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Hampton Roads Sea Level Rise/Flooding
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Prioritizing Natural and Nature-Based Features (NNBFs) that increase the resilience of Coastal Communities to Flooding

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Prioritizing natural and nature-based features (NNBFs) that increase the resilience of coastal communities to flooding

Pamela Mason



Hampton Roads Adaptation Forum
July 9, 2020



OFFICE FOR COASTAL MANAGEMENT
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NNBFs that enhance coastal flooding resilience

Goals

1. Support the preservation and creation of natural and nature-based features (NNBFs) as a component of coastal community resilience
2. Incorporate water quality and flood insurance services into the assessment for existing features
3. Support localities' decision-making by:
 - Identifying NNBFs that provide multiple benefits
 - Identifying target areas for new NNBF creation/restoration



NNBFs that enhance coastal flooding resilience

Goals

Three primary steps:

1. Map existing natural and nature-based features (NNBFs) and buildings at less than 10 feet elevation in the coastal zone
2. Identify and rank existing NNBFs that provide multiple benefits for communities
3. Identify target areas for new NNBFs to improve flood resilience



NNBFs that enhance coastal flooding resilience

Map Existing NNBFs and buildings

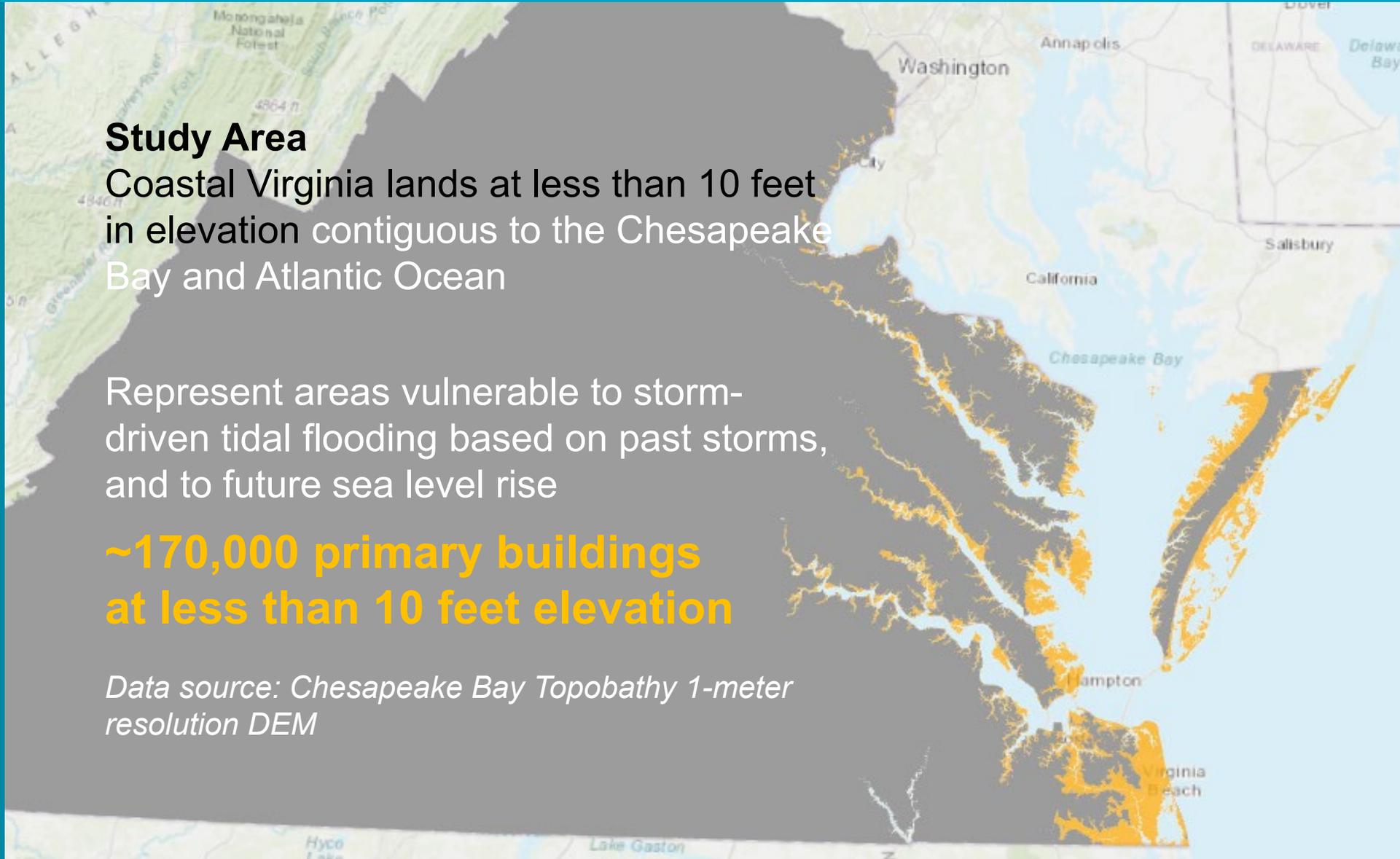
Study Area

Coastal Virginia lands at less than 10 feet in elevation contiguous to the Chesapeake Bay and Atlantic Ocean

Represent areas vulnerable to storm-driven tidal flooding based on past storms, and to future sea level rise

~170,000 primary buildings at less than 10 feet elevation

Data source: Chesapeake Bay Topobathy 1-meter resolution DEM

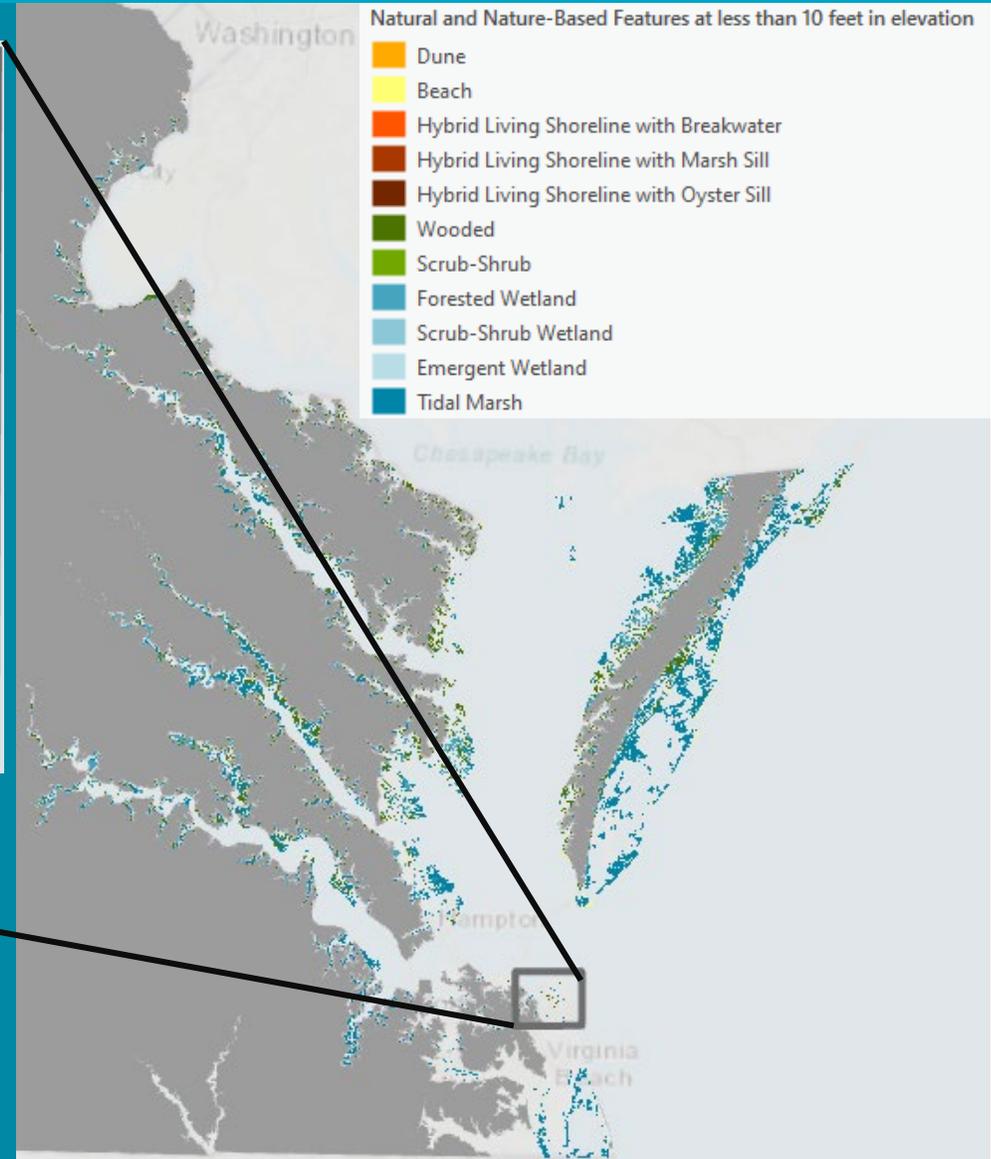


NNBFs that enhance coastal flooding resilience

Map Existing NNBFs and buildings



~ 350,000 NNBFs within study area



NNBFs that enhance coastal flooding resilience

Identify NNBFs that provide multiple benefits



How do we link NNBFs with buildings that they benefit?

Inundation Pathways (IPs)

...depict lowest elevation areas connecting the shoreline to buildings.

IPs represent where rising waters begin to flood onto the land, but *do not represent flooding extent.*

IPs depicted as multicolored lines. Building footprints are outlined in black.

NNBFs that enhance coastal flooding resilience

Identify NNBFs that provide multiple benefits



Using these IPs, we can find NNBFs that lie between the shoreline and building and in the path of rising water

For each NNBF, count the number of building IPs that intersect

→ This NNBF (tidal marsh) benefits 4 buildings

For each building, count how many NNBFs intersect its' IP

→ This building receives benefits from 2 NNBFs (a tidal marsh and a wooded area)

NNBF Types (on this map):

 Tidal Marsh

 Wooded

Building footprint

Inundation Pathway (IP)

NNBFs that enhance coastal flooding resilience

Identify NNBFs that provide multiple benefits

NNBF Ranking

Four components or measures:

1. NNBF flooding mitigation services
2. How many buildings does the NNBF benefit?
3. Are there any critical community facilities the NNBF benefits?
4. **Can the NNBF be used to take advantage of existing programmatic incentives?**

Each NNBF is assigned a normalized score of low, medium, or high for each of these four components.

Overall NNBF Score for Priority Ranking:			
<i>Add score for each category</i>			
	low	medium	high
1. NNBF Total Capacity <i>Flooding mitigation potential based on elevation and feature type.</i>	0-0.0008 (1-33 percentile)	0.008-0.4 (33-66 percentile)	>0.4 (66-100 percentile)
2. Number of buildings impacted <i>Number of buildings that the NNBF benefits.</i>	0	1 building	>= 2 buildings
3. Critical Facility Benefit <i>Does the NNBF benefit a community critical facility?</i>	no		yes
4. Co-Benefits Potential <i>Potential for NNBF to be used in incentive programs.</i>	0	1 cobenefit	>=2 cobenefits
Score	1	2	3

NNBFs that enhance coastal flooding resilience

Identify NNBFs that provide multiple benefits

Identify NNBFs that may be used to take advantage of incentives

1. FEMA Community Rating System (CRS) credits. Potentially qualifying NNBFs are in 100-year flood zone Special Flood Hazard Area and overlay the Resource Protection Area (RPA) or RPA 100-ft buffer

- Undeveloped set-aside lands in the Special Flood Hazard Area (SFHA).
- Land must have some level of protection: Regulatory or Property ownership
- Resource Protection Area Buffer considered Regulatory Protection
- CRS Potential = all open space in SFHA and the Resource Protection Area 100 foot buffer

2. Water quality/TMDL credit potential – N, P, TSS reductions. All NNBFs except for beaches and dunes

- NNBFs provide water quality services to varying degree dependent on intrinsic factors and location
- Within the study area and proximal to the shore
- Assumed all NNBF features other than beach and dune provide service
- Existing Chesapeake Bay Program approved BMPs for tidal and nontidal wetlands and riparian buffers



Friday, May 07, 2021

ADAPTVA

Evidence-based planning for changing climate



FORECASTS

Forecasting water levels, temperature, and precipitation helps mitigate impacts and plan resilient communities. Access a tide forecast & sea level projections for Virginia



ADAPTATIONS

Case studies and story maps illustrate how adaptation works, and can be financed, through zoning, planning, engineering, and policy practices.



TOOLS

Tools assess risk and inform preparation and response to a changing environment. Access flood risk maps, shoreline recommendations, and an interactive comprehensive map of adaptation strategies.



RESILIENCE RESOURCES

Data, websites, and other resources important for community adaptation. Including: social and equity issues, climate outlooks and resilience projects.



PLANNING & POLICY

Management strategies from local and State code to the Community Rating System. Learn about FEMA National Flood Insurance Program, relevant local ordinances, state legislation, and access legal analyses.

Tools

Evidence-based planning for changing climate



TOOLS are available to help assess risk and vulnerability to climate impacts, build community resiliency against extreme events, and provide guidance to prepare and respond to a changing environment.



FLOOD RISK

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. Learn more about flooding and floodplains in maps, models, documents and websites.

[Virginia's Flood Risk Information System](#)

[Locality Road Flood Tool](#)



SHORELINE MANAGEMENT

What is the best management strategy for your shoreline?

[Learn more](#)



ADAPTVA INTERACTIVE MAP

View water levels, social vulnerability, infrastructure and natural capital in one viewer.

[Launch Viewer](#)

Coastal Community Resilience

Restoration/ Creation of Nature-Based Features To Provide Benefits:

Erosion Protection

Flood mitigation

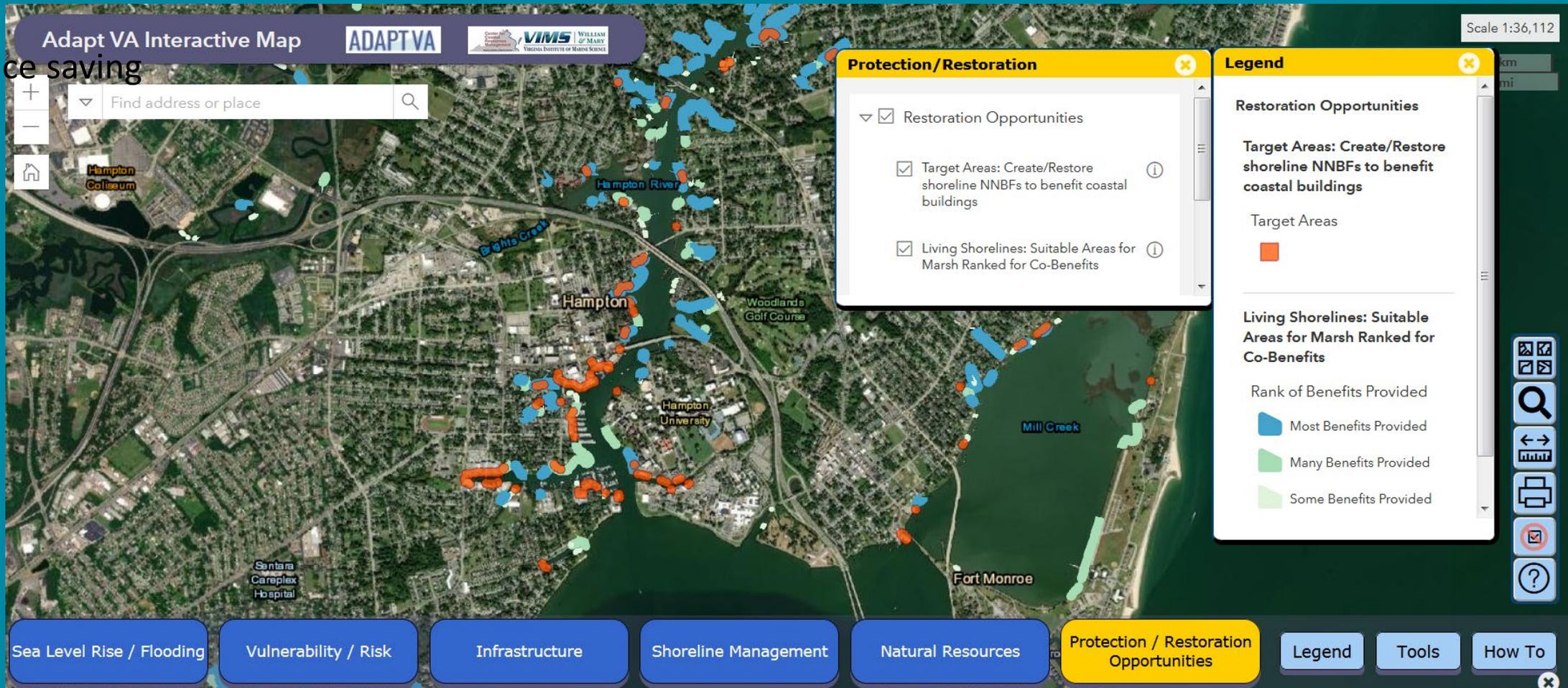
Water Quality Improvement

Habitat for Fish, crabs, birds

Open Space

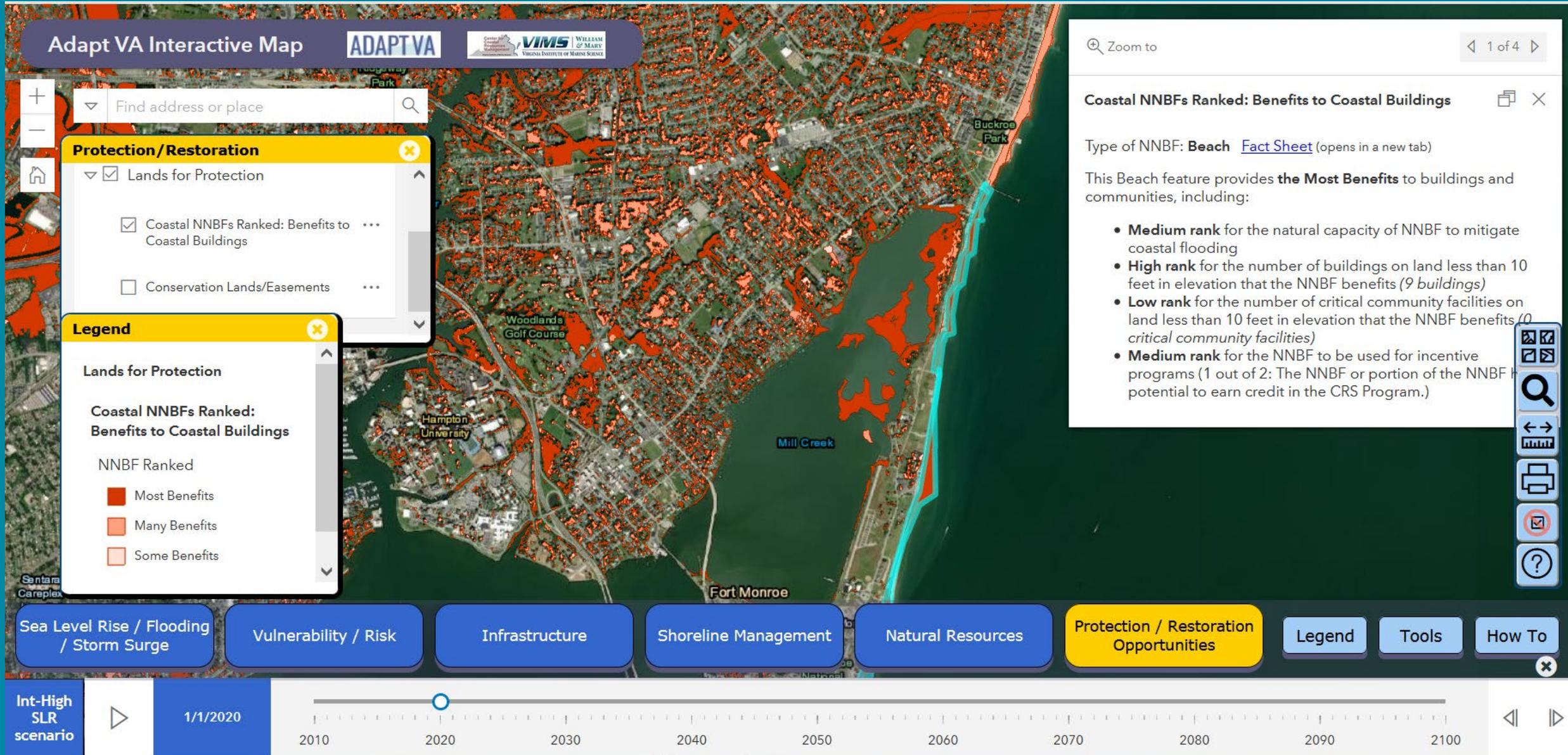
Flood Insurance saving

Aesthetics



NNBFs that enhance coastal flooding resilience

Identify NNBFs that provide multiple benefits

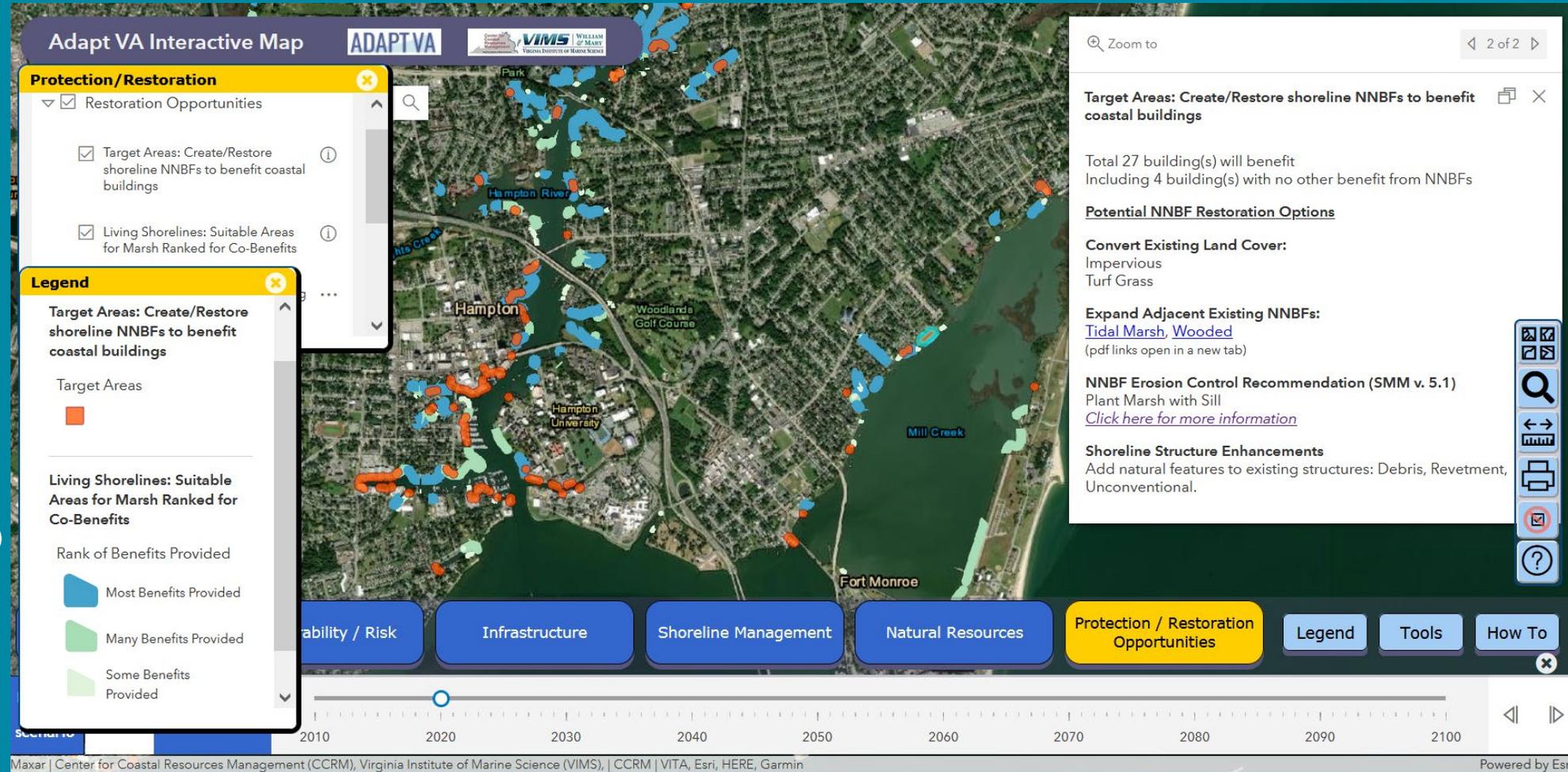


Opportunities to improve coastal resilience

Identify target areas for new NNBFs

Why target the shoreline?

- First line of defense
- Programmatic incentives – in RPA
- Other tools available to help inform NNBF creation (e.g., CCRM Shoreline Management Model)



NNBFs that enhance coastal flooding resilience

Next steps...

- Work with localities to refine and communicate

Build on the Current Project:

- Add sea level rise projections
- Add co-benefits, e.g. RTE species habitats, habitat corridors...
- Incorporate offshore NNBFs: spits, SAV...
- Broaden target areas for NNBF creation to the upland



Questions?

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ADAPTVA

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