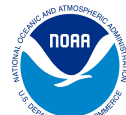


Collaborative Tidal Marsh Adaptation Projects

Using resilience metrics, social vulnerability data, and partnerships to support large-scale tidal marsh adaptation projects

August 25, 2026
CBP Adaptation Workgroup

Julie Reichert-Nguyen, NOAA/CBP Adaptation Workgroup Coordinator
Email: julie.reichert-nguyen@noaa.gov



Marsh Adaptation

Incorporating climate change information and resilience strategies when planning, designing, implementing, and managing marsh restoration and conservation projects to enhance longevity of marsh area and health and ecosystem function.



Climate Change Factors	Resilience Strategies
Sea Level Rise (SLR)	● Identify and conserve marsh migration corridors ● Acquire land/easements for marsh migration ● Restore/preserve healthy marsh sediment dynamics and vegetation ● Ensure habitat connectivity ● Pursue conservation incentives/carbon credit programs ● Construct living shorelines/natural breakwaters
Increase in Storm Events and Precipitation	

Products to Date

- **Collaborative Marsh Adaptation Framework** (GIT-Funded; 2023-2024)
 - Used existing datasets and stakeholder engagement to identify focus areas
 - Internal mapper to customize for workshops
 - Hosted joint workshop with Middle Peninsula, VA and Wicomico R./Deal Island partners
 - Cross-workgroup: Climate Resiliency Workgroup, Wetland Workgroup, and Geospatial Science and Applications Team
 - Leads: Nicole Carlozo (Maryland DNR), Julie Reichert-Nguyen (NOAA), Catherine Brown, Bianca Boggs, and Alisa Wilson (Skeo), John Wolf and Coral Howe (USGS), and Jamileh Soueidan (Chesapeake Research Consortium)
- **Choptank Marsh Adaptation Report** (University of Michigan SEAS Program; 2025-2026)
 - Masters student capstone: Identified and analyzed data sources to assess marsh vulnerability and inform adaptation options working with Envision the Choptank partnership
 - Workshop with resilience and wetland experts
 - Leads: Julie Reichert-Nguyen (NOAA), Emily Thorpe (JBO), Matt Pluta (ShoreRivers), and Paul Cirillo, Ilana Greenspan, Mia McNinch, and Bojun Zong (University of Michigan Masters students)

Place-Based Framework for Targeting Collaborative Marsh Adaptation Projects

Broader-Scale Targeting

Phase 1: Metric Mapping (Tier 1)

- Climate vulnerability
- Adaptive capacity
- Ecological services
- Social vulnerability

 Identify Areas of Need

Phase 2: Partner Alignment Mapping

- Partner areas of activity
- Partner areas of interest

 Identify Focus Areas

Finer-Scale Targeting and Customization

Phase 3: Identify Project Opportunities

- Add specific regional data (Tier 2)
- Connect data with funding priorities/ ecosystem services
- Facilitate partnership building activities

 Identify Collaborative Marsh Adaptation Projects

Phase 4: Conduct Partner Workshop

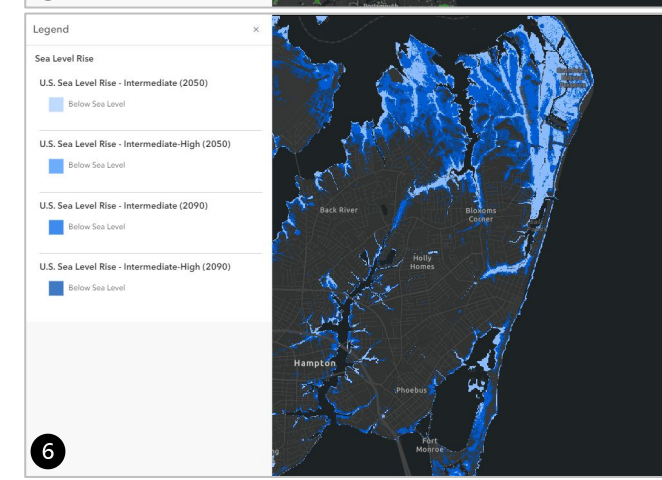
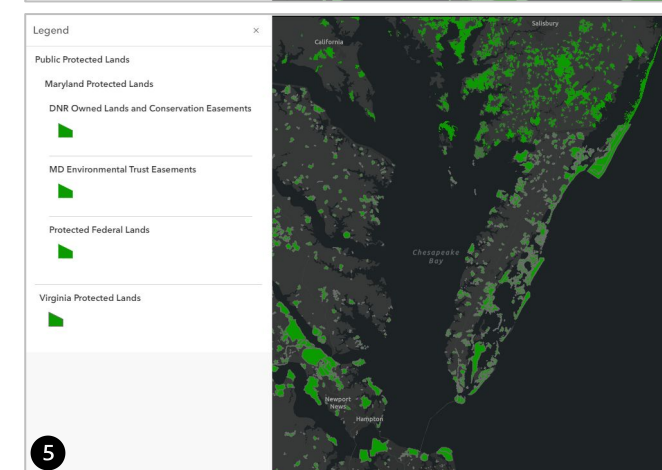
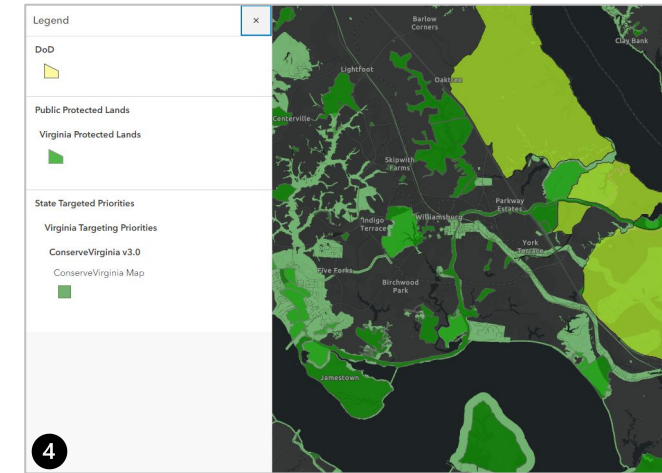
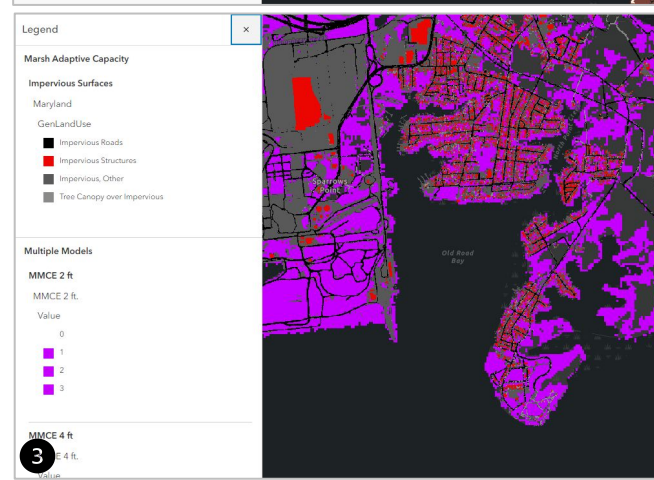
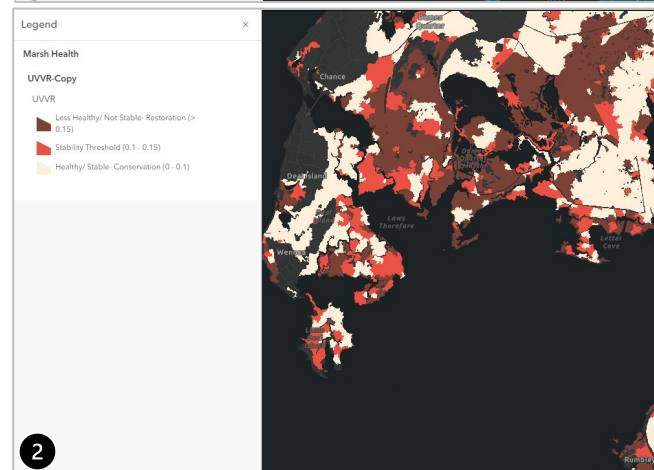
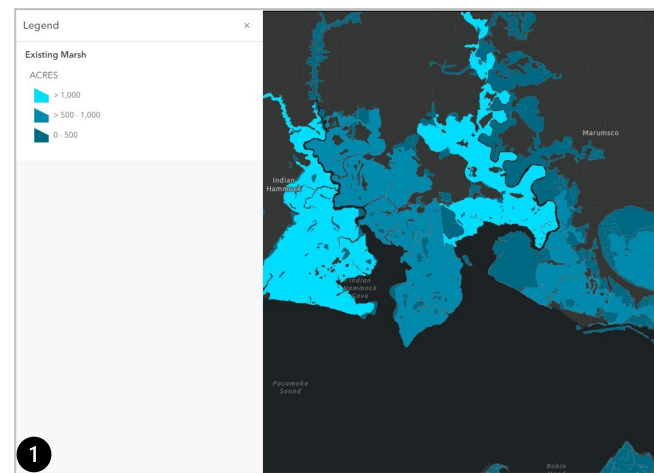
- Address topics specific to focus area project planning
- Facilitate discussion of opportunities and challenges for project advancement
- Identify potential partnerships, projects and next steps for project development

 Identify Project Advancement Priorities

Framework utilizes existing datasets

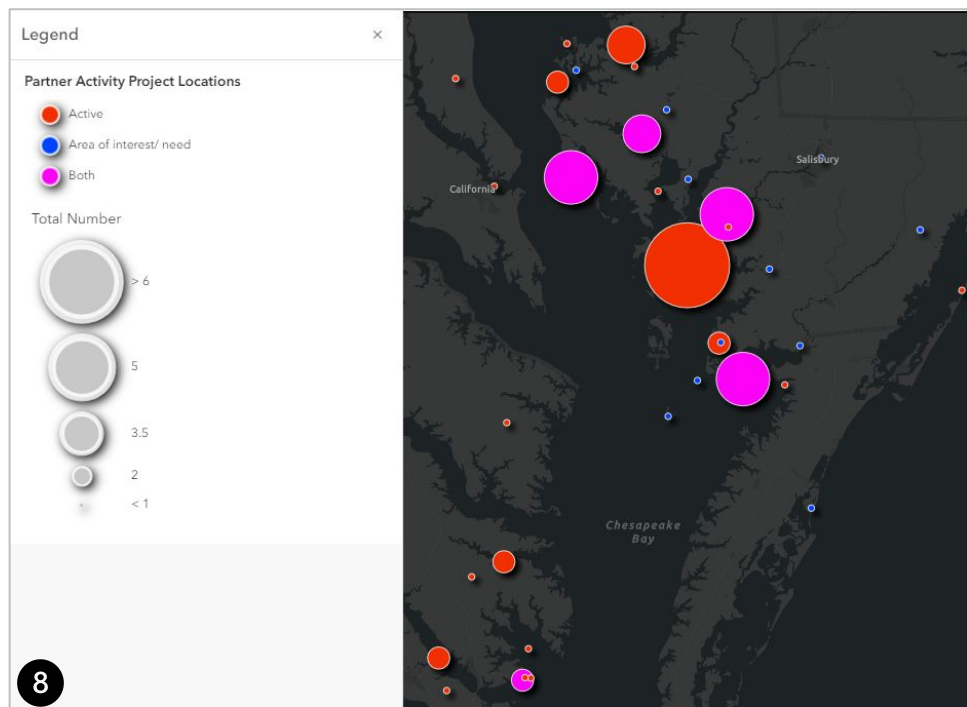
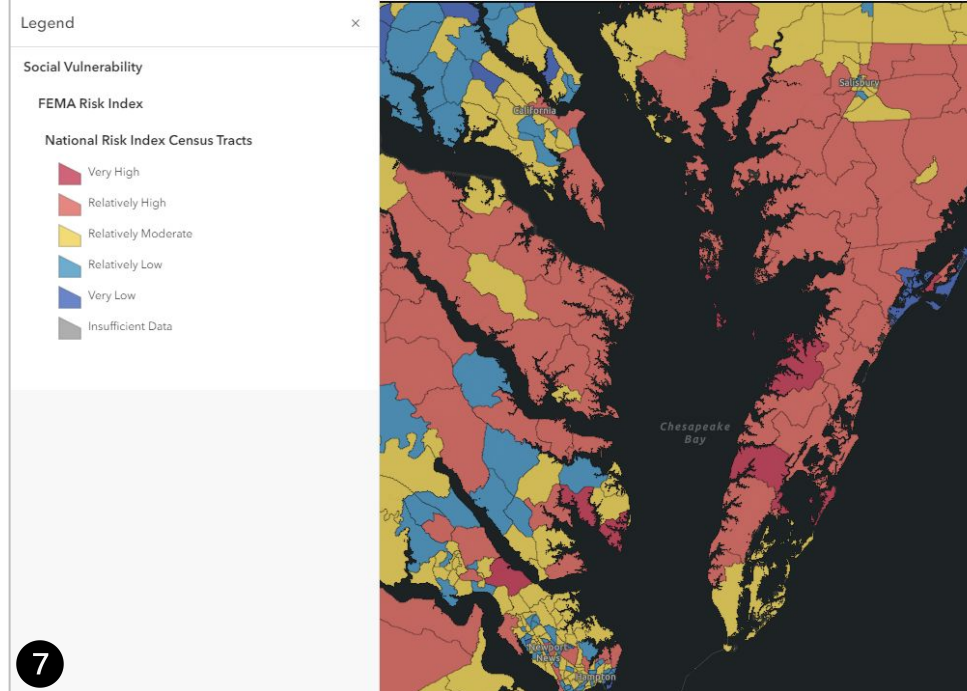
Tier 1 Mapper Visual Analysis: Adaptive Capacity and Ecological Metrics

1. Existing Marshes, Marsh Size
2. Marsh Stability (UVVR)
3. Marsh Adaptive Capacity
4. Protected Lands
5. State Targeted Priority Areas
6. SLR Projections



Tier 1 Mapper Visual Analysis: People Metrics

- 7. Social Risk and Vulnerability
- 8. Partner Area of Interests & Activity



Place-based: Identified Marsh Adaptation Project Focus Areas

1. Pocomoke Sound Area
(Crisfield, MD to Saxis, VA)
2. **Wicomico River (Monie Bay to Deal Island, MD)**
3. **Choptank River, MD**
4. Suffolk/Elizabeth River, VA
5. **Middle Peninsula, VA**
6. Middle Peninsula Tribal Lands (Mattaponi, Pamunkey)

Blue = Workgroup has
provided technical assistance

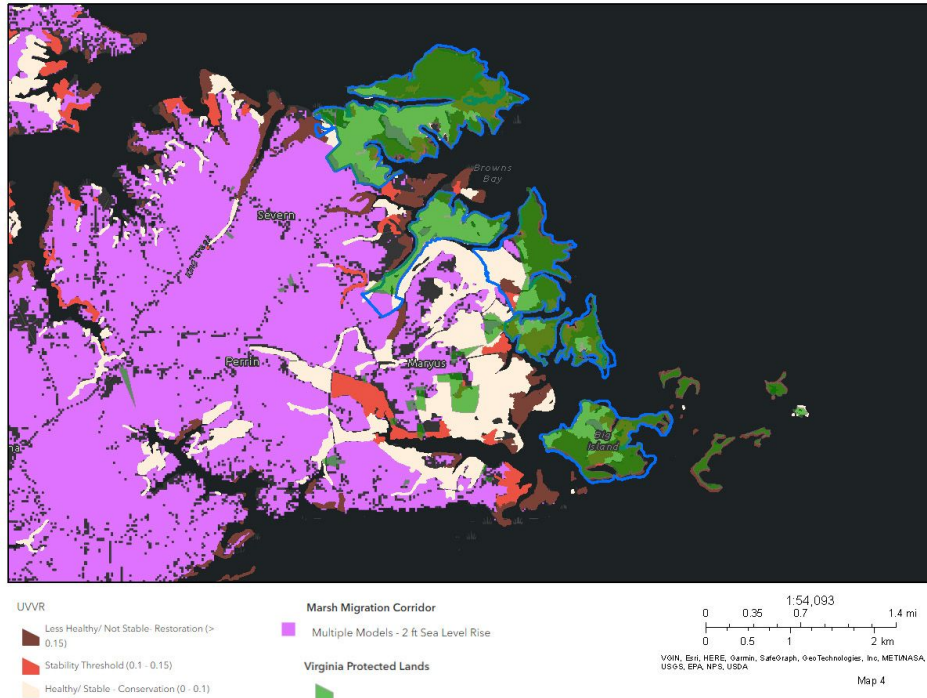


Partner Workshop

Joint Wicomico
River, MD and
Middle Peninsula,
VA

(January 24, 2024)

- Workshop focused on addressing challenges and recognizing opportunities to advance tidal marsh projects in these areas.
- Workshop sessions included “lightning” talks, discussions specific to each focus area, and a shared learning discussion.
- Key themes included:
 - Innovating resilience tools and technologies
 - Managing marsh transition
 - Incentivizing marsh adaptation actions related to protection and restoration (beneficial reuse of sediment dredge)
 - Addressing marsh loss through short term and long-term planning tracks
 - Coordinating and collaborating on projects



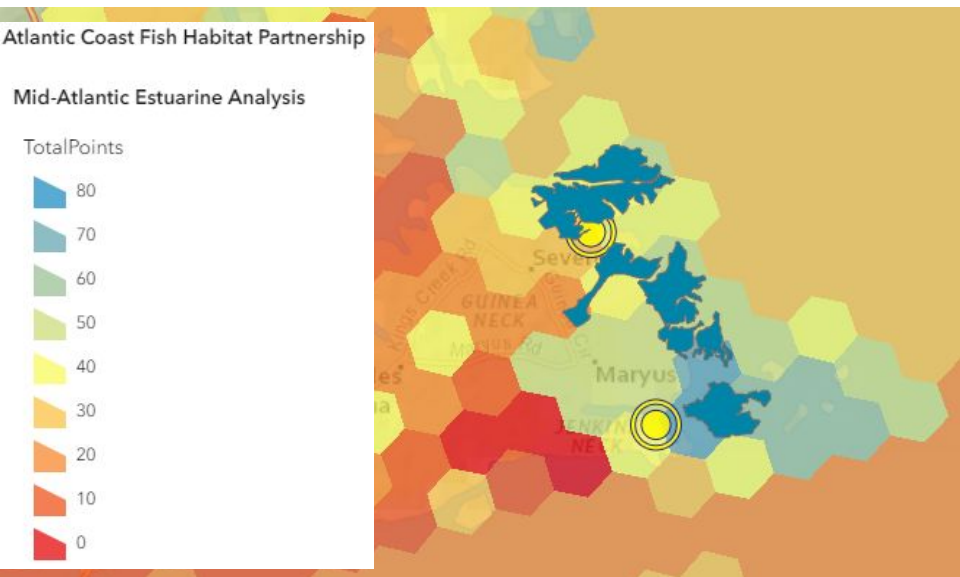
Guinea Marsh Complex Targeting Analysis

Adaptive Capacity (Tier 1 Data)

- Protection: Has extensive protected lands and state targeted conservation areas along with undeveloped, privately owned lands that adjoin stable marshes for marsh migration land use planning.
- Restoration: Opportunities to restore unstable marshes where protected land adjoins areas with extensive healthy marsh and potentially suitable migration corridors.

Ecosystem Services (Tier 2 Data)

- High estuarine fish habitat scores (60 and greater total points) .
- Marsh habitat providing protection for aquaculture operations (yellow targets on map).



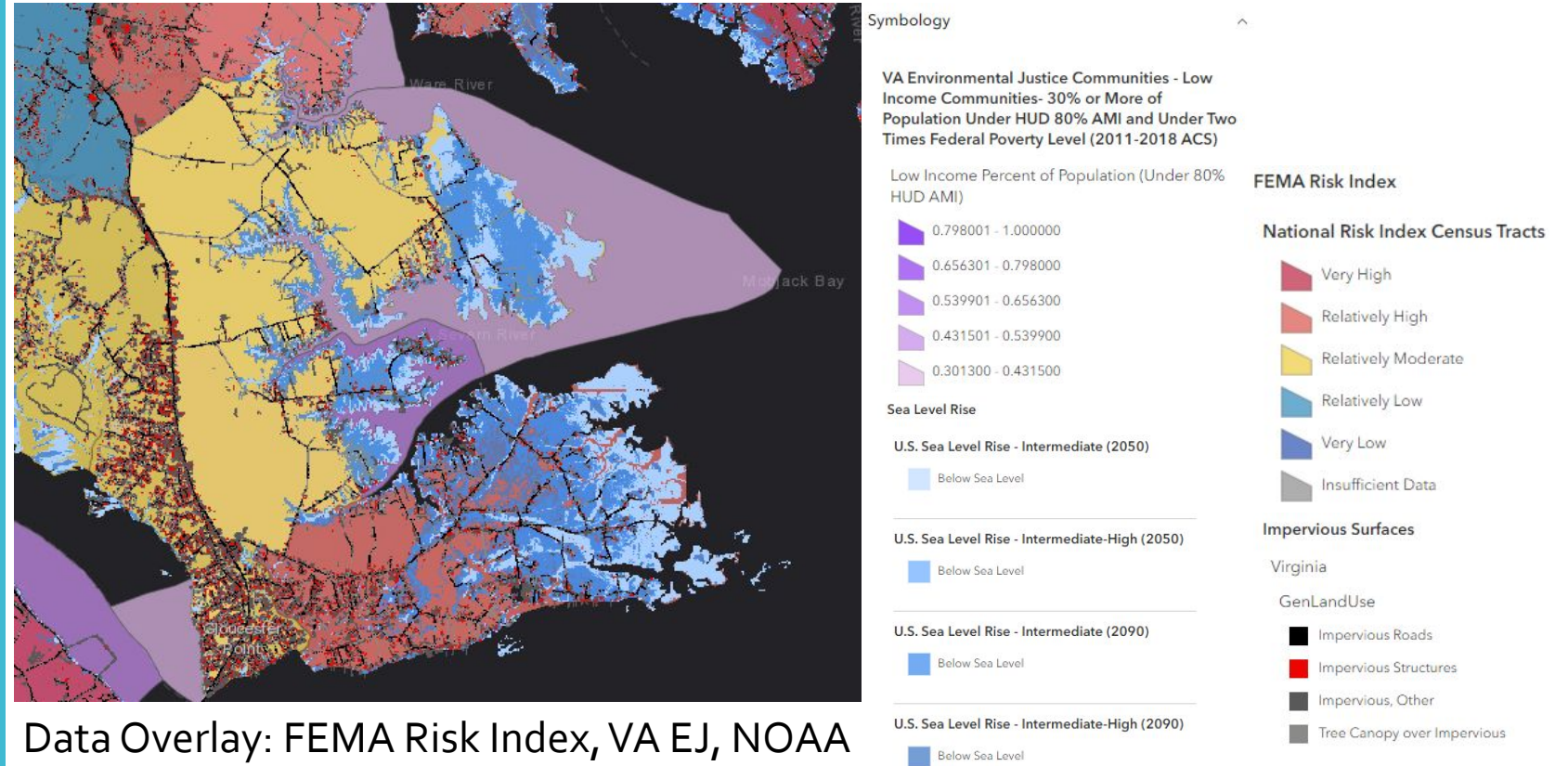
Higher score = better fish habitat

Tier 2 Analysis (Finer-Scale Targeting): Vulnerable Communities

Guinea Marsh Complex

Social Vulnerability (Tier 1 Data)

- Marsh complexes in this area provide protection for nearby high-risk community areas as sea level rises (FEMA data).



Data Overlay: FEMA Risk Index, VA EJ, NOAA SLR (2050, 2090), Impervious Surfaces

**SUPPORTED PARTNER FUNDING
PROPOSALS – AWARDED FUNDING**

Envision the Choptank & Chesapeake Bay Program



ENVISION THE CHOPTANK

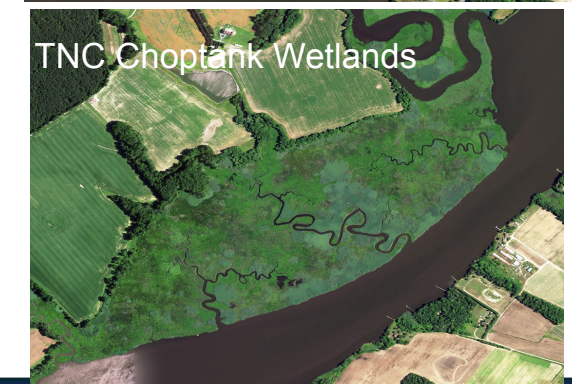
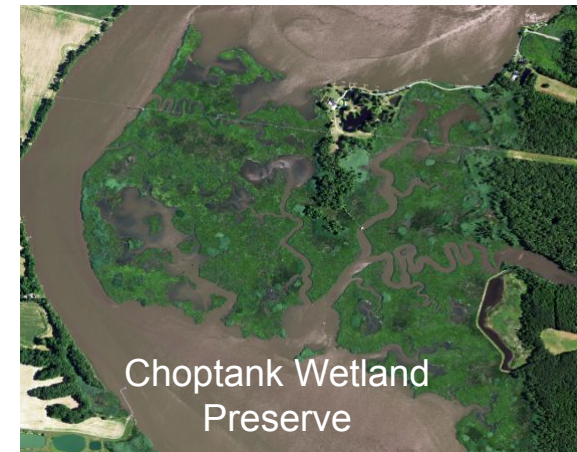
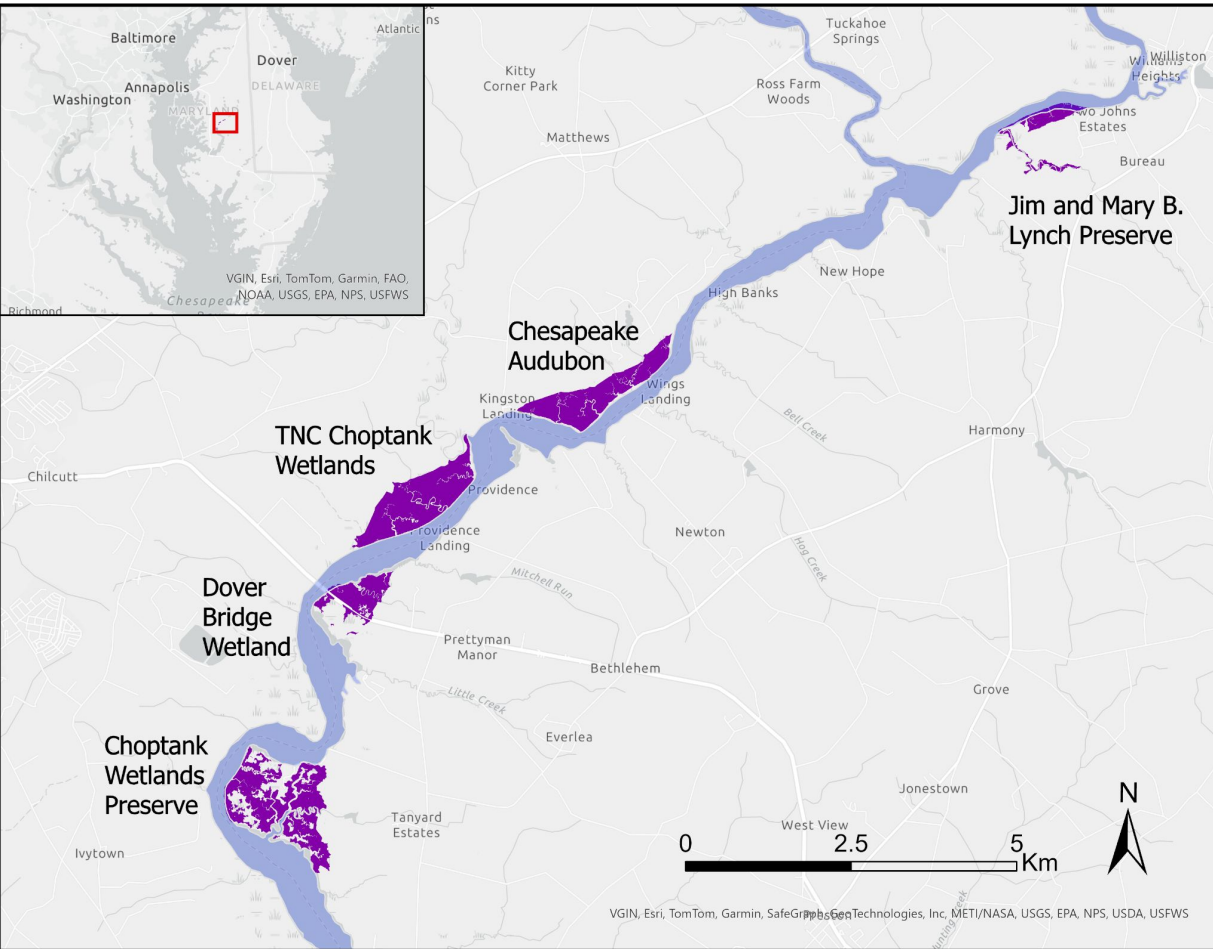
Three Key Questions (From 2024 Workshop)

1. How has land cover changed over time across the five key marshes?
2. How might the five key marshes change in extent in the future?
3. What does the current management landscape look like for tidal marsh practitioners?

Master Capstone: Four Approaches

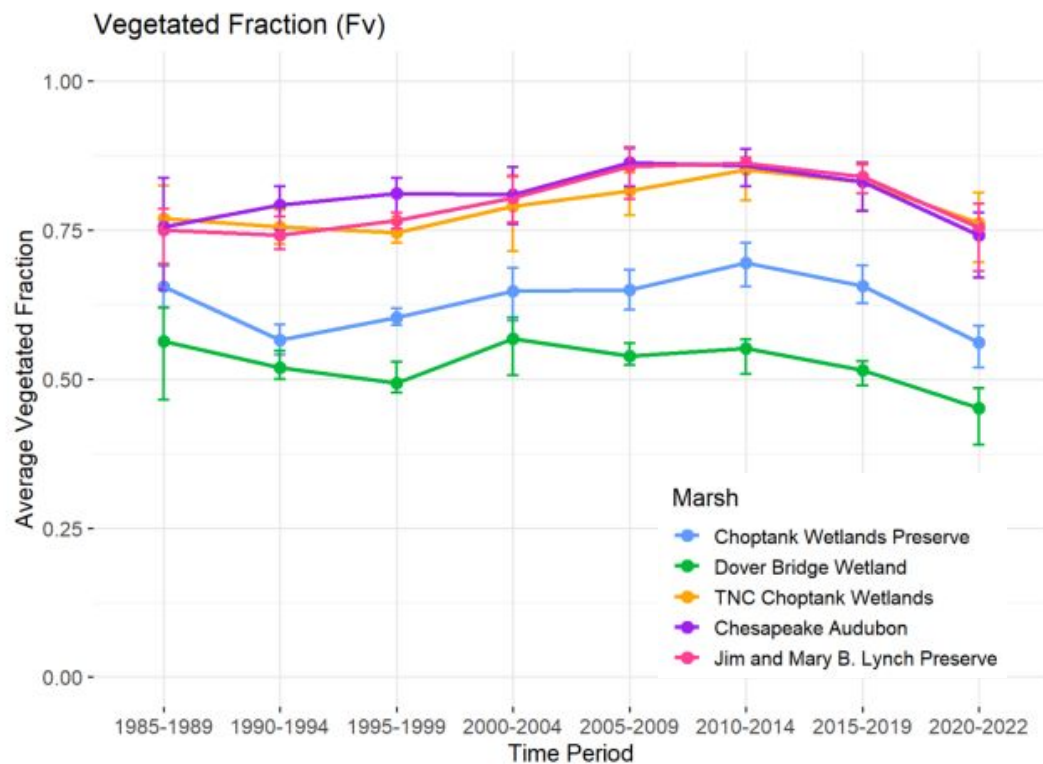
1. Literature Review
2. Professional Interviews
3. GIS Analysis
4. Identify Potential [Adaptation Opportunities](#) for Marsh Management

Choptank Five Key Marshes Assessed



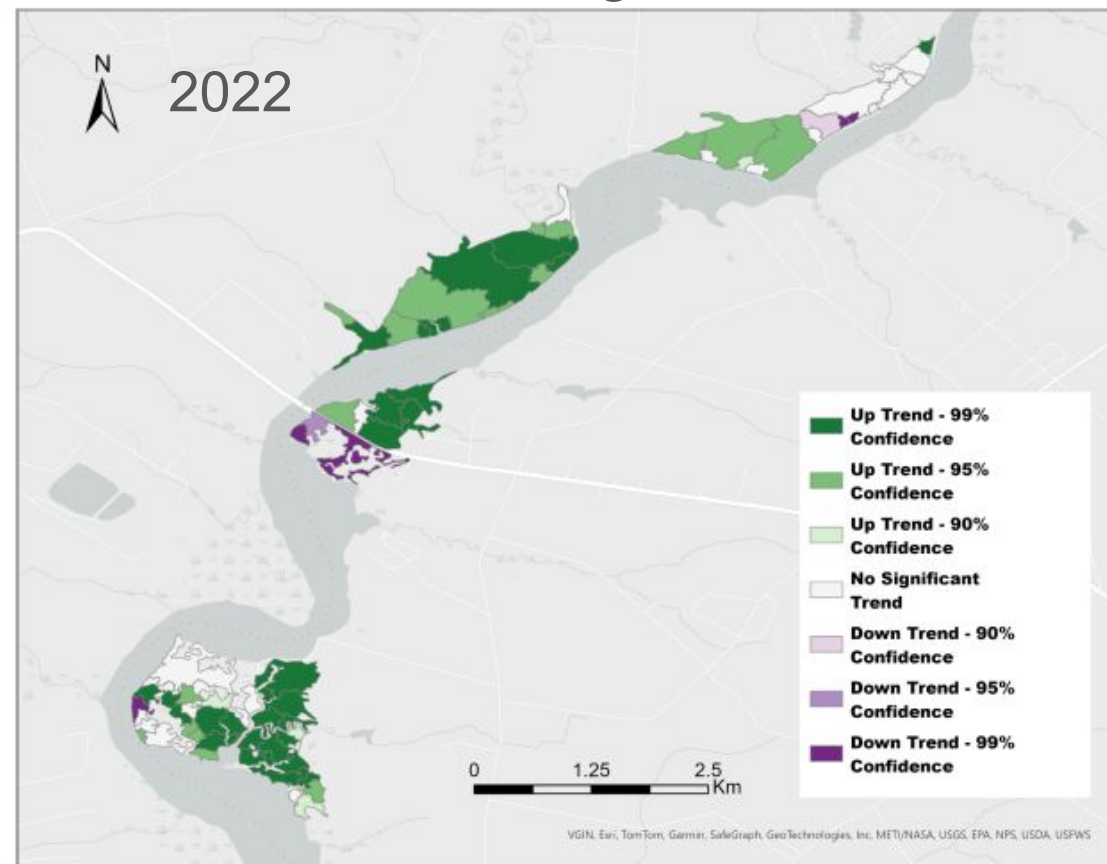
Vegetation Trends

Whole Marsh



From USGS Data

Marsh Segments



Invasives: Phragmites

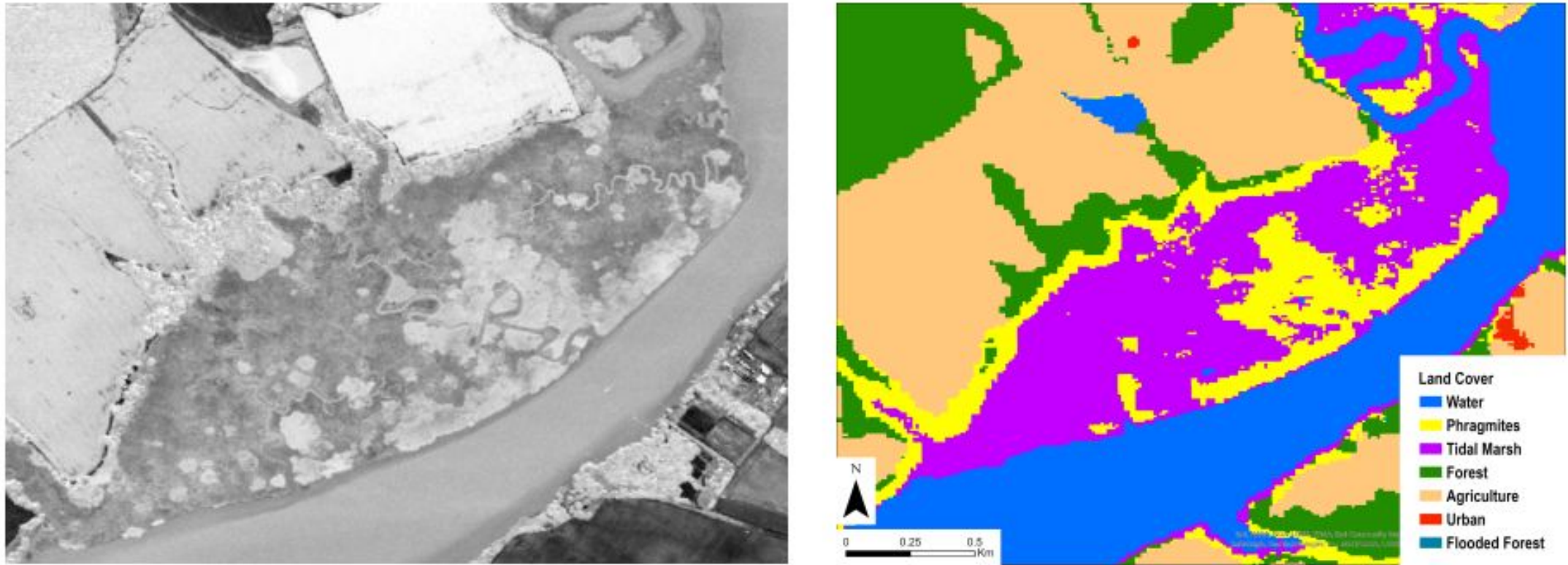
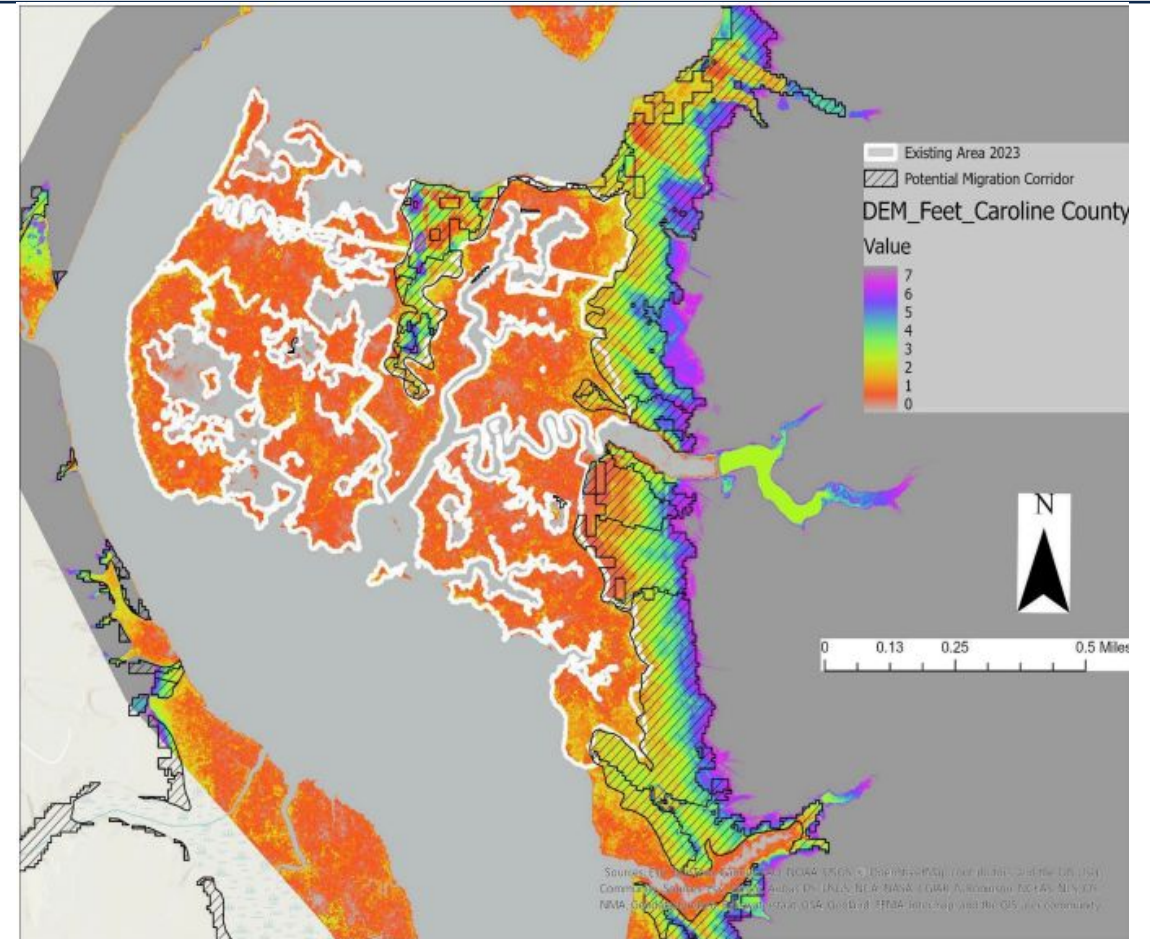
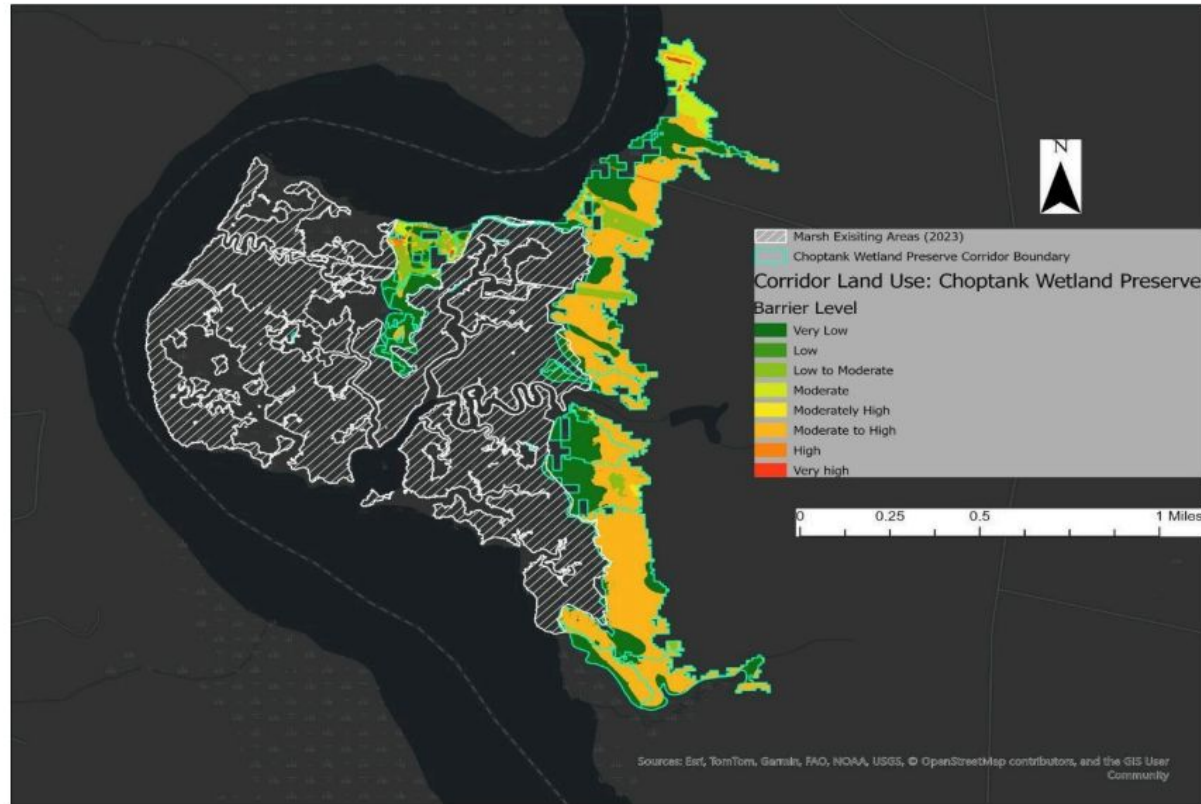


Figure 4.13 TNC Wetland Preserve (a) PCA3 image and (b) Land Cover Map.

Marsh Migration Potential and Adjacent Land Barriers

Choptank Wetland Preserve



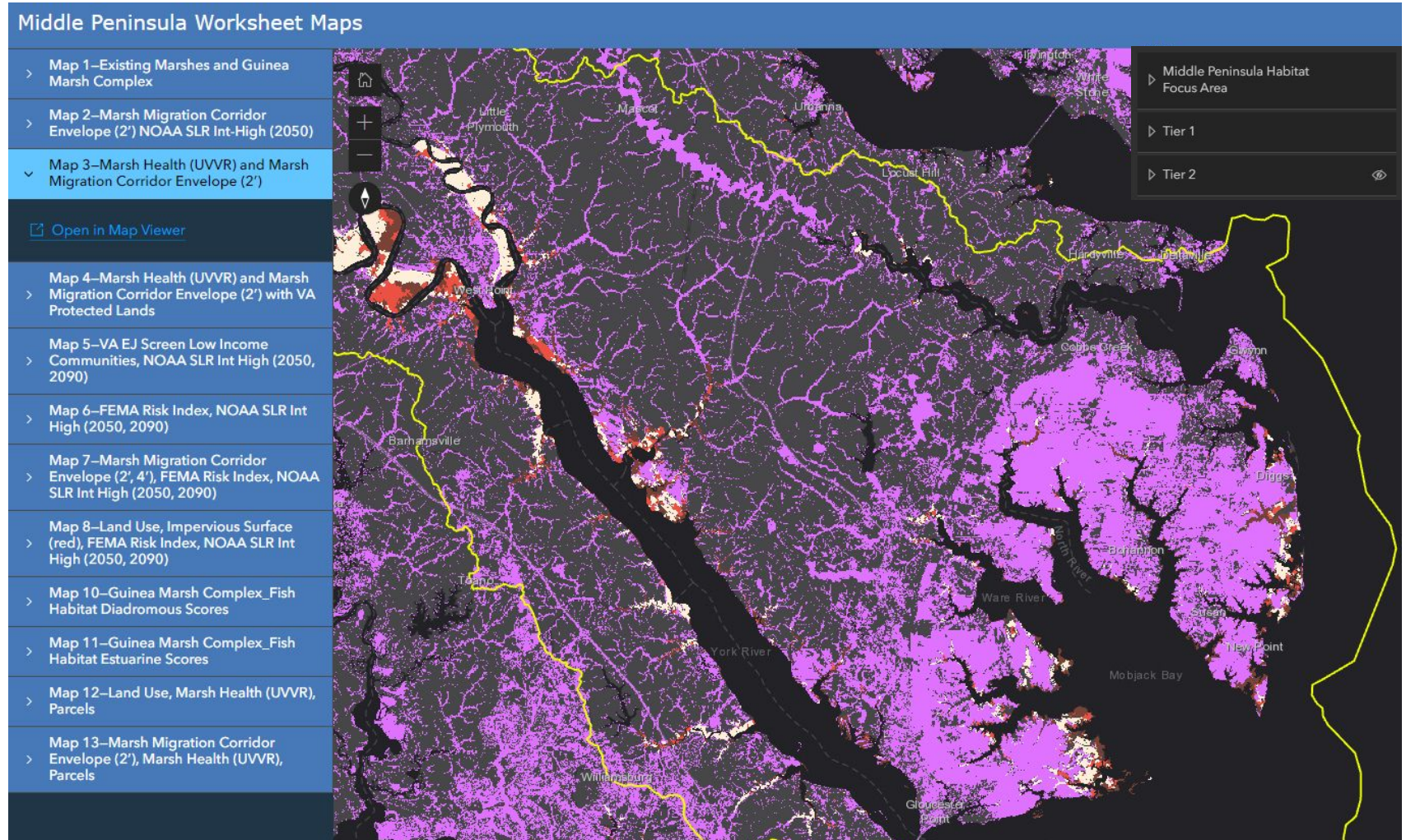
Corridor to Marsh: 58%

Choptank R. Marsh Adaptation Main Takeaways

- Invasive Phragmites removal can degrade marshes at a faster rate if it is sediment-limited and vulnerable to elevation change; limited knowledge of how native plants may adapt to climate change.
- Sediment placement (e.g., thin layer placement) could be a strategy to consider for marsh segments that exhibit resilience to sea level rise; on-site data needed to improve understanding of sediment dynamics before pursuing.
- Land use strategies (e.g., resilience easements) that aim to make marsh migration corridors available could aid in recovering some losses of existing marsh footprint.

Communication Products: Interactive Story Maps of Data Overlays

(No Funding to Complete)



Considerations

- By working closely with partners and customizing the technical assistance to meet their needs, they have been able to use the information
 - Funding success for wetland resilience/restoration projects
 - Analyses available to inform next steps for marsh restoration activities
- Needs champions within workgroup to be successful given level of involvement - helps with tracking use of products.
- Funding and capacity lacking for communication products.

Slides for reference



Why We Need Collaborative Marsh Adaptation Projects

- Manage marshes to be **resilient** to sea level rise (SLR) and other climate change impacts to **preserve** ecosystem services.
- Identify **strategic large-scale** marsh adaptation projects that support **multiple benefits** instead of opportunistic, disconnected projects.
- Increase understanding of **geographical and organizational priorities** to build partnerships to support large-scale implementation.
- Align marsh resilience **research opportunities with implementation** to increase data and information on the **success** of strategies.
- Identify **short-term** and **long-term funding** opportunities.



Marsh Adaptation Approaches

A combination of strategies is likely needed for large-scale marsh adaptation projects to address short- and long-term habitat and coastal resilience needs.

- Marsh restoration (restoring unstable marsh adjacent to marsh migration corridors to provide near-term ecoservices and facilitate long-term healthy marsh migration)
- Management (maintaining healthy marshes and managing the transition of land to healthy marsh as sea level rises)
- Conservation (acquiring land or easements to protect existing and potential marsh area)
- Marsh creation (constructing marshes in strategic locations to bolster resilience and provide habitat areas)



Marsh Adaptation Supporting Features and Activities



Physical interventions

- Living shorelines
- Oyster structures
- Breakwaters
- Thin layer placement

Property interventions

- Easements
- Acquisition
- Agriculture transition

Planning activities, policy and programs

- Community collaboration
- Conservation and management incentives
- Regulatory actions
- Carbon credit programs

Collaborative Tidal Marsh Adaptation Mapper

Tier 1 Data:

Broader-Scale
Targeting

	Data Layers	Source
Existing Tidal Marsh	• Maryland Wetlands- estuarine and marine • Virginia Wetlands	• MD Wetland Inventory • VA Tidal Marsh Inventory
Marsh Health	Unvegetated to Vegetated Ratio (UVVR)	USGS Chesapeake Bay Coastal Wetlands Synthesis Datasets
Marsh Adaptive Capacity	• 2 and 4 ft SLR Marsh Migration Corridor Envelope (MMCE) • Developed lands/ Impervious Surfaces	• Marsh Migration Data Synthesis Report- SLAMM, InVest, NOAA SLR • CBP Land Use
Protected Lands	MD and VA State Protected Lands	• MD Greenprint • VA Natural Heritage Data Explorer
State Targeted Priority Areas	• MD Targeted Ecological Areas • ConserveVirginia Map	• MD GreenPrint • VA Natural Heritage Data Explorer
Climate change Vulnerability	U.S. Sea Level Rise (SLR) – • Intermediate (2050) • Intermediate High (2050) • Intermediate (2090) • High (2090)	NOAA
Social Vulnerability	National Risk Index	FEMA
Partners	Areas of activity (currently engaged) Areas of interest/priority	Questionnaire, small group discussions

Marsh Adaptation Scenario Examples

Protection Scenario

Use data to identify *healthy marshes* that are susceptible to SLR and have the potential to migrate.

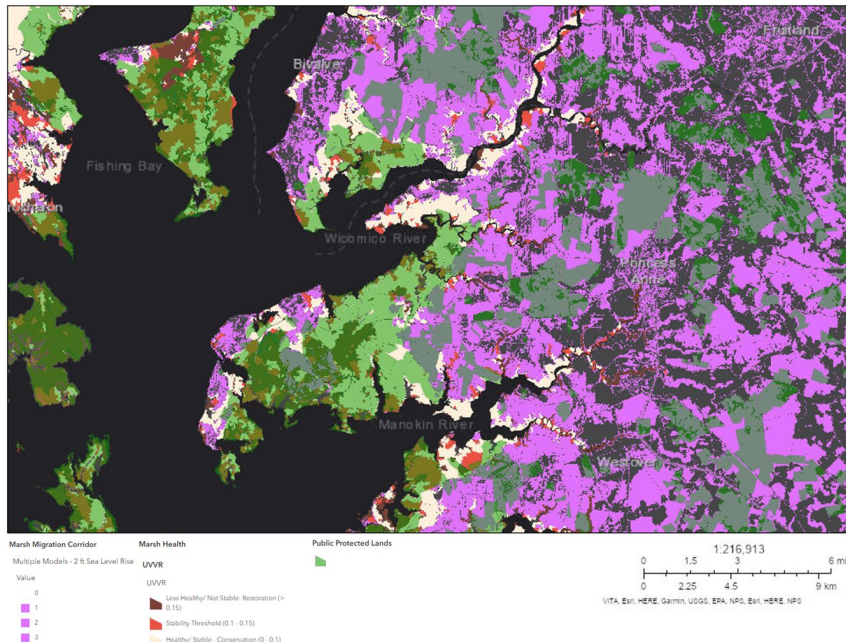
- Good Existing Marsh Condition
- High Climate Change Risk
- High Adaptive Capacity

Restoration and/or Enhancement Scenario

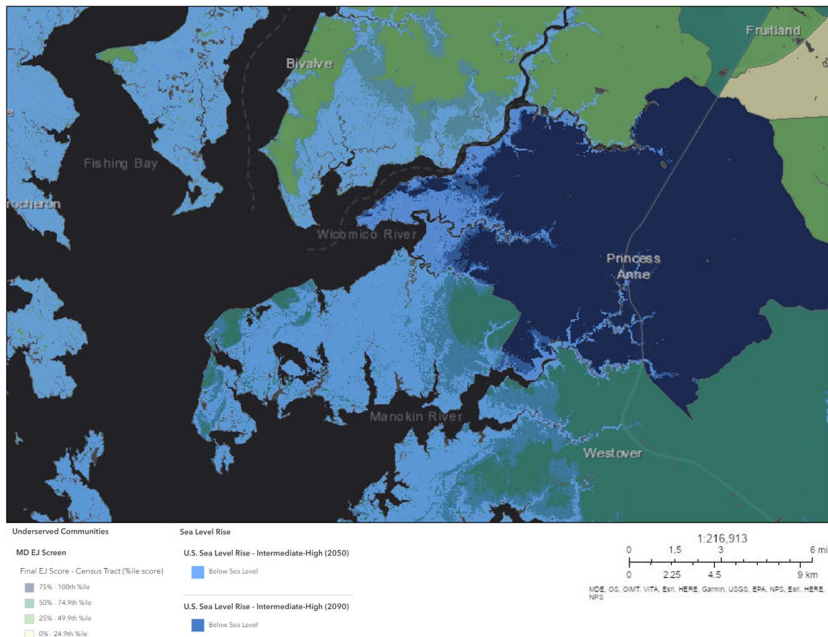
Use data to identify *degraded marshes* that are susceptible to SLR and have the potential to migrate.

- Degraded Existing Marsh Condition
- High Climate Change Risk
- High Adaptive Capacity

Based on the [NOAA Landscape Scale Marsh Resilience Framework](#) and Unvegetated to Vegetated Ratio (UVVR) decision matrix by USGS ([Ganju et al. 2023](#))



MD EJ Score, NOAA SLR Int-High (2050 & 2090)



Wicomico River Targeting Analysis

Adaptive Capacity (Tier 1 Data)

- Protection: Has areas of stable marsh adjacent to potential marsh migration corridors, with opportunities for protection on both protected lands and undeveloped, privately owned lands.
- Restoration: Has areas of less stable marsh that overlap with protected lands and are adjacent to stable marsh and potential marsh migration corridors.

Social Vulnerability (Tier 2 Data)

- MD EJScreen: Communities in the area are categorized as more vulnerable based on pollution burden exposure and effects, sensitive populations, and socio-economic/demographic status.
 - Aligns with greater risk from sea-level rise impacts (NOAA SLR Projections 2050 & 2090).
 - Marsh migration corridors adjacent to the Wicomico River could increase protection for communities as sea level rises.

Land Use Planning (Tier 2 Data)

- MD Wetland Adaptation Areas & Land-Use: MD Wetland Adaptation Areas and Land-Use data provides insights into where to facilitate land (undeveloped, developed, agricultural) to wetland transition activities.