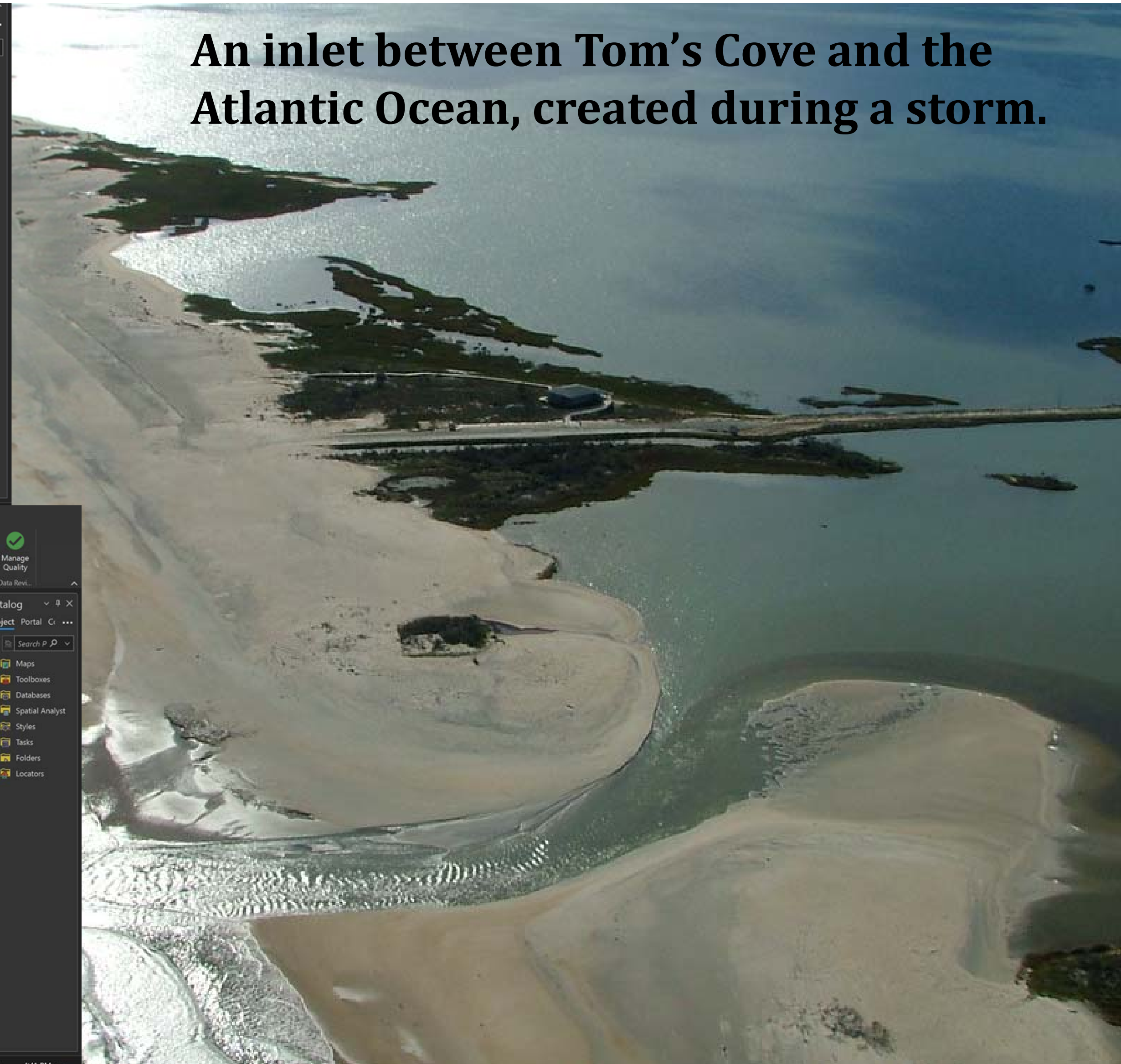
https://dnr.Maryland.gov/ccs/Documents/training/hardaway.pd





An inlet between Tom's Cove and the Atlantic Ocean, created during a storm.





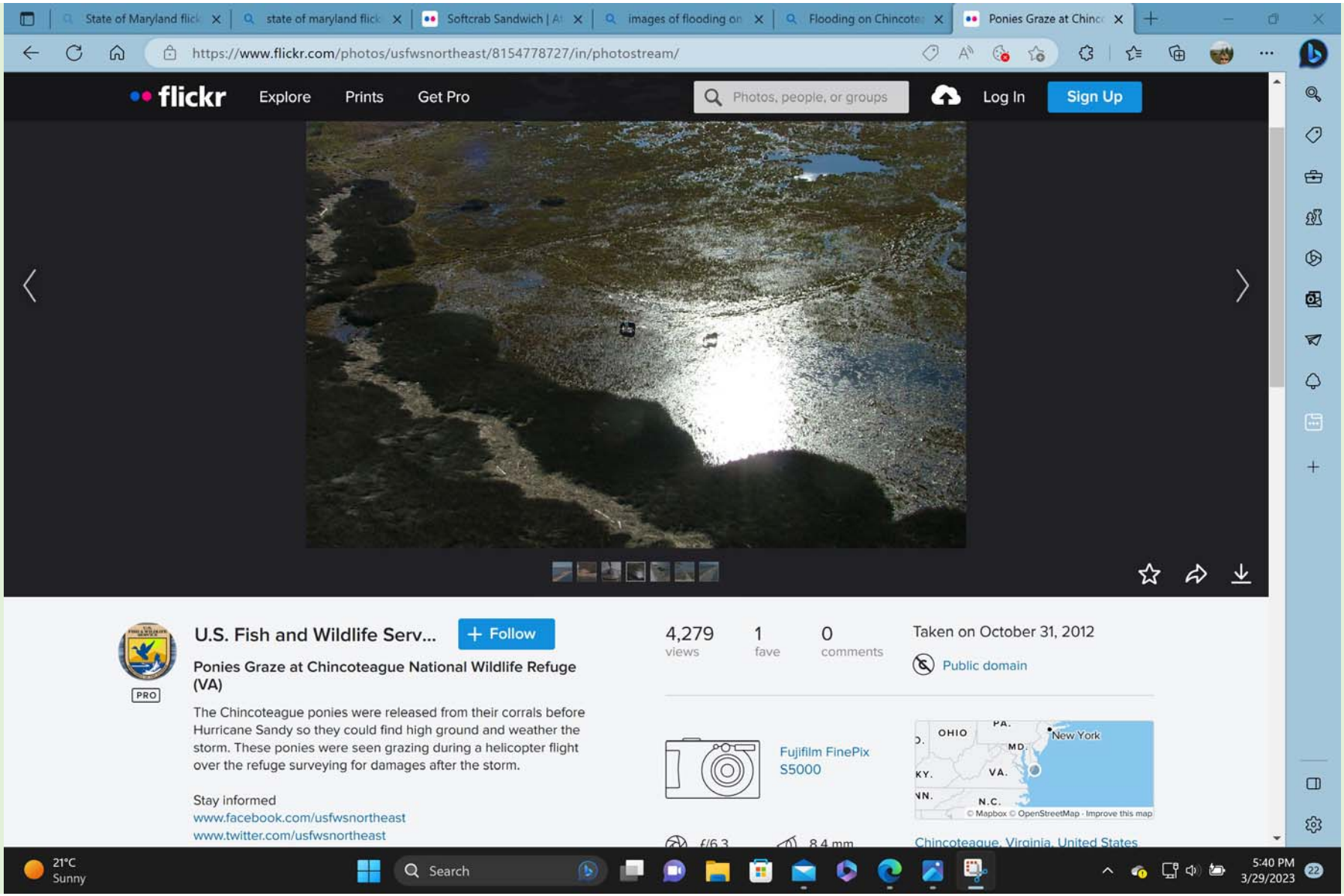
Erosion and washover by Tom's Cove
US Fish and Wildlife Service
Chincoteague National Wildlife Refuge (VA)
Photo 10/31/2012
Effects of storm surge, Chincoteague National Wildlife Ref… | Flickr

Infrastructure damage during Hurricane Sandy
October 29, 2012

Hurricane damage at Chincoteague National Wildlife Refuge (VA)
Road to Assateague.
U.S. Fish and Wildlife Service Northeast Region
#ChincoteagueVAHurricaneSandyDamages

www.facebook.com/usfwsnortheast
www.twitter.com/usfwsnortheast

Parking Lot 2, Chincoteague National Wildlife Refuge
Photo Credit: Jim Fair


flickr
Explore
Prints
Get Pro
Photos, people, or groups
Log In
Sign Up
U.S. Fish and Wildlife Serv...
+ Follow
PRO
Ponies Graze at Chincoteague National Wildlife Refuge (VA)
The Chincoteague ponies were released from their corrals before Hurricane Sandy so they could find high ground and weather the storm. These ponies were seen grazing during a helicopter flight over the refuge surveying for damages after the storm.
Stay informed
www.facebook.com/usfwsnortheast
www.twitter.com/usfwsnortheast
4,279 views
1 fave
0 comments
Taken on October 31, 2012
Public domain
Fujifilm FinePix S5000
f/6.3
8.4 mm
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N.C.
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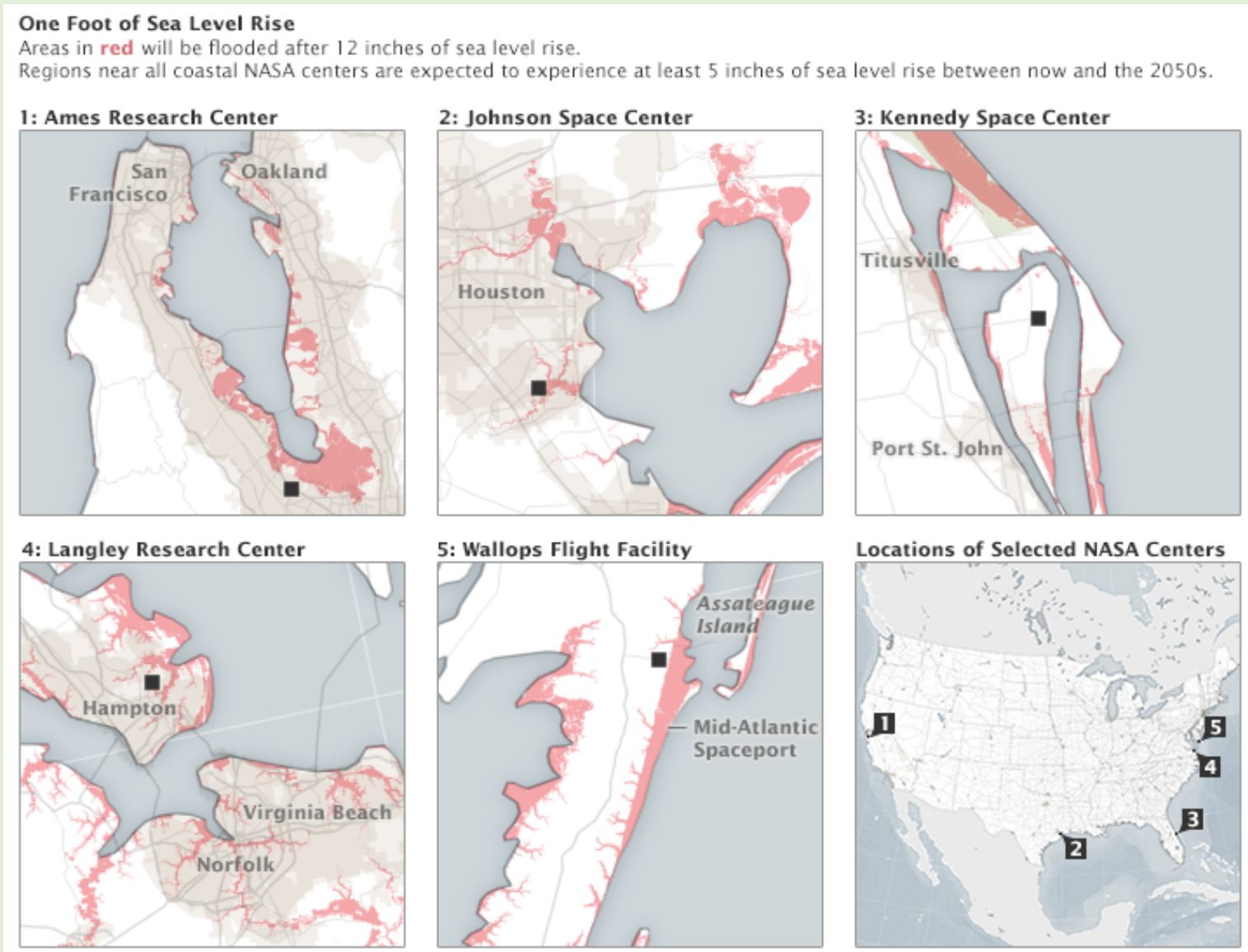
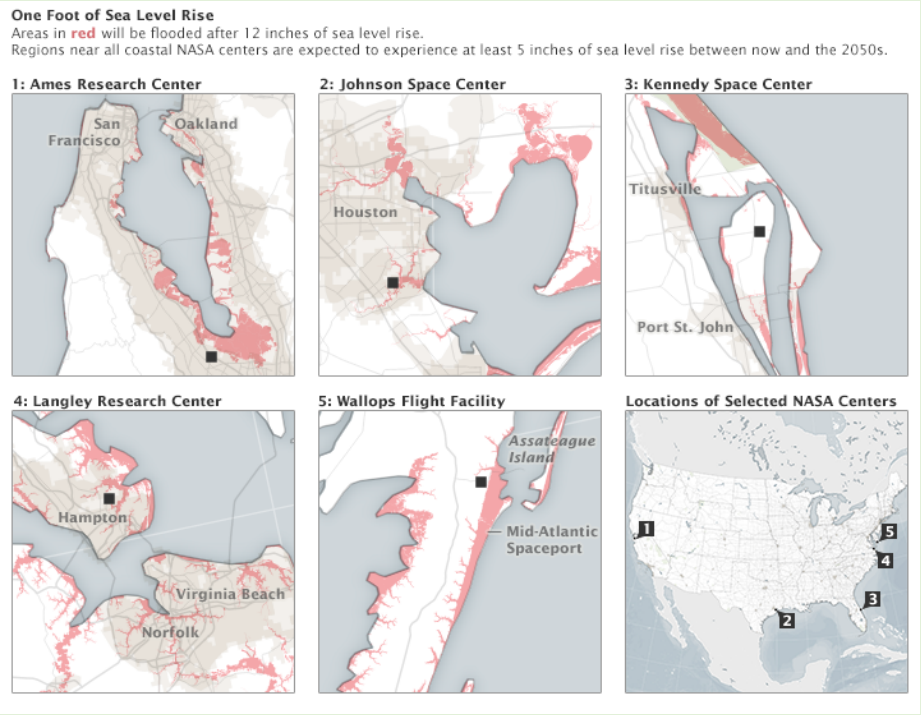
Chincoteague, Virginia, United States
21°C
Sunny
Search
5:40 PM
3/29/2023



NASA Earth Observatory article

Authored by Michael Carlowicz
Design by Joshua Stevens & Paul Przyborski
August 26, 2015



[Sea Level Rise Hits Home at NASA]

‘ “How do we fight Mother Nature for another fifty years?”’ said Kim Toufectis. His colleagues at each center and in the Office of Strategic Infrastructure – people with skills in civil and chemical engineering, urban planning, real estate, facilities construction and maintenance – must now weigh their options and develop long-range plans.

In some places, they will need to design smarter buildings; in others, they will retrofit and harden old infrastructure. If a facility must stay within sight of the water, then maybe the important laboratories, storage, or assembly rooms should not be on the ground floor. For the launch facilities, which must remain along the shore, beach replenishment, sea wall repair, and dune building may become part of routine maintenance.

But across the space agency, from lab manager to center director to NASA administrator, people will have to continually ask the question: is it time to abandon this place and move inland? It’s a question everyone with coastal property in America will eventually have to answer.”

Adapted From NASA Earth Observatory article

Authored by Michael Carlowicz
Design by Joshua Stevens & Paul Przyborski
August 26, 2015

House Financial Services Subcommittee on Housing and Insurance

Hearing broadcast on CSPAN March 10, 2023, regarding flood insurance proposals and ways to encourage more people to get flood insurance. Discussion of ways Congress can help with long term reauthorization of NFIP and affordable and accessible flood insurance for all.
Change the narrative so people know that flooding is possible in most areas. Public education is necessary. 99% of US counties are impacted by flooding yearly. ***There was $85 billion in damage and losses from floods in 2021 alone.***

Discussion about flood insurance policies:

1) Unaffordability
2) Limited awareness of flooding risk and not see a need to purchase insurance coverage
3) Enforced requirements to future flood risks for lenders
4) Flood insurance coverage in clearer language. Some people don't realize homeowner insurance may not cover flooding from outside sources.
5) Reduce risks that make purchasing flood insurance so expensive, such as thoughtful buyouts for repetitive loss properties.
6) Lack of transparency of data about properties and insurance properties. ***25% of flooding is outside of high risk zones.***

93% of flood insurance is through National Flood Insurance Program. The consensus is that those in attendance would like maps that are more accurate and so people can look at the geography and decide the risk.
"Congress must periodically renew the NFIP's statutory authority to operate. On Dec.29,2022, the president signed legislation passed by Congress that extends the NFIP' s authorization to September 30, 2023. The level of damage from recent catastrophic storms makes it clear that FEMA needs a holistic plan to ready the nation for managing the cost of flooding under the NFIP." (fema.gov)

So… what to do about preserving traditions, wild ponies, and the seafood industry ?

Destination

In the future, Chincoteague could provide the higher ground needed for the ponies to survive catastrophic storms as the barrier island of Assateague becomes more and more submerged and Assateague loses its protective benefits.

The Town of Chincoteague may find it necessary to relinquish the island to natural forces and create a wildlife refuge that is a destination rather than permanent residence, much in the same way that Assateague Island is not residential.

Carnivals and other celebrations and events could take place on the mainland of Virginia and in the interim, use that revenue to assist with property buyouts.

Whatever the future holds for coastal residents worldwide, adjusting to climate change and asking thoughtful questions based on data analysis and research will enable quality decision making as they:

- Evaluate options
- Alternative solutions
- Determine the impact and possible outcome of decisions

Photo: State of Maryland Department of Natural Resources

Critical Thinking Defined
https://www.thoughtco.com

Live demo: pan to lighthouses, etc.

Supplemental Resources

Climate Change | U.S. Fish & Wildlife Service (fws.gov)
coastal-barrier-resources-system-digital-mapping-pilot-project-fact-sheet (1).pdf
https://www.fws.gov/ ecological-services/habitat-conservation/ cbra/Act/Pilot.html
Chincoteague National Wildlife Refuge | Visit Us - Locations | U.S. Fish & Wildlife Service | FWS.gov
Chincoteague National Wildlife Refuge | About Us | U.S. Fish & Wildlife Service (fws.gov)
NASA
Jpl.nasa.gov
Wallops Island National Wildlife Refuge | U.S. Fish & Wildlife Service (fws.gov)
NASA Wallops to Host Information Outreach Event April 5 | NASA
Wallops Flight Facility | NASA
PFAS Environmental Testing at Wallops | NASA
NASA Study: Rising Sea Level Could Exceed Estimates for U.S. Coasts – Climate Change: Vital Signs of the Planet
State of Maryland Department of Natural Resources
https://dnr.maryland.gov/publiclands/Pages/eastern/Assateague/Wild-Ponies.aspx
Chincoteague
Contact Us – Town of Chincoteague (chincoteague-va.gov)
Chincoteague National Wildlife Refuge | An inlet between Swa… | Flickr
https://www.flickr.com/s/statemaryland

Supplemental Resources

CSPAN

MARCH 10, 2023

Hearing on Flood Insurance Coverage Proposals

Insurance and risk management experts testified on ways to encourage more people to get flood insurance before the House Financial Services Subcommittee on Housing and Insurance. They also discussed ways Congress could help make flood insurance more affordable and accessible to Americans. Several pending pieces of legislations including the reauthorization of the National Flood Insurance Program (NFIP) were also debated among the witnesses and lawmakers. The program's authorization goes until September 30, 2023.

Chesapeake Bay Program :https://www.flickr.com/photos/chesbayprogram/51888513730

Census.gov data on Chincoteague: https://data.census.gov/profile/Chincoteague_town,_Virginia?g=160XX00US5116512

Observation-based trajectory of future sea level for the coastal United States tracks near high-end model projections article

https://doi.org/10.1038/s43247-022-00537-z

USGS and NOAA

USGS | National WaterDashboard
https://coast.noaa.gov/digitalcoasts/tools/slr.html (a cool sea level rise slider that uses USGS DEM's)
2022 Sea Level Rise Technical Report (noaa.gov)
https://.oceanservice.noaa.gov Global and Regional Sea Level Rise Scenarios for the United States (pdf); has photo on cover of flooding on Smith Island as a result of 15-knot northerly winds.

https://www.thoughtco.com

Supplemental Resources

Alliance for the Chesapeake Bay

Virginia Institute of Marine Science – William and Mary
https://dnr.Maryland.gov/ccs/Documents/training/hardaway.pdf
Link courtesy of Sandra Olek at the State of Maryland Department of Natural Resources

For further inquiries:

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6150 Community Drive, Chincoteague Island, Virginia 23336
FOIA Requests:
Please direct all FOIA Requests to the FOIA Officer:
Michael T Tolbert PE, Town Manager
6150 Community Dr.
Chincoteague, Va. 23336
Email: mtolbert@chincoteague-va.gov
Phone: (757) 336-6519