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Batten School of Coastal & Marine Sciences
Center for Coastal Resources Management

Virginia Tidal Wetlands Board Training
Friday, October 9, 2026
9:00-11:30 a.m.
Zoom

Agenda

9:00 a.m. - Welcome and Introductions

- **Introduction:** Kirk Havens, Director, Center for Coastal Resources Management (CCRM)
- **Welcome:** Hon. Adrienne Kotula, Deputy Secretary of Natural and Historic Resources

Purpose, Responsibilities, & Jurisdictions of Local Wetlands Boards

- This presentation covers the purpose of local wetlands boards, their role in serving Virginia localities, and an overview of board procedures and jurisdiction.
  Presenter: Kirk Havens, Director, Center for Coastal Resources Management (CCRM)

Virginia Marine Resources Commission (VMRC)

- The role of the Virginia Marine Resources Commission as the regulatory authority under the Tidal Wetlands Act and its relationship with local wetlands boards.
  Presenter: Randy Owen, Chief, Habitat Management, Virginia Marine Resources Commission

U.S. Army Corps of Engineers

- The Corps' regulatory role and jurisdiction, and an overview of the Regulatory Request System (RSS).
  Presenters: Laura Herrmann, Robert Howell, and Rowen Schmidt, U.S. Army Corps of Engineers, Norfolk District

Virginia Department of Environmental Quality (DEQ)

- Tidal wetlands and the Chesapeake Bay Preservation Act.
  Presenter: Justin Williams, Director, Office of Watersheds and Local Government Assistance Programs

11:15 a.m. - Wrap-Up and Questions
11:30 a.m. - Adjourn

VMRC Virginia Marine Resources Commission

DEQ Virginia Department of Environmental Quality

US Army Corps of Engineers
Norfolk District

Purpose, Responsibilities & Jurisdiction of Local Wetlands Boards regarding the Tidal Wetlands Act

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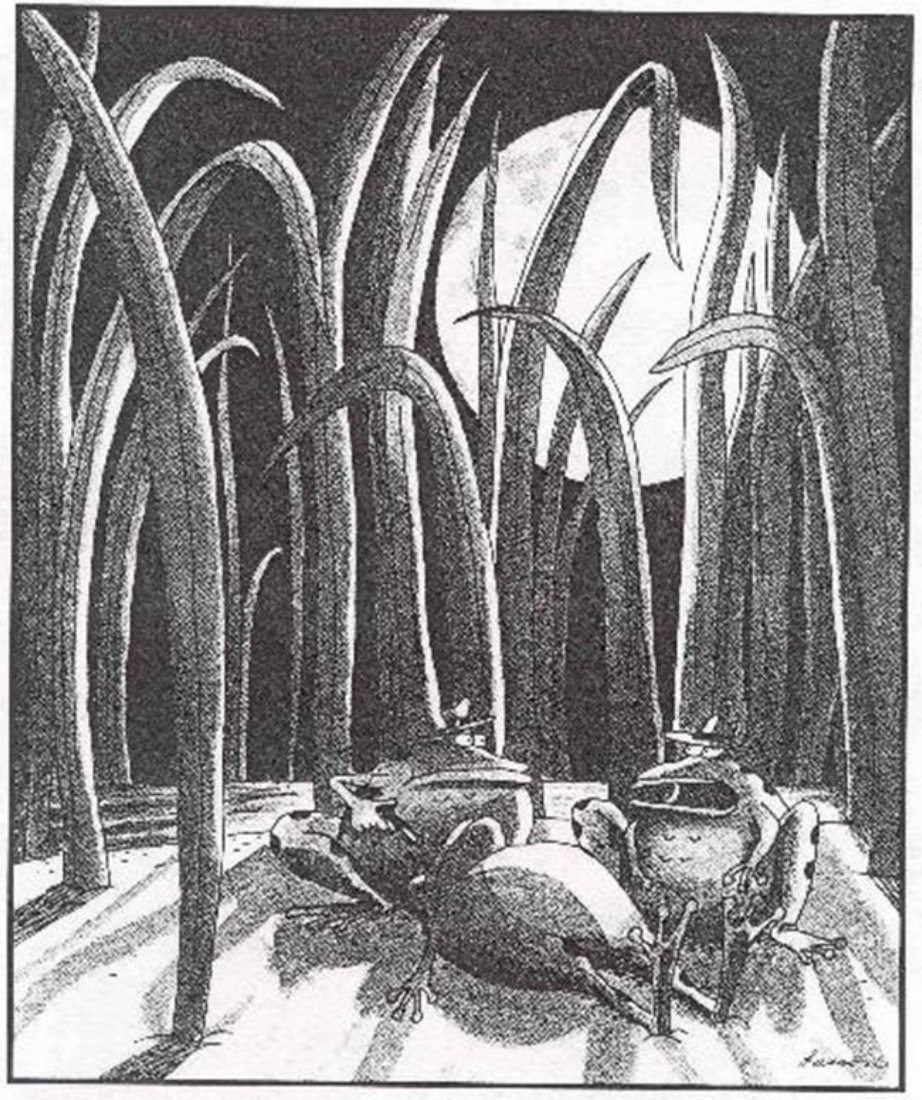

"Throw him in the swamp? You idiot! That's the *first* place they'll look."

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Purpose, Responsibilities & Jurisdiction of Local Wetlands Boards Regarding the Tidal Wetland Act

Roles & Responsibilities

Jurisdiction Areas

Shoreline Stabilization

Wetlands Board Resources



SHORELINE MANAGEMENT

- Making shoreline development choices to address desire for shoreline protection with benefits and uses of natural resources
- Legal programs required to manage development pressure & protect services valued by society
- Balancing private benefits & costs with public benefits of natural resource protection

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Roles & Responsibilities

Local Wetlands Boards

REGULATORY AUTHORITY



Citizen-based administration of Tidal Wetlands Act ordinances



5 or 7 members plus alternates & staff support



Balance tidal wetlands preservation with protection and use of private property



Public participation required

Public hearings & records

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Roles & Responsibilities

Virginia Marine Resources Commission VMRC

mrc.virginia.gov

REGULATORY AUTHORITY

- **Manage & issue permits** for activities on State-owned submerged lands
- **Provide regulatory oversight** of Tidal Wetlands Act administration - Designated VMRC staff
- **Manage saltwater fisheries**, shellfish harvesting & farming
- **Provide law enforcement** in marine waters

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Virginia Shore Zone Jurisdictions

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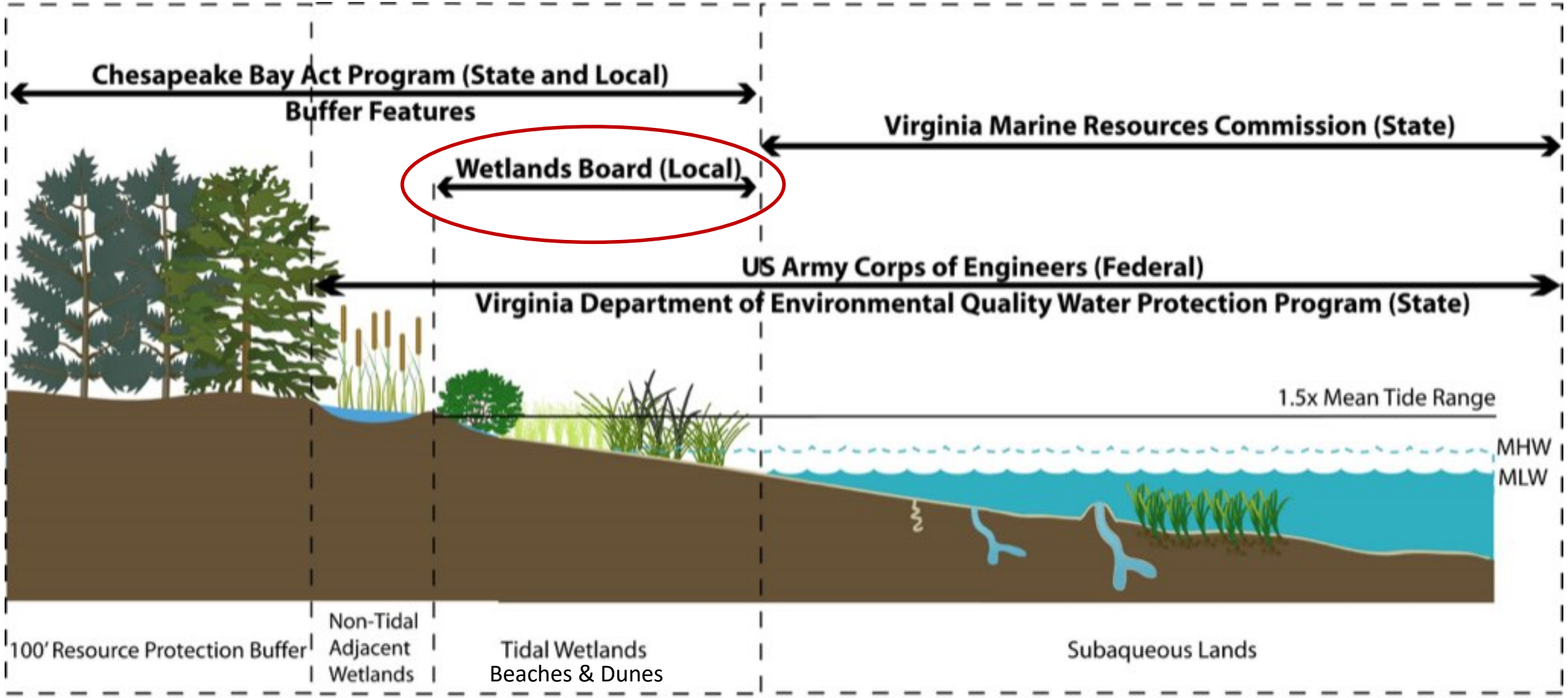

Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/), University of Maryland Center for Environmental Science

Source: [Shoreline Management Handbook - Laws & Jurisdictions]

Roles & Responsibilities

Virginia Institute of Marine Science VIMS

www.vims.edu

ADVISORY AGENCY

- **Collect and share scientific evidence** of tidal shoreline conditions
- **Develop guidance** that fosters sustainability of shoreline resources
- **Assist local governments** with tidal shoreline regulations & policies
  - Online maps & resources
  - Training & workshops
  - Shoreline permit review assistance

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VIMS Advisory Service for Wetlands Boards

VIMS Office of Research & Advisory Services

- Assistance & comments for Joint Permit Application Reviews
- Coordinated consultation with VIMS expert scientists
- Contact Emily Hein eahein@vims.edu
- Visit web site Advisory Services for Wetlands Board Staff

VIMS Center for Coastal Resources Management CCRM

- GIS Mapping Tools & Models
- Shoreline Education & Professional Development
- Applied Shoreline Research
- Virginia Coastal Policy Team Member
- Visit web site CCRM Shoreline Management Advisory Service

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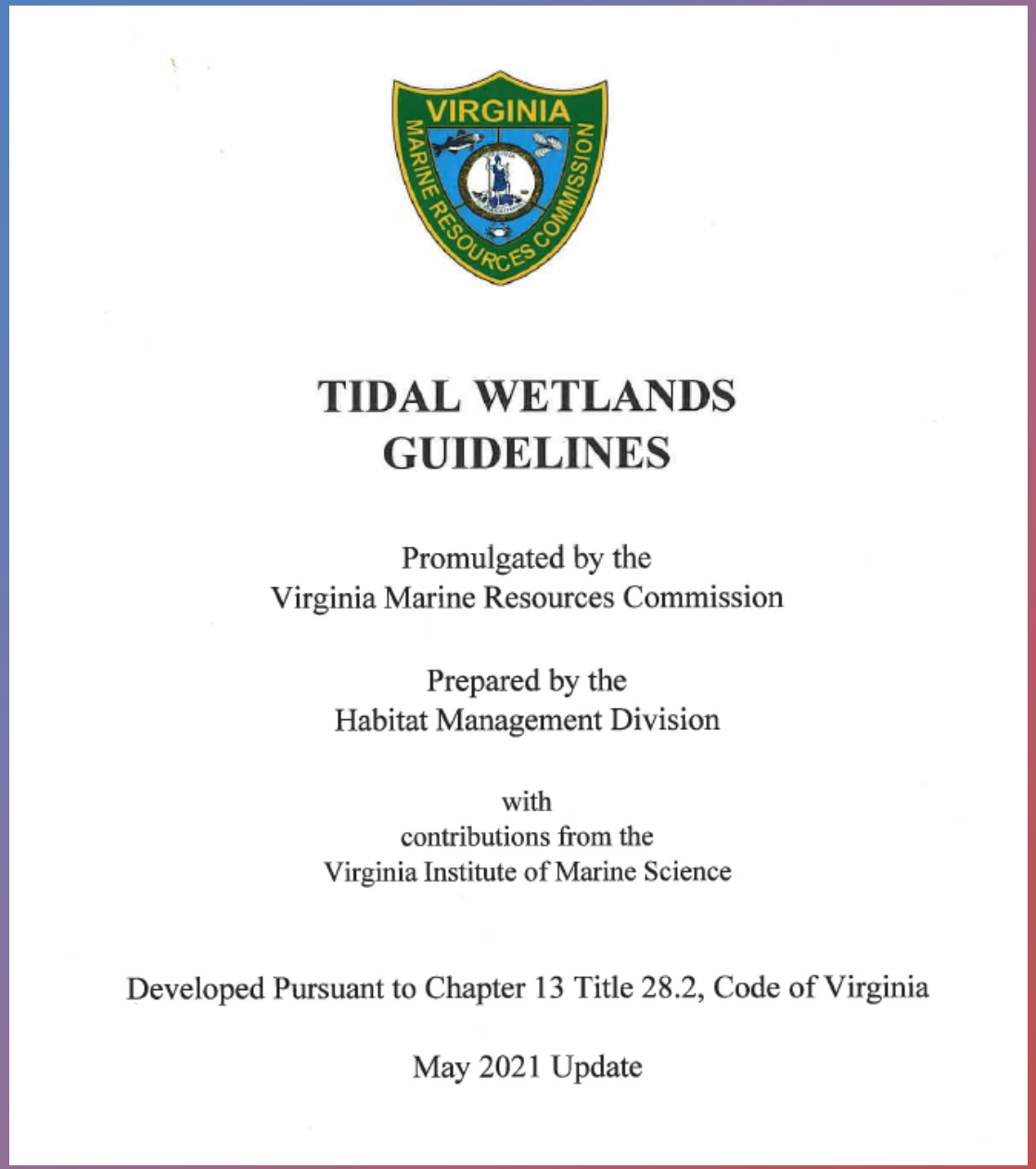

Tidal Wetlands Guidelines

- Wetland Types & Determining Jurisdictions
- Minimum Standards for protection & conservation of wetlands
- Integrate approval process with Chesapeake Bay Preservation Act **as amended in 2020**
- **Ensure protection of shorelines and sensitive coastal habitat from sea level rise and coastal hazards**
- **Permitted activities shall be designed to survive the impacts of sea level rise**

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Tidal Shoreline Habitats

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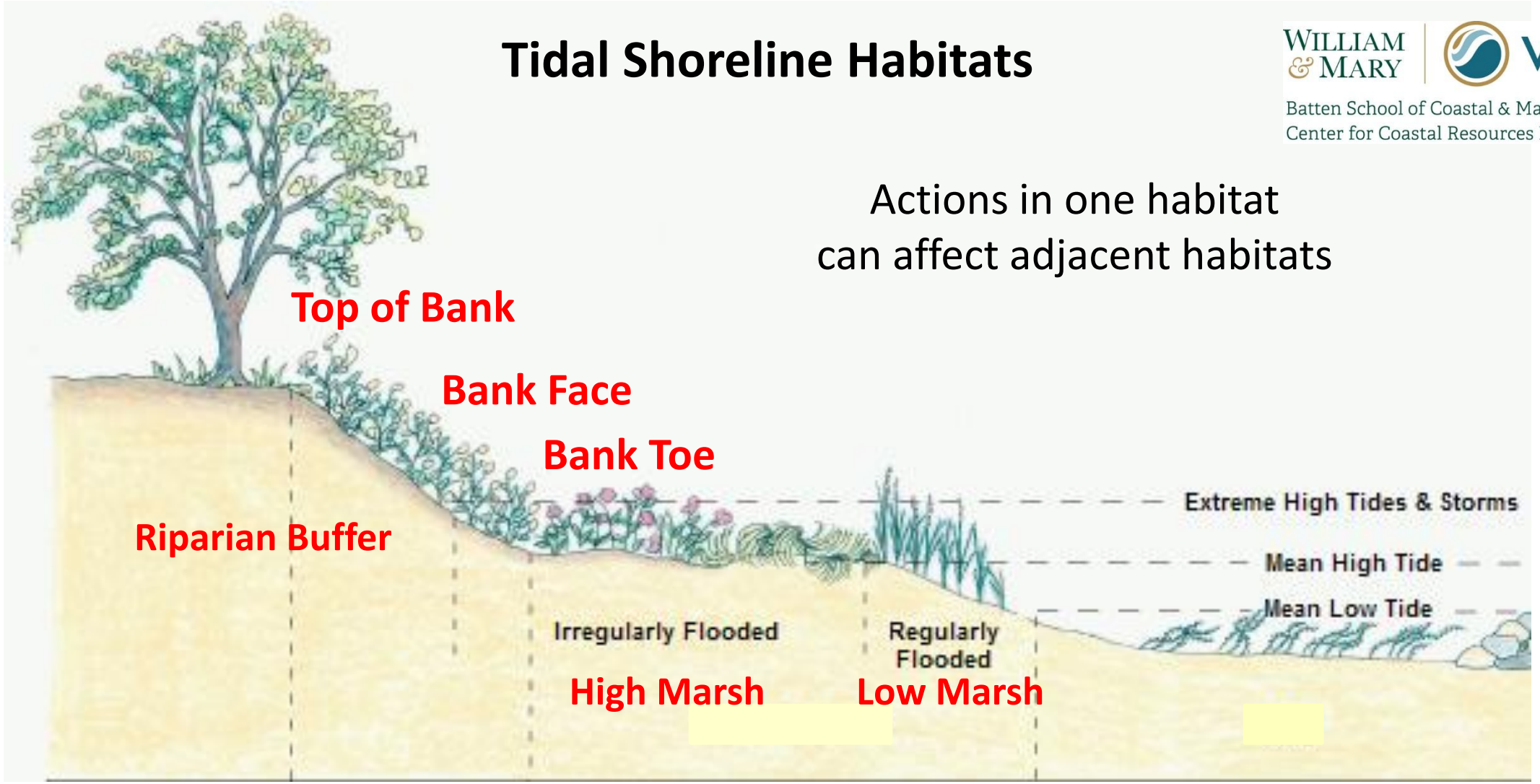
Actions in one habitat
can affect adjacent habitats



Graphic courtesy Burke Environmental Associates

Changing Shoreline Conditions

Increasing

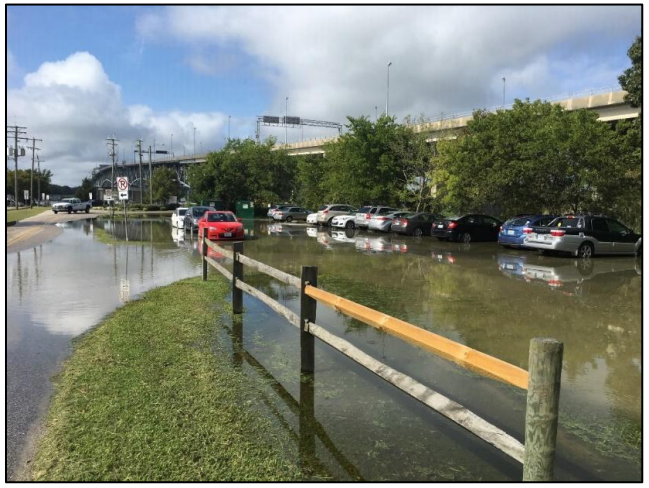
Air & water temperatures

Storm intensity

Precipitation amount and/or intensity

Relative sea level = global sea level rise + land sinking

Number of high tide flooding days (sunny day flooding)



Sunny day high tide flooding at public parking lot

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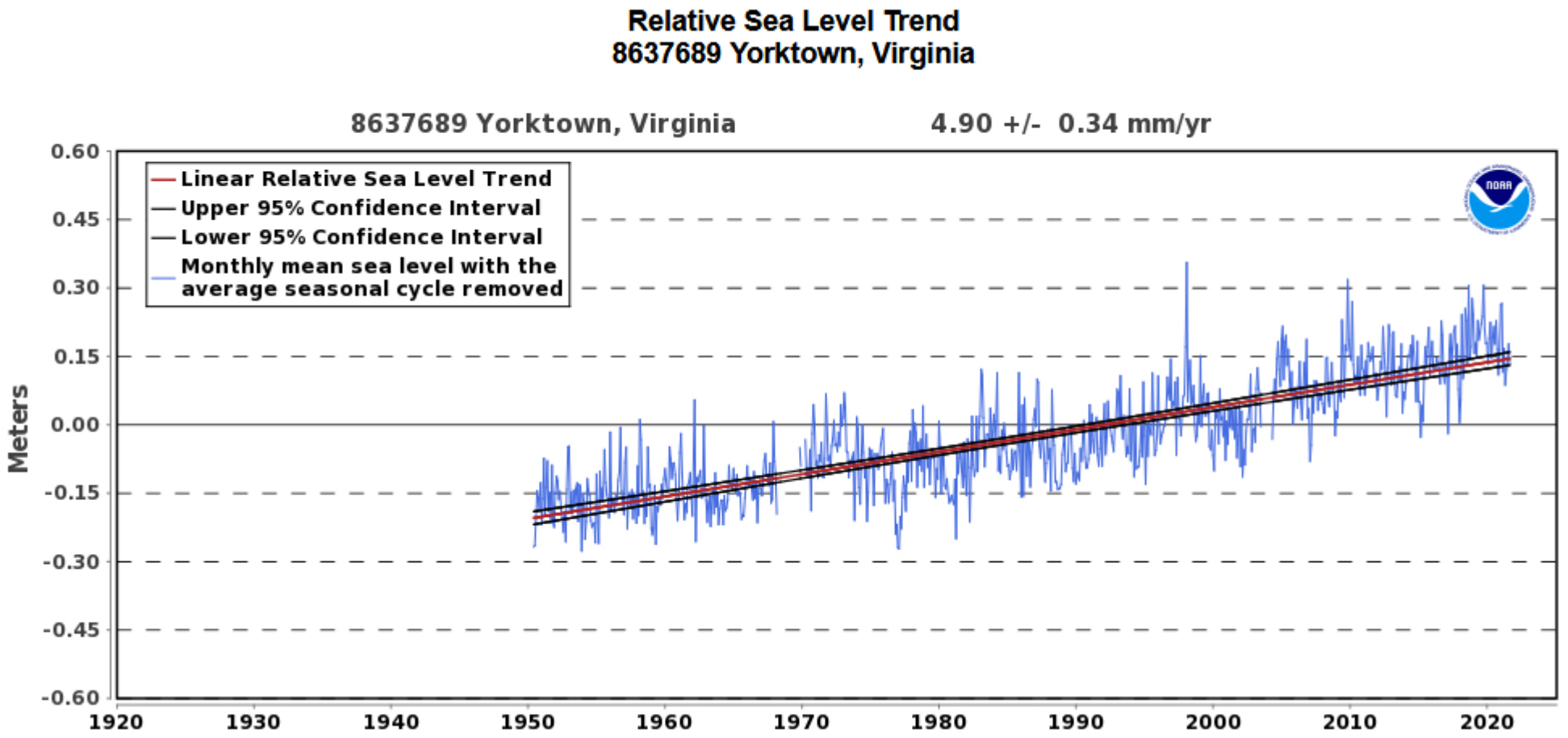
Relative Sea Level Rise
Historic Trend



Monthly mean sea level

Linear trend

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Natural Habitat Shifts





Riparian forest to tidal marsh (ghost forest)

Nontidal wetlands to tidal freshwater

Tidal freshwater to brackish marsh

High marsh to low marsh

Low marsh to mud flats

Mud flats to open shallow water

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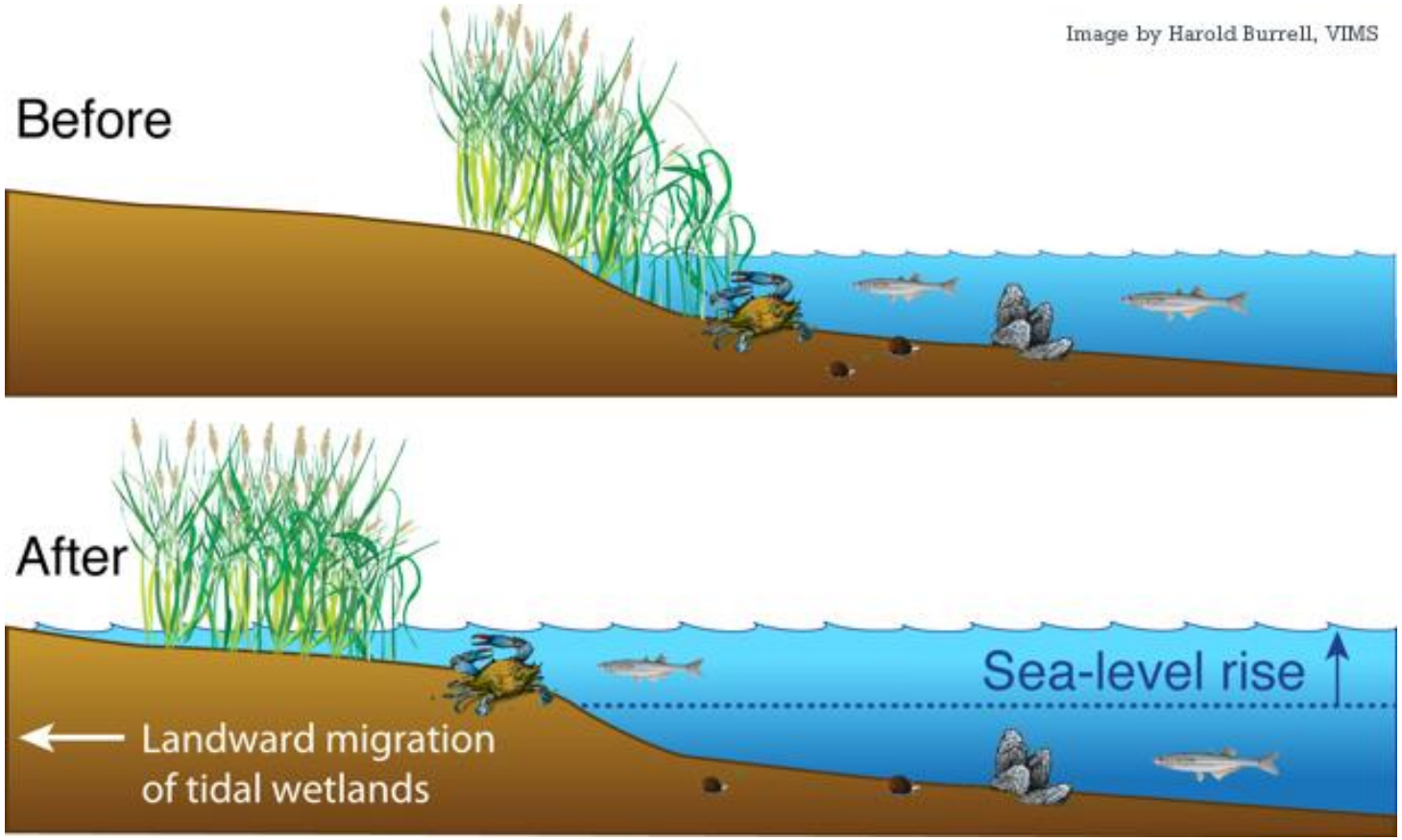
SEA LEVEL RISE IMPACTS TO NATURAL RESOURCES

A report for the Governor's Coastal Climate Resiliency Plan June 2019

Tidal Marsh Migration

- Habitat shift to higher elevation
- in response to sea level rise



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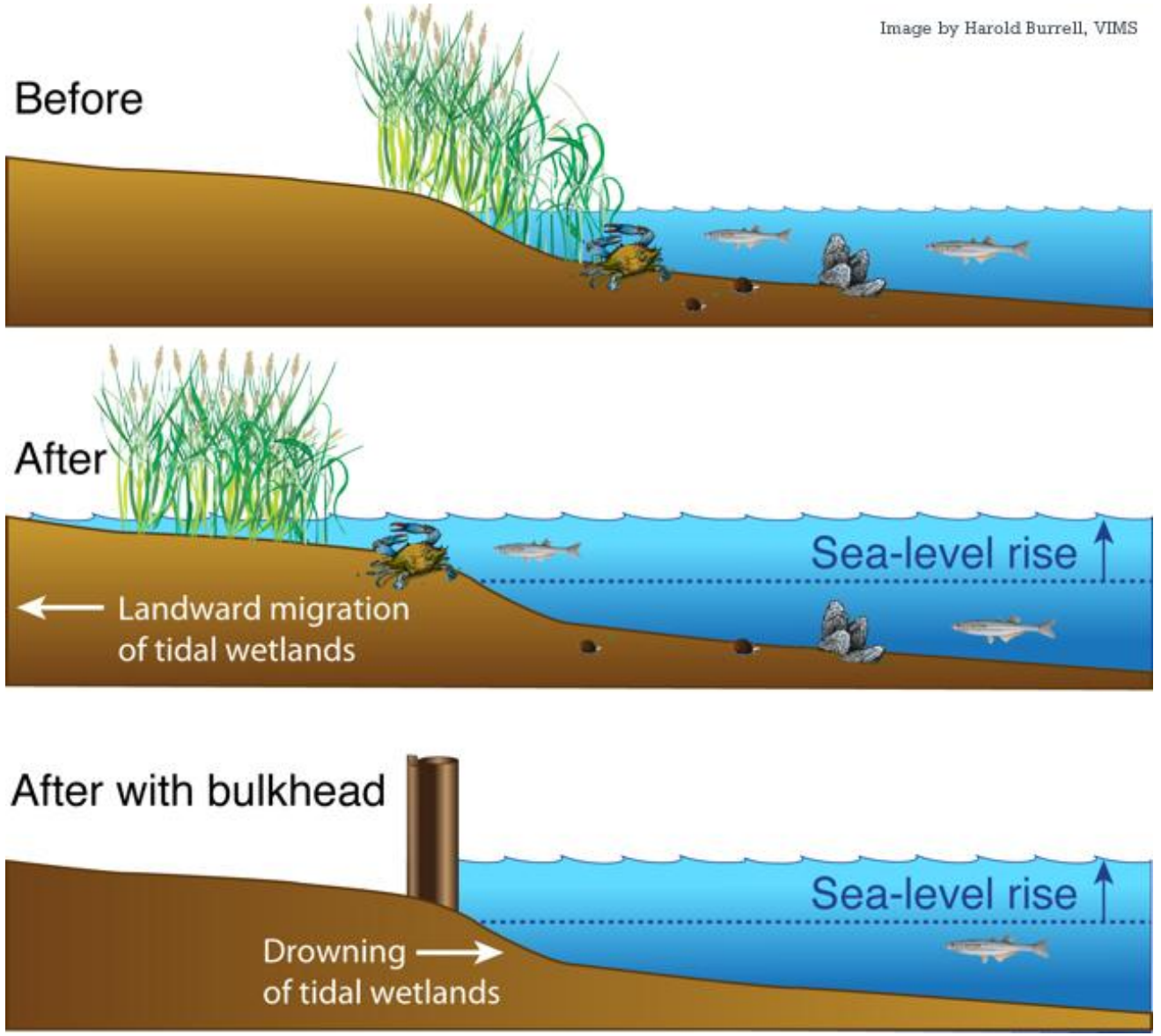
Tidal Marsh Migration Prevented with Bulkhead



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JURISDICTION AREAS

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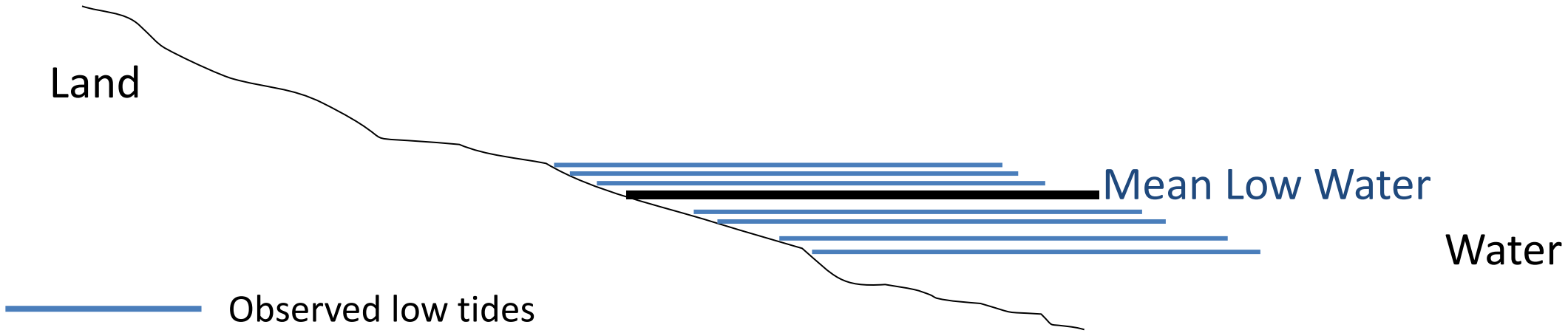
Mean Tide Levels

- MLW = Mean Low Water
- average of all the observed Low water elevations
- over a specific 19-year period (tidal epoch)



Mean Tide Levels

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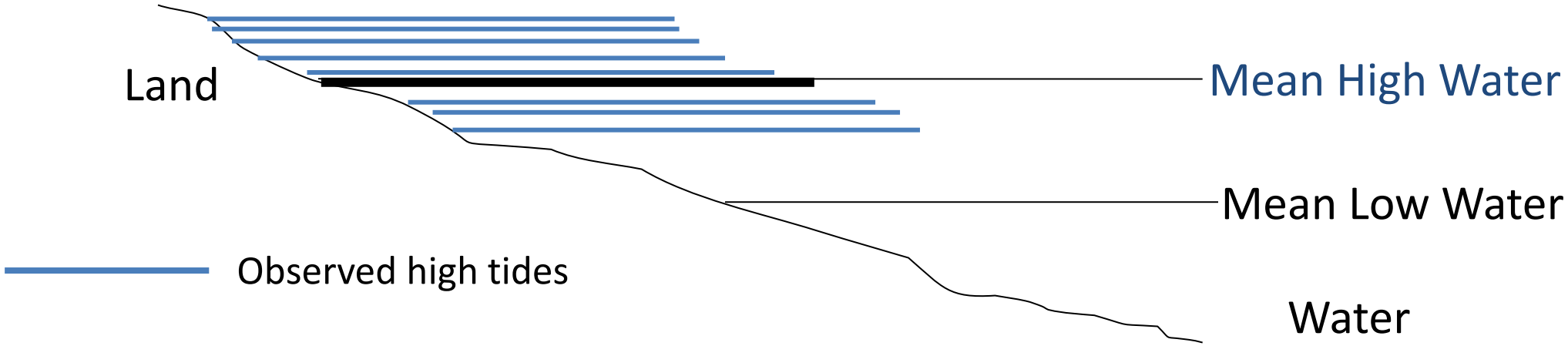
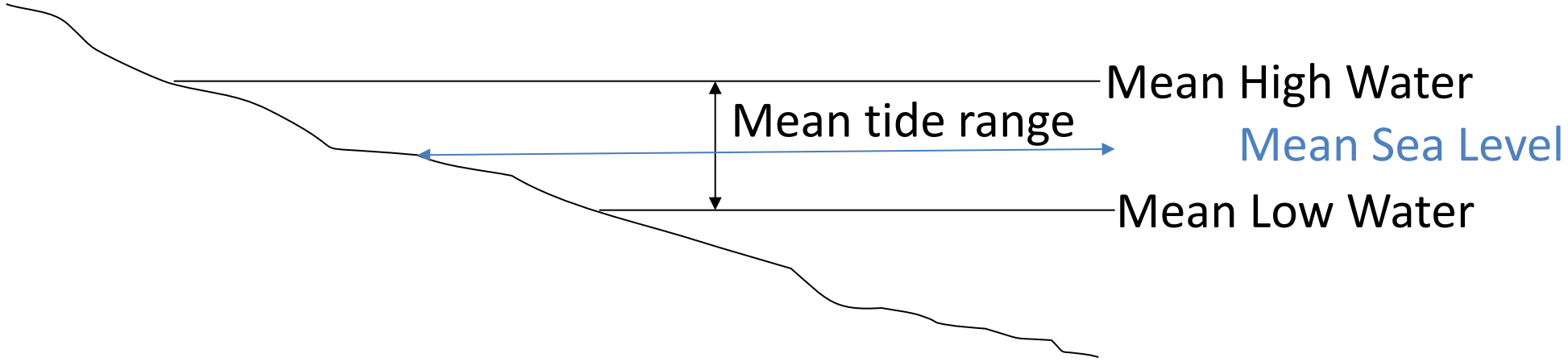
- MHW = Mean High Water
- average of all the observed high water elevations
- over a specific 19-year period (tidal epoch)



Mean Tide Range & Mean Sea Level

Mean tide range = the vertical difference in elevation between MLW and MHW



Mean sea level = the average between MLW and MHW

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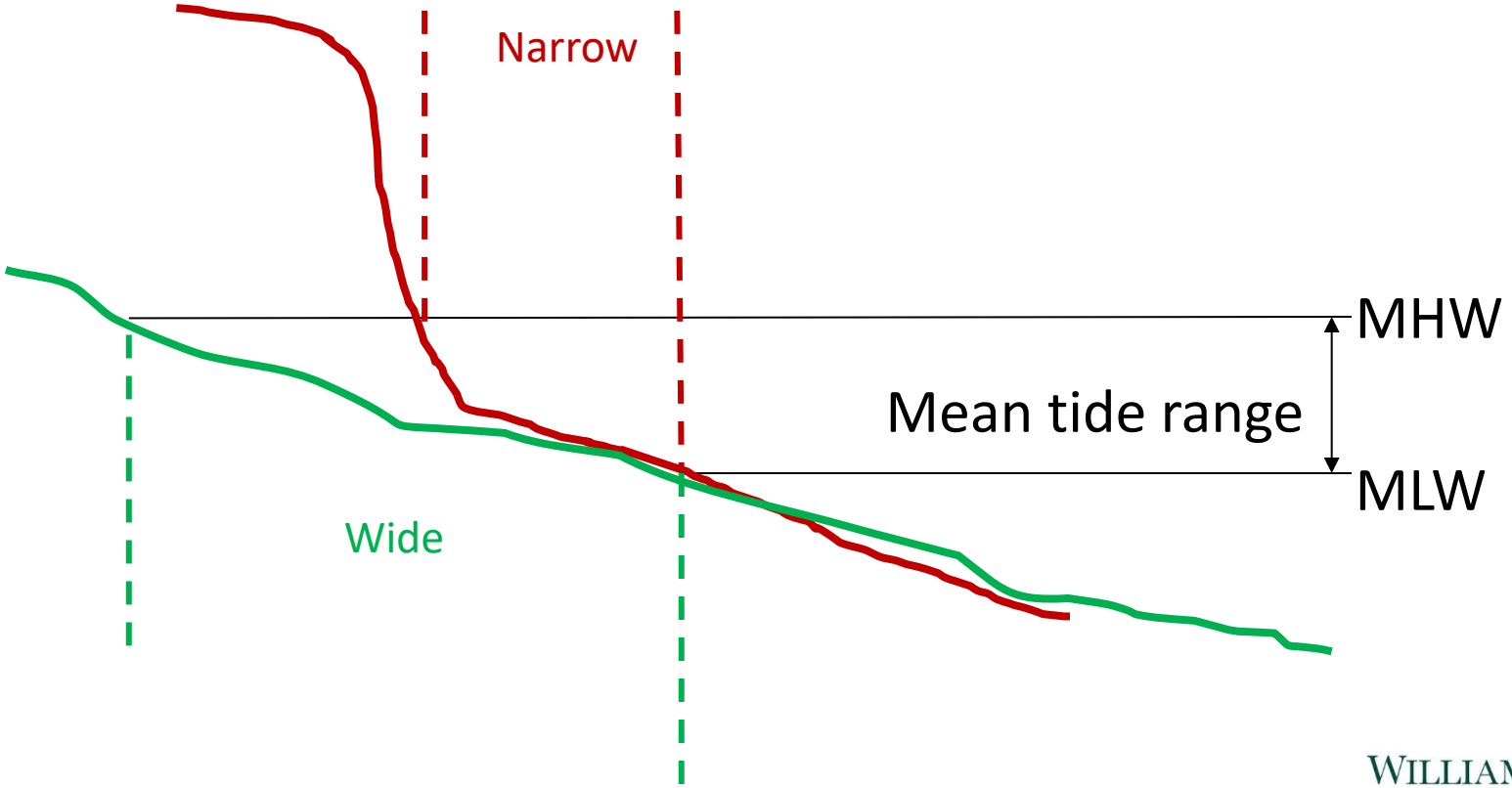
Mean tide range

horizontal comparison steep & gentle slope

Width of the intertidal zone depends on slope of the land



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Non-Vegetated Tidal Wetlands

- No tidal wetland plants
- Soft or hard substrates
- Regular high tides usually at or near upland bank
- Possibly because overhanging trees cast too much shade





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Legal Definition:
Non-Vegetated Tidal Wetlands

- Between Mean Low Water MLW & Mean High Water MHW
- Contiguous to Mean Low Water (no physical separation)
- Not otherwise considered vegetated wetlands
- Includes:
- SOFT SEDIMENT Intertidal Beaches, Sand Flats, Mud Flats
- HARD SUBSTRATE Gravel, Cobbles, Intertidal Oyster Reef, Intertidal Rock

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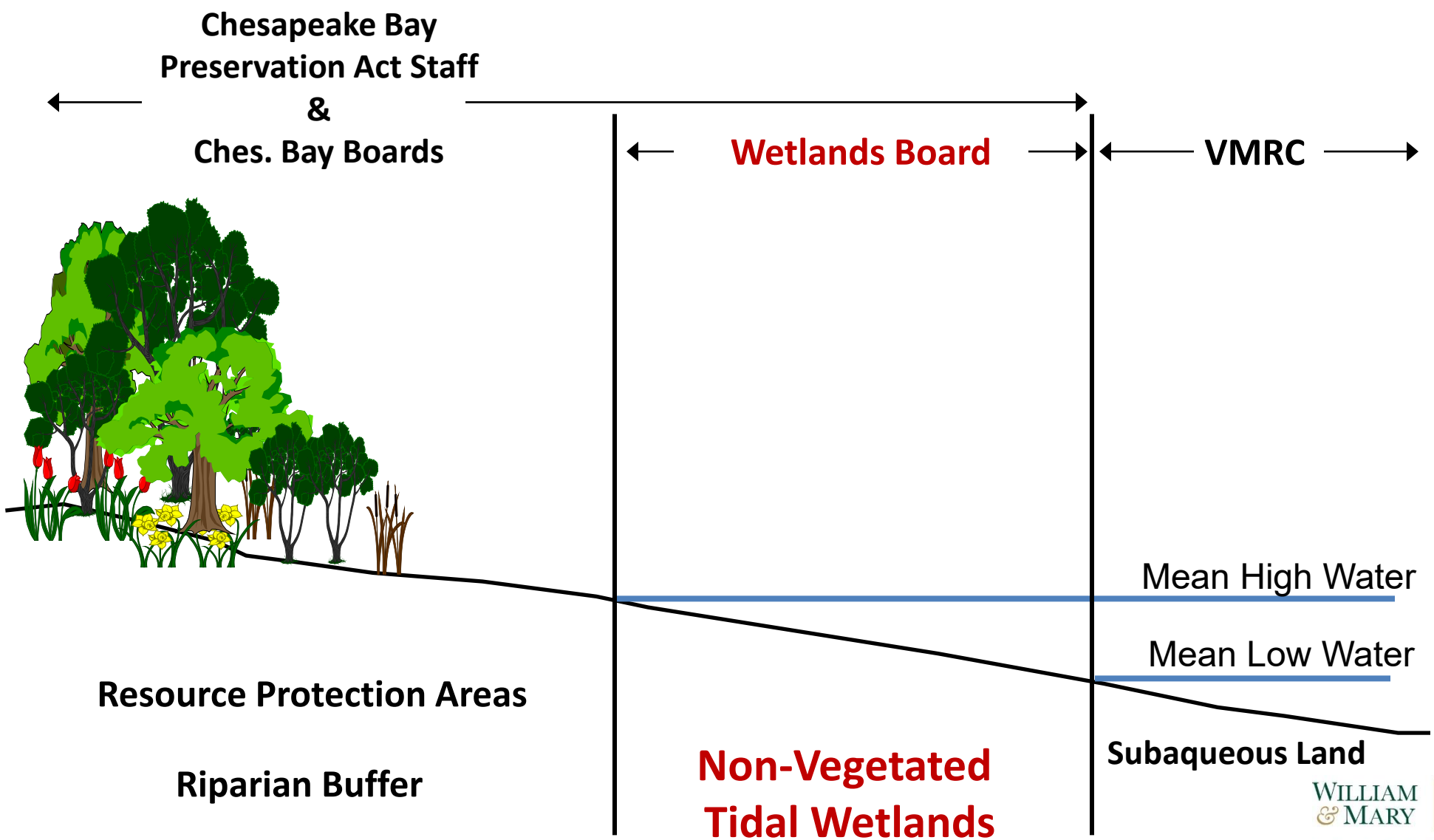
Jurisdictional Boundaries – Non-Vegetated Tidal Wetlands



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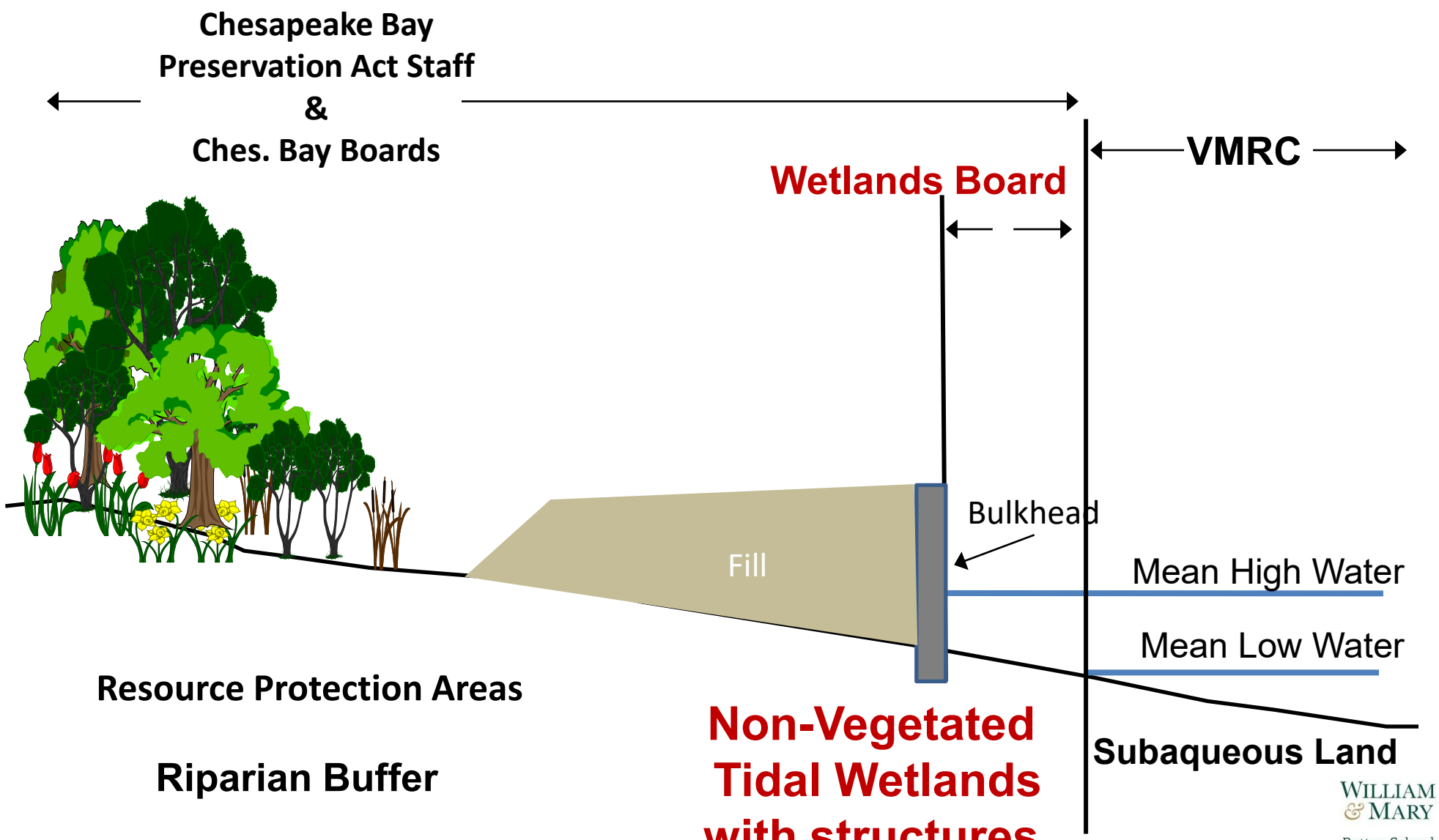
Jurisdictional Boundaries – Non-Vegetated Tidal Wetlands with structures



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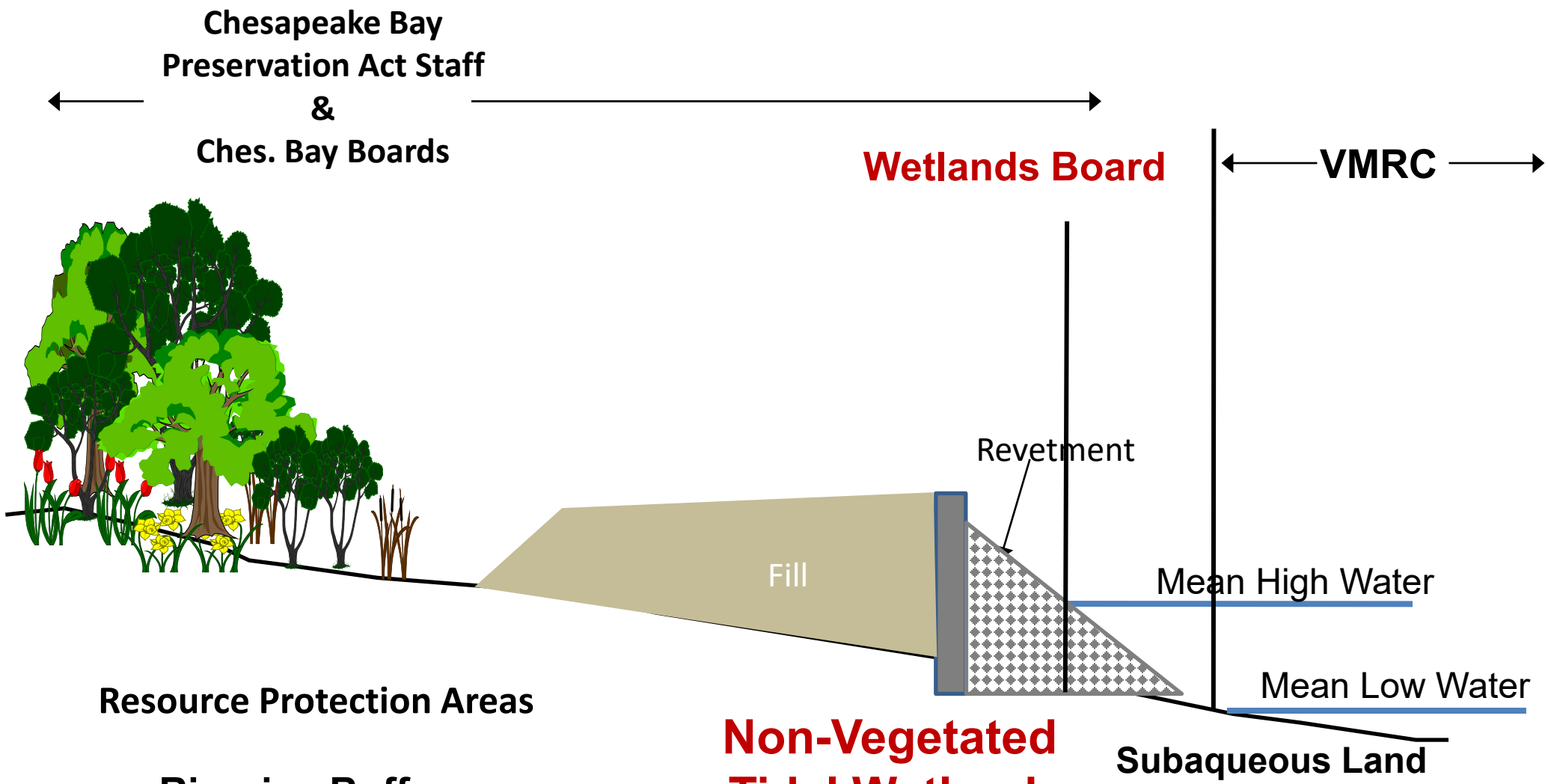
Jurisdictional Boundaries – Non-Vegetated Tidal Wetlands with structures



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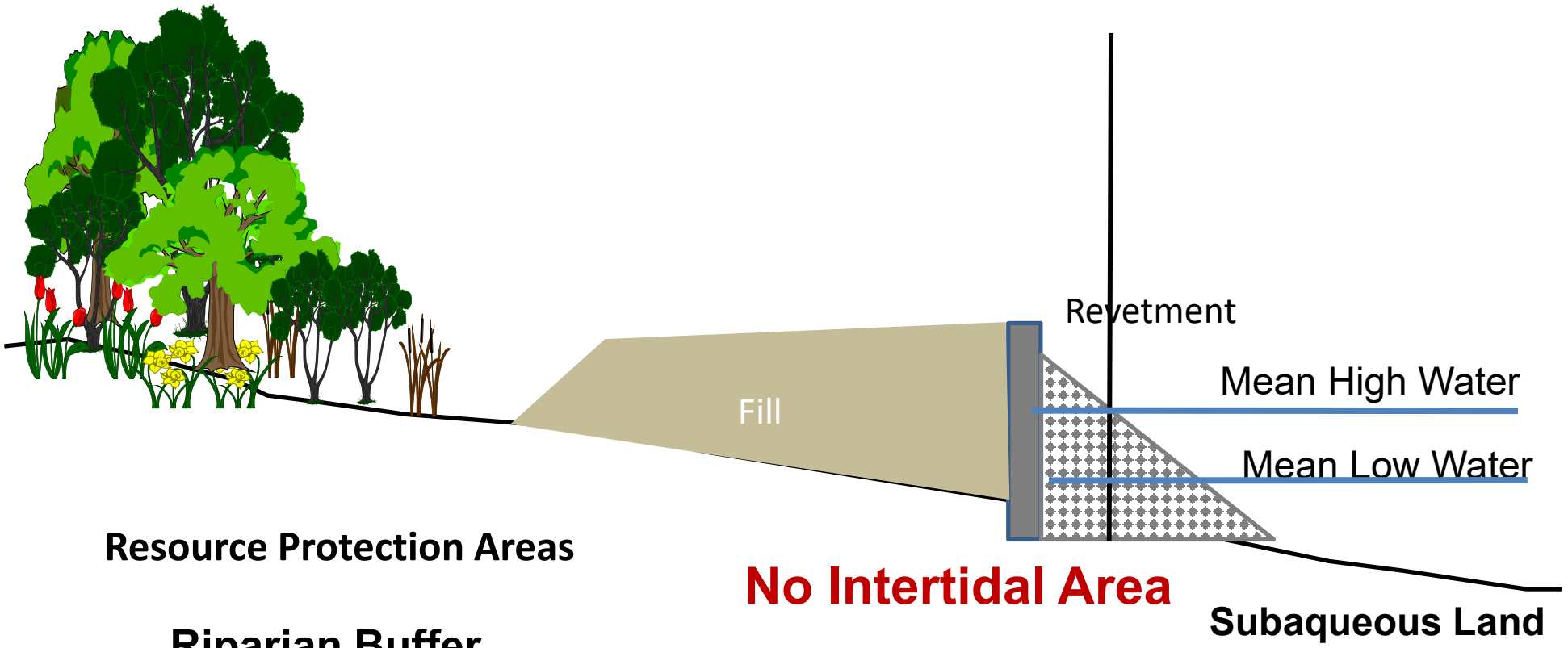
Jurisdictional Boundaries – No Tidal Wetlands with structures

Chesapeake Bay Preservation Act Staff & Ches. Bay Boards

VMRC



Resource Protection Areas

Riparian Buffer

No Intertidal Area

Subaqueous Land

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Vegetated Tidal Wetlands

- Regularly flooded Low Marsh in the intertidal zone
- Irregularly flooded High Marsh above Mean High Water
- Different marsh types based on salinity
- Salt marshes, brackish mixed species, tidal fresh



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Legal Definition:
Vegetated Tidal Wetlands

Between Mean Low Water MLW & an elevation above MLW equal to 1.5 times the mean tide range

Contiguous to Mean Low Water

AND Vegetated with any of the listed wetland plant species

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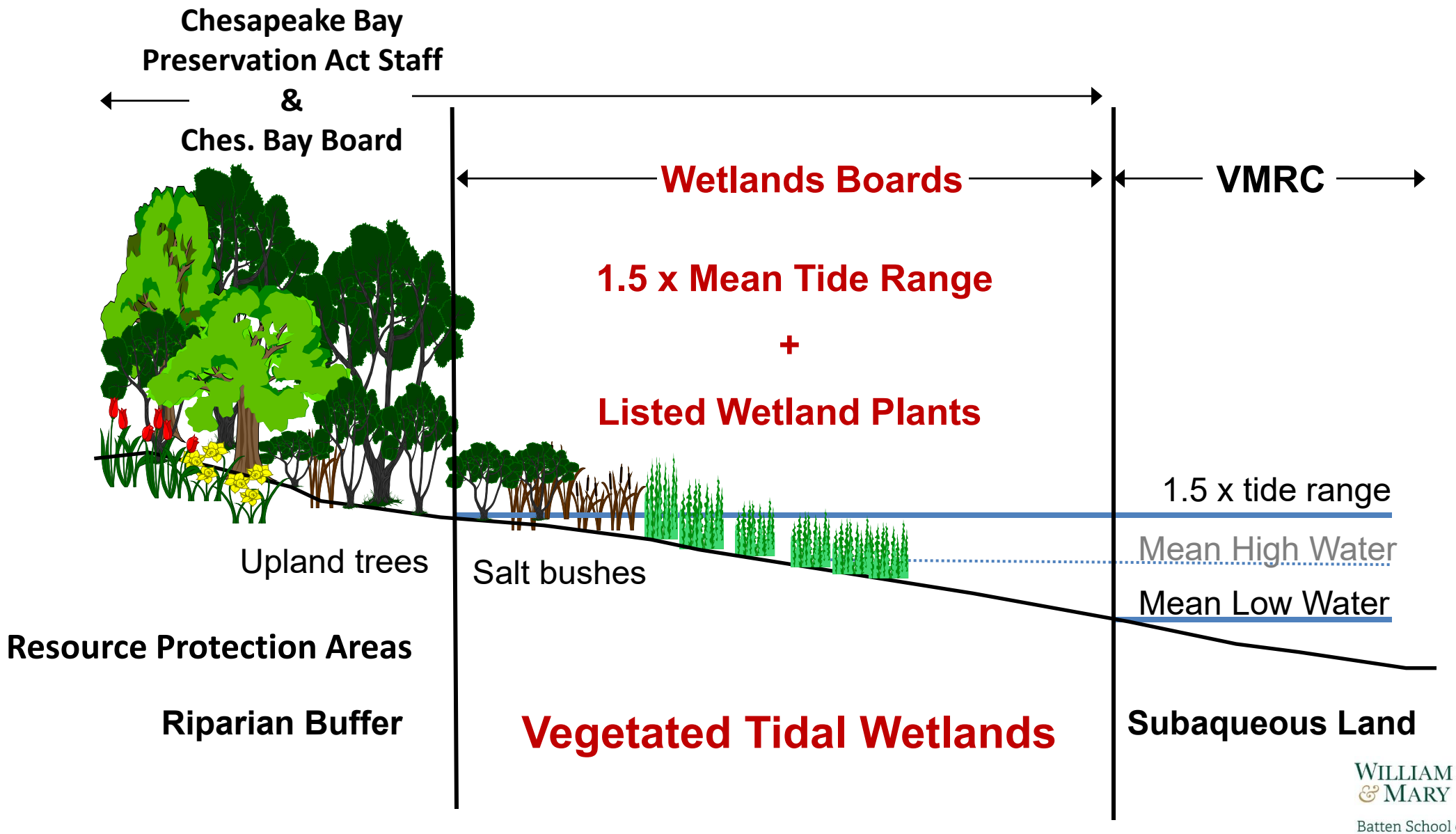
Jurisdictional Boundaries – Vegetated Wetlands



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How Jurisdictional Wetlands are Determined

Elevation surveys with tidal benchmark references

Natural shoreline features & indicators

- Saltbush community if present
- Upland trees, shrubs & vines
- Tide & water lines

Applicants/agents provide delineation verified by local staff

- Prior to public hearings

State regulatory and academic personnel verification



US Army Corps of Engineers wetland delineation is a different, separate process

May or may not coincide with Code of VA delineation

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Shallow Water

Channelward from Mean Low Water

Vegetated

Submerged Aquatic Vegetation SAV

Very important habitat for many species



Non-Vegetated

- Bottom sediments
- Sand
- Sand-Mud
- Mud
- Full of life in most places

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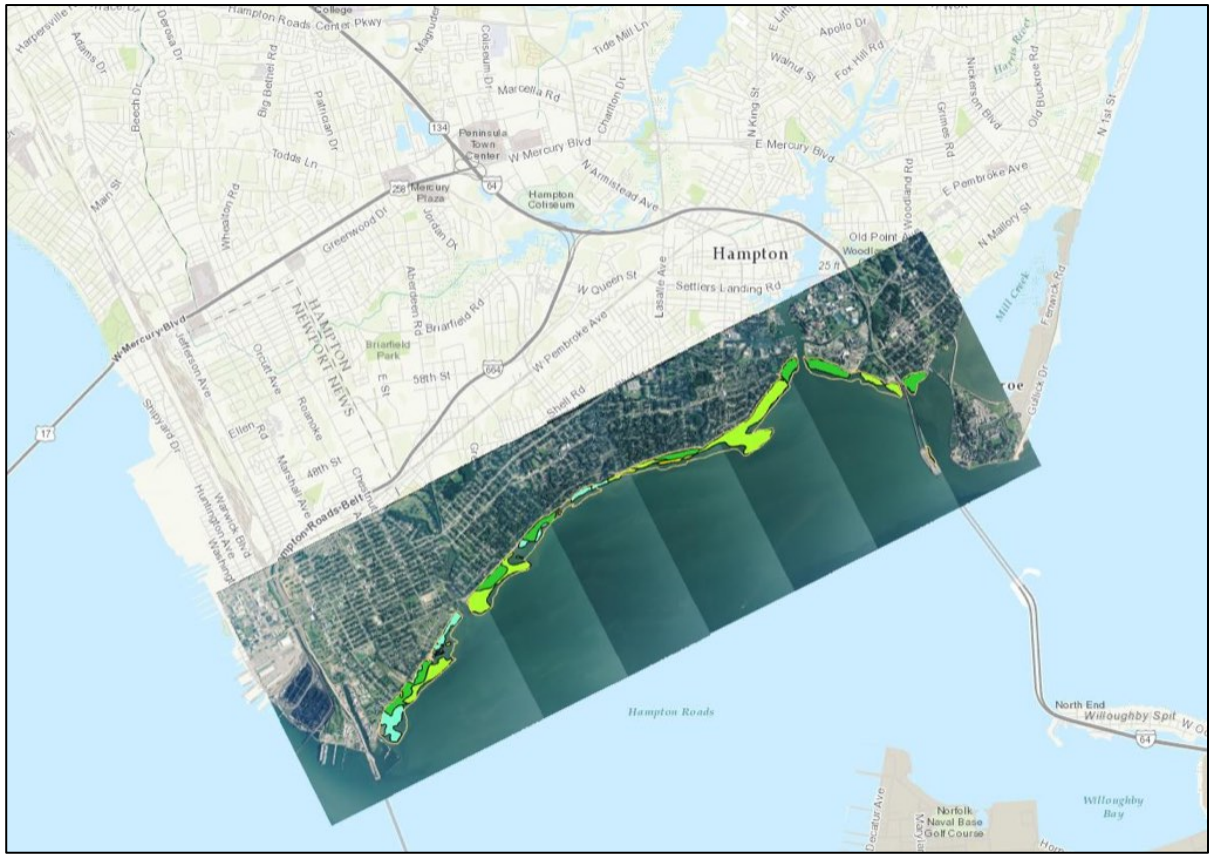
Submerged Aquatic Vegetation SAV
Highly beneficial habitat

Newport News



Poquoson



Source: [VIMS SAV Inventory]

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Legal Definitions:

Subtidal Land

Area channelward from MLW

Without regard to political subdivision or land ownership

Subaqueous land

- Ungranted beds of the bays, rivers, creeks and shores of the sea owned by the Commonwealth

- Political boundary for private & public land

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Shared Jurisdiction Project Example

Date Photo Taken: 2022:02:16 15:41:07



Date Photo Taken: 2022:02:16 15:41:49



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Man-Made Canals

Man-made canals & other dredged waterbodies are regulated by VMRC only if created from wetlands or tidal waters

No VMRC jurisdiction if excavated from upland areas



Whitehouse Cove canal Poquoson

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Exceptions - Allowable Activities without Tidal Wetlands Act permit

- Non-commercial piers, boathouses, footbridges, observation decks and similar structures on pilings
- Government activity in wetlands owned or leased by Commonwealth political subdivision
- Living shoreline projects authorized by a general permit
- Drainage ditch maintenance
- Shellfish cultivation & harvesting
- Harvesting agricultural, forestry or horticulture products
- Conservation & research activities by select agencies
- A few other uncommon activities

SHORELINE STABILIZATION

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Shoreline management may be necessary





Protect property from erosion

Gain access to navigable waters

Replace failing protection structures

Public safety

Protect public infrastructure

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Shoreline Alterations

UPDATES in 2021 GUIDELINES

Justified

- No significant marine fisheries, valuable fish habitat, wetlands and wildlife resources, flood protection, and water quality not detrimentally affected
- Gain access to navigable waters for water-dependent interests
- Protect property from significant damage or loss due to erosion or other natural causes
  - Provided only living shoreline approaches are used unless the best available science shows such approaches are not suitable

Not Justified

- Non-water dependent activities
- Dredging channels to create waterfront property from lots and subdivisions which are not naturally contiguous to waters of navigable depth…
- When damage to properties owned by others is a likely result
- When alteration will result in drainage or discharge of effluents or storm water which impair wetlands, water quality or other marine resources
- If the local government has determined that the proposed alteration does not comply with the Chesapeake Bay Preservation Act, as amended in 2020 and any regulations adopted….to promote coastal resilience and adaptation to sea level rise and climate change.

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Shoreline Protection Alternatives

in order they should be considered

1. No Action

   Leave shoreline in natural condition, enhance native habitats

   Reduce risk through land use changes

2. Non-Structural Living Shoreline

   Maximize vegetation cover

   Change grade

3. "Hybrid" Living Shoreline

   Use structures to support natural erosion buffers (e.g. tidal marshes, beaches)

4. Revetments

5. Bulkheads

With Living Shoreline Enhancements

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Bulkheads

Vertical structures that act as retaining walls

Usually built parallel to shoreline using various materials

Timber



Concrete





Dry-Stack Blocks



Vinyl



Gabions



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Bulkhead Replacement





POSSIBLE SCENARIOS

- Remove & replace in same alignment
- Move landward
- 2 ft in front of original bulkhead

- Increase height to contain backfill and reduce flooding

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Revetments

Sloped structures with layers of stone or broken clean concrete

Placed along upland bank or failing bulkheads

Preferred structures over bulkheads – less overall impact





Bulkhead toe revetment

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Groins & Groin Field

Shore-perpendicular structures to trap sand moving along shoreline

Protection by wide sand beach, not the individual structures



Warwick on the James

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Jetties



Like Groins but for Navigation Channels

Leeward Municipal Marina

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Shoreline Hardening

The installation of multiple bulkheads and revetments along the shoreline that “hardens” previously natural shoreline conditions.





Each individual project may seem insignificant by itself
but the combined miles of many hard structures across time & space
has cumulative impacts on entire estuary

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Types of Adverse Effects



Direct impacts

Immediate result of activity



Secondary or incidental impacts

Occur after the activity or in a nearby area



Cumulative impacts

Combined impacts of many projects over time and space

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Cumulative Impacts of Shoreline Hardening

Habitat loss & fragmentation

- Decreased habitat diversity

Sediment supply & transport altered

- Increased scour & turbidity

Increase in invasive species

Decrease in fish & benthos # & diversity

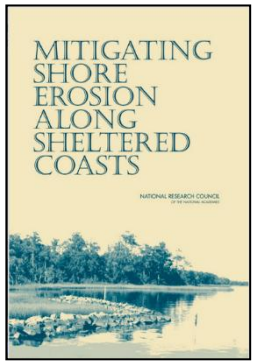
Decrease in marsh bird diversity

Habitat migration interrupted

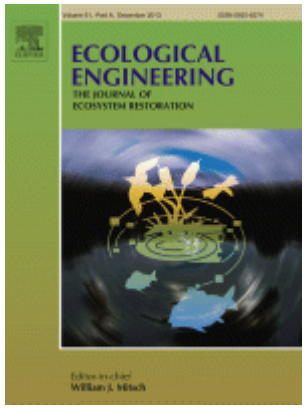
Evidence of low thresholds

- Some adverse effects noticed @ 5% hardening
- Even more when hardening reaches >15%

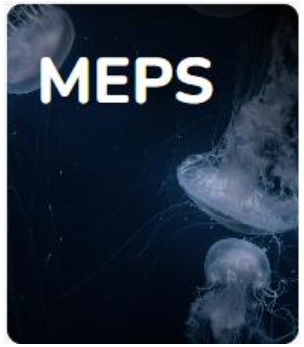
For More Information



National Research Council



Ecological Engineering



Marine Ecology Progress Series

D. Bilkovic & M. Roggero. 2008. *Effects of coastal development on nearshore estuarine nekton communities*

D. Bilkovic & M. Mitchell. 2013. *Ecological tradeoffs of stabilized salt marshes as a shoreline protection strategy: Effects of artificial structures on macrobenthic assemblages*

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Science-Based Shoreline Policy Changes



Direct impacts get the most attention in permit process

Efforts to move activities out of 1 jurisdiction into another does not reduce other types of impacts



Now understand how secondary & cumulative impacts have as great or greater overall effect on coastal habitats

Also stressed by sea level rise & recurrent flooding



Shoreline guidance & Commonwealth policy evolved

Based on the current scientific understanding of impacts on living resources



That is why 'Living Shoreline' treatments are now the default approach in Virginia

Why rigorous alternatives analyses are necessary to carefully consider all possible shoreline project options

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What are Living Shorelines for Erosion Protection?



- **Nature-Based Shoreline Stabilization Alternatives**
- to bulkheads & revetments
- Where erosion is present & cannot be tolerated

- **Mimic & restore natural shoreline habitats**
- Riparian Buffers + Tidal Marshes & Beaches + Reefs

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What is a living shoreline?

A living shoreline is a nature-based shoreline management practice that addresses erosion through the strategic placement of plants, stone, and sand fill to mimic a natural shoreline in appearance and benefits.

Function as carbon sinks, storing atmospheric CO2 in marsh vegetation and sediments.

Improve water quality through settling of sediment and **removal of excess nutrients, heavy metals, and other contaminants** from the ecosystem.

Support populations of key bivalve shellfish like oysters and mussels through restoration and tidal regime.

Preserve the natural connection between water, shoreline, and upland - **providing better habitat** for fish, birds, and other animals.

Dampen incoming wave energy by acting as natural barrier.



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CONTINUUM OF SHORELINE PROTECTION APPROACHES

Natural features







Marshes,
Beaches, Dunes,
Reefs, Forests

Living shoreline









low Energy high

Enhanced







Hard Armor







Figure: D. Bilkovic, VIMS

Natural features | Nature based features | Ecologically enhanced hard structural features | Hard armor structure features

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What's the Difference?

Habitat Restoration

Primary purpose:

Create & replace lost natural habitat for its intrinsic value

People are generally absent

Living Shorelines for Erosion Protection

Primary purpose:
Solve erosion problems for people

Reduce erosion risk

Human presence normal

Waterfront activities accommodated
e.g. water access, recreation, boating

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Living shorelines as defined by the Commonwealth of Virginia

Virginia defines living shorelines in Code (Code of Virginia § 28.2-104.1) as:

1. *a shoreline management practice that provides* erosion *control and water quality benefits;*

2. *protects, restores or enhances natural shoreline habitat; and*

3. *maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials.*

4. *When practicable, a living shoreline may enhance coastal resilience and attenuation of wave energy and storm surge.*

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Virginia Living Shoreline Policy

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1968-2010

Research to inform policy

-1968 VIMS directed to report on VA wetland status
-Research shows cumulative impacts of shl armoring
-2006-8- VIMS develops LS curriculum, workshops, Suitability Model V1
2010- VIMS directed to study VA shl management

2011

Living Shoreline Act

-Made LS preferred alternative
-General Permit development
-Technical guidance (VIMS)

2015

Incentives

-Group 1 General Permit
-State revolving loan
-Approved BMP for TMDL credits

2017

Incentives

-Group 2 General permit
-Cost-share program (VCAP)

VA Living shoreline collaborative formed (2019)

2020

LS Act Amendment

-LS mandatory where suitable
-Update standards to protect shorelines and habitats from SLR & coastal hazards (consider upland buffer in designs)

2021-2025

LS increasing

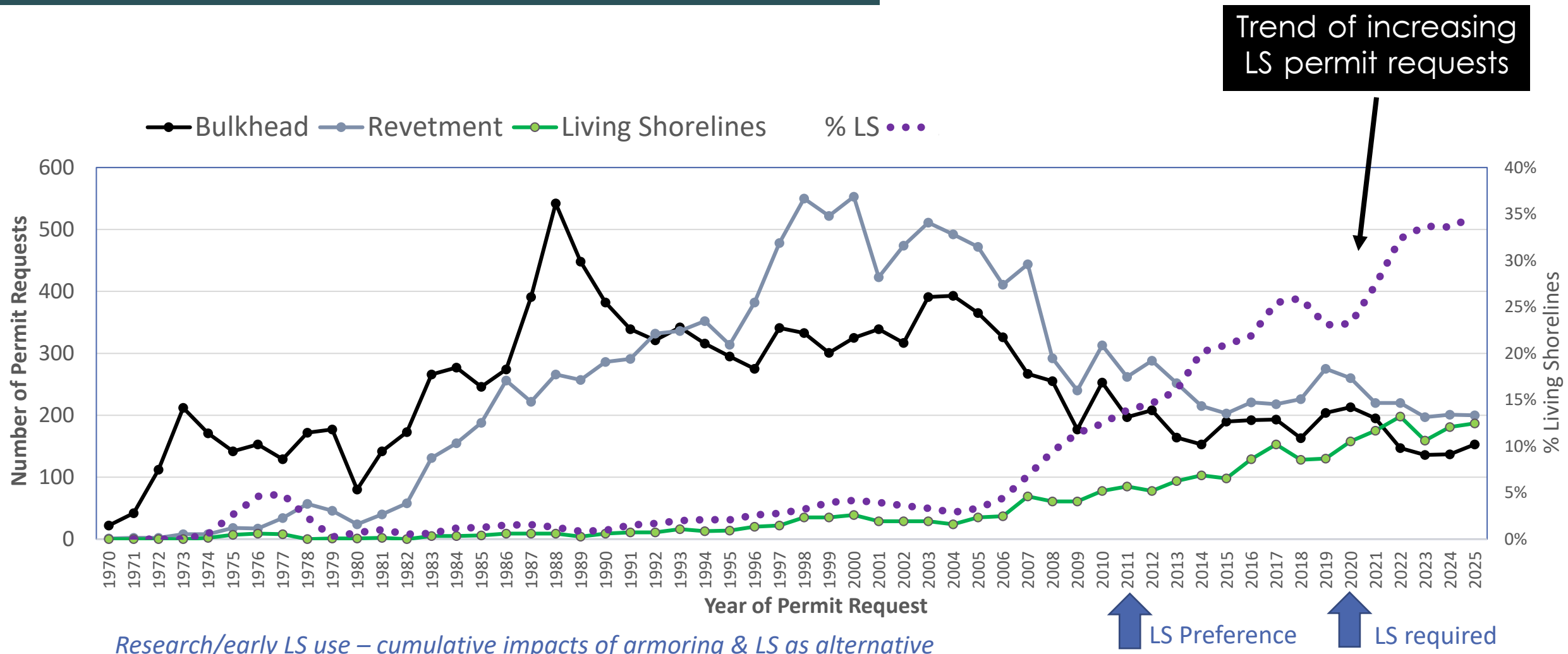
-New guidance & tools
-Designing VA LS for SLR
-SMM v 6.0 w oysters
-Community groups





Image: D.M Bilkovic, VIMS

Virginia Living Shoreline Permit Trends – 1970-2025



Research/early LS use – cumulative impacts of armoring & LS as alternative

Technical support

Community groups

Financial incentives

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Permit Data Source: VMRC

Living Shoreline General Permits

2015 Living Shoreline Group 1 General Permit

- Non-structural activities, e.g. planted marshes, sand fill, oyster shell

2017 Living Shoreline Group 2 General Permit

- Marsh sills in tidal wetlands and subaqueous lands

Each general permit has qualifying criteria, e.g., materials used, distance across the waterway (fetch distance), design requirements

VMRC & locality must agree with General Permit qualification

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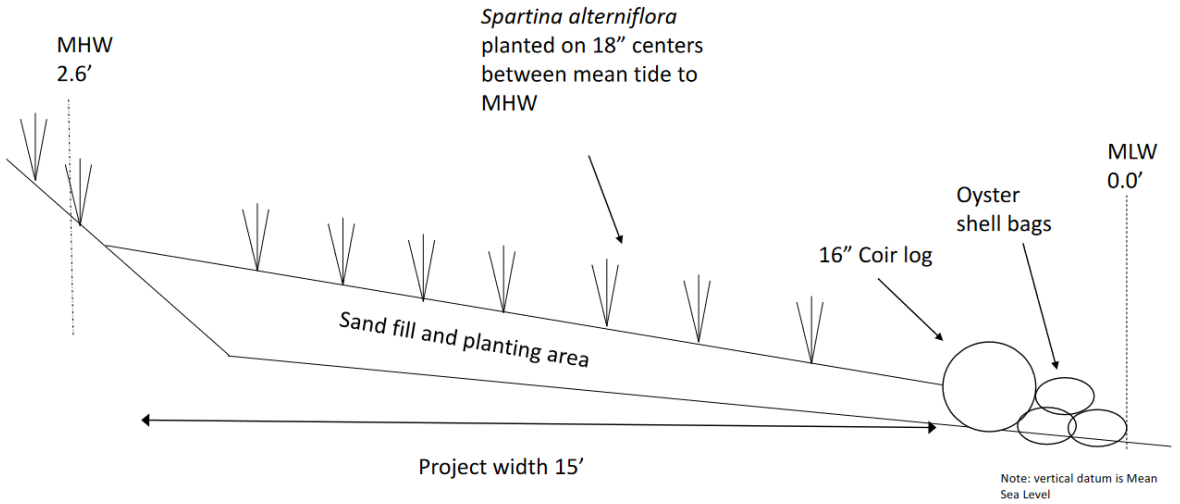
Group 1 Living Shoreline General Permit





Similar project

- Wide flat nearshore in quiet tidal creek
- Coconut fiber logs + oyster shell bags
- Sand fill & tidal marsh planting
- Existing oysters relocated out of fill area



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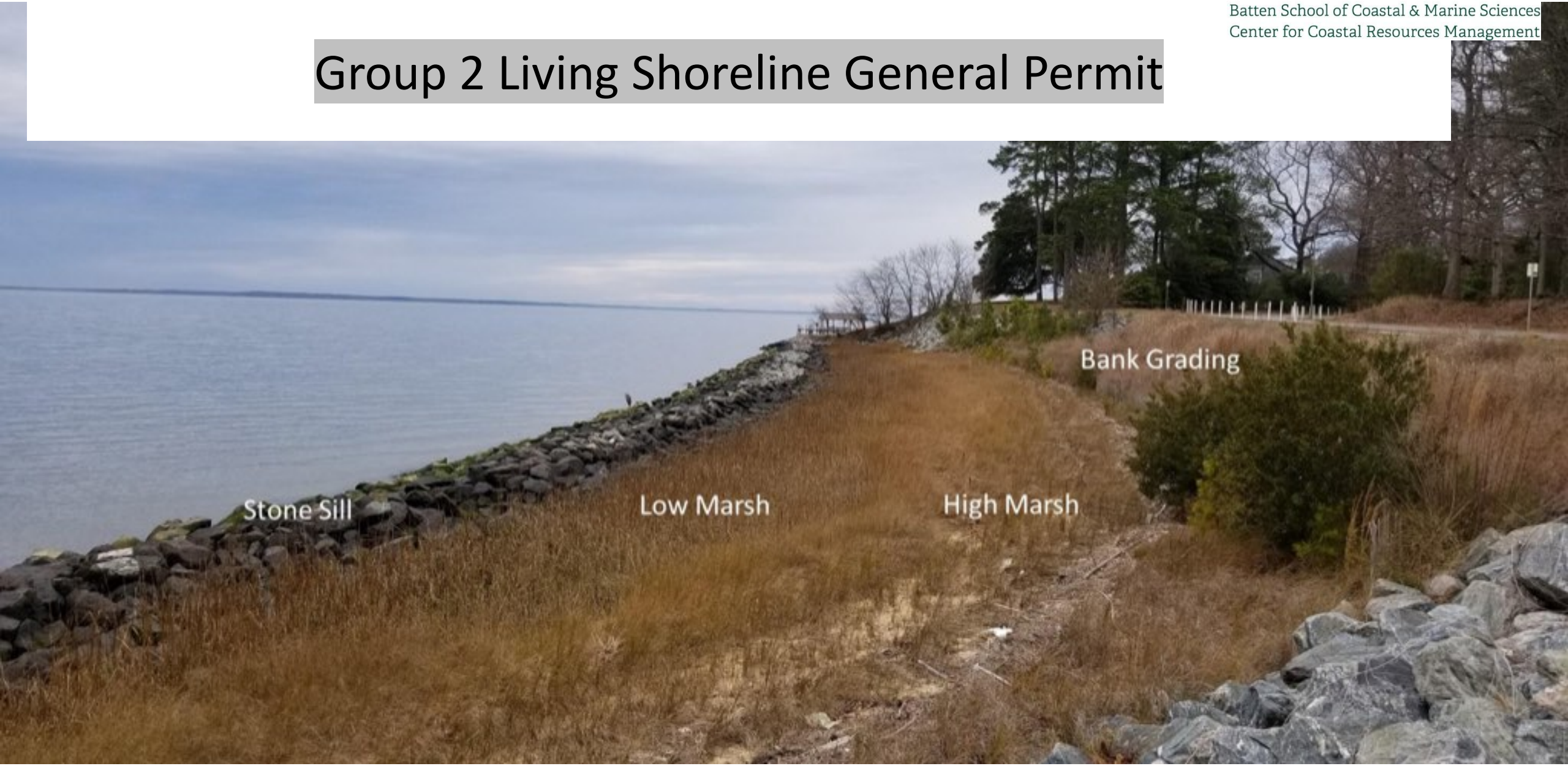
Group 2 Living Shoreline General Permit



Living Shoreline Suitability
Best Available Science Considerations include but are not limited to:

	Most Suitable	Least or Not Suitable
Erosion Risk & Protection Needed	Low	High
Wide Gradual Slopes	Present	Absent & not feasible
Healthy Vegetation Potential	High	Low or Absent
Nearshore Water Depth	Shallow	Deep
Nearshore Bottom Condition	Hard bottom	Soft muddy bottom
Land & Water Use Conflicts	Absent	Present
Significant Natural Resources	Not Impacted	Likely to be impacted
Significant Cultural Resources	Absent	Present & likely to be disturbed

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Retrofit Hardened Shorelines









Before –After examples from cbtrust.org

CBTRUST Chesapeake Bay Trust

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Suitable for Living Shoreline

Compatible
Upland Land Uses

Active Erosion



Large Existing
Tidal Marsh

Wide Shallow Nearshore

Hard Sand Bottom

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Suitable for Living Shoreline

Construction Access Available



Large Existing Tidal Marsh



Blend with Natural Tidal Marsh

Wide Shallow Nearshore

Hard Sand Bottom

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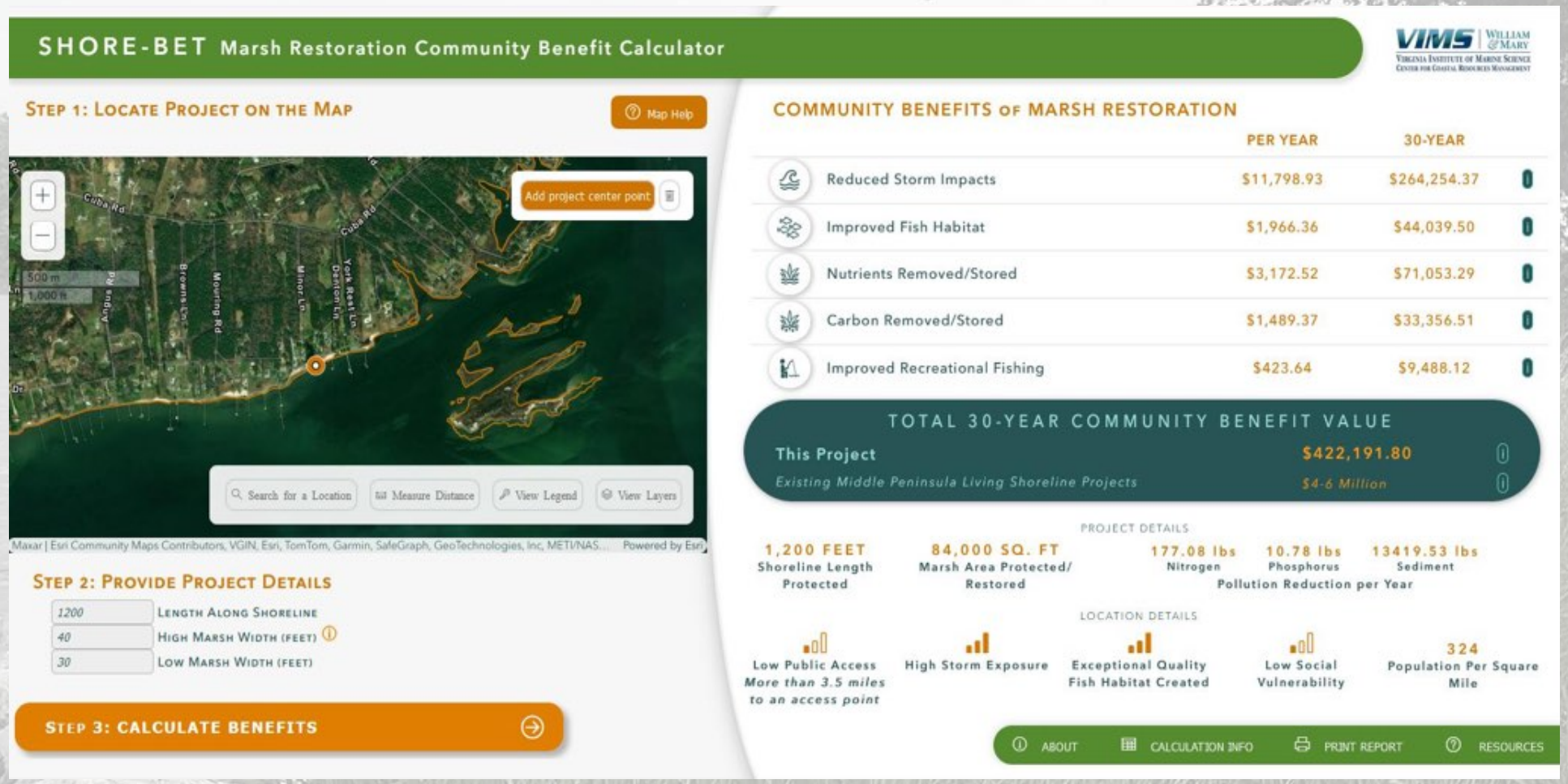
What is that living shoreline worth to my community? – SHORE-BET





https://cmap22.vims.edu/ShoreBet/

Scheld et al. 2024. *Valuing shoreline habitats for recreational fishing. Ocean & Coastal Management*

Bilkovic et al. 2025. *Valuing present and future benefits provided by coastal wetlands and living shorelines. Nature-Based Solutions.*

NOAA

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Shoreline Protection Strategies Guidelines Summary

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Shoreline modification to address upland and landscape issues other than stormwater runoff is not permitted



Only living shoreline approaches may be approved unless best available science shows that such approaches are not suitable.



Considerations must include how tidal wetlands are integrated with submerged aquatic vegetation and riparian habitats



Rock revetments can be permitted only if there is active, detrimental erosion & a living shoreline is not suitable. Bulkheads are not allowed unless deemed necessary and no other approach is suitable.



All shoreline structures must be designed to function under future sea level rise conditions

The Science Behind Virginia's Living Shoreline Standards: Guidance for Coastal Decision-Making

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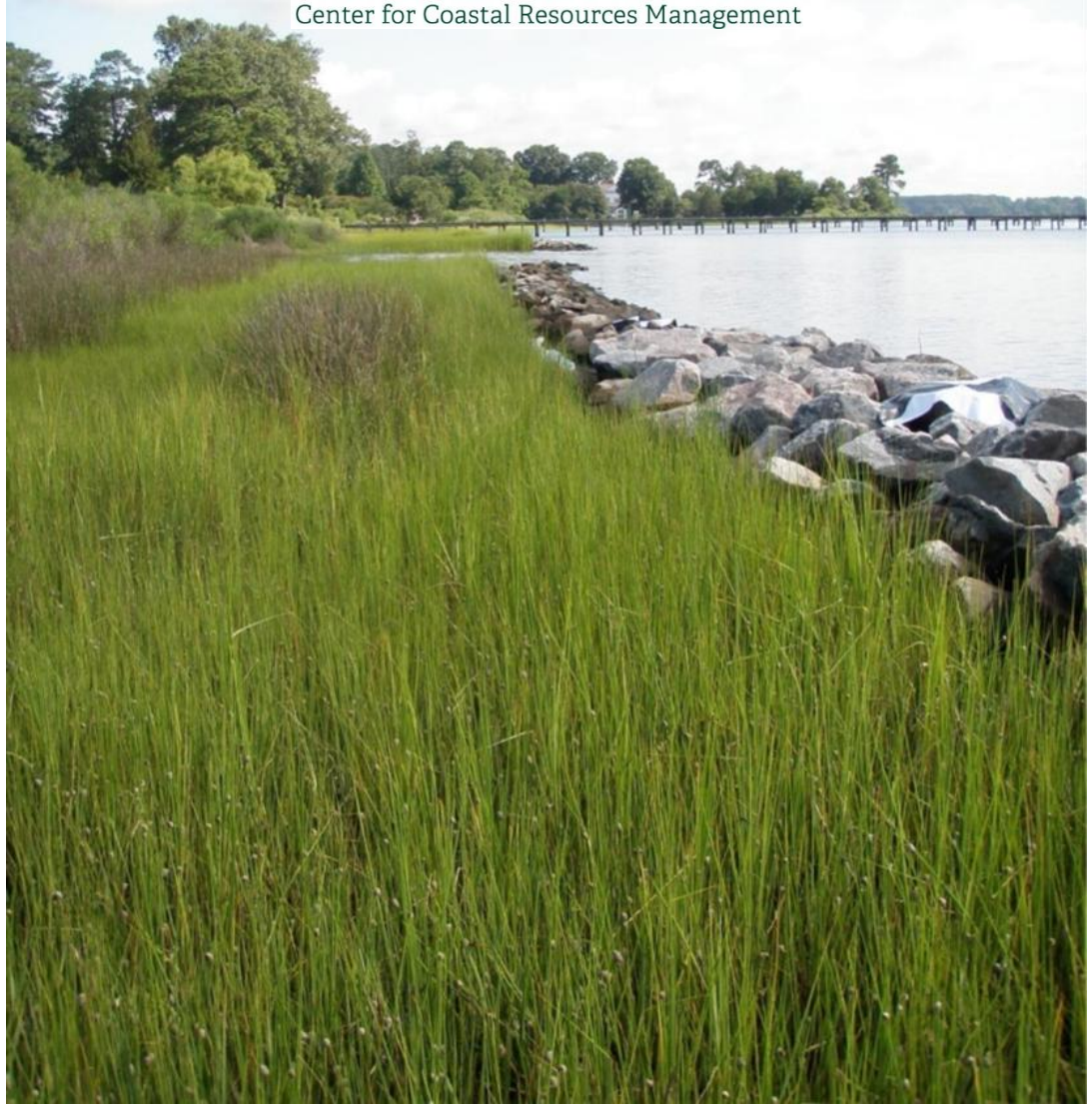

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RESOURCES FOR WETLAND BOARDS

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VMRC Electronic Permit Records

https://webapps.mrc.virginia.gov/public/habitat/

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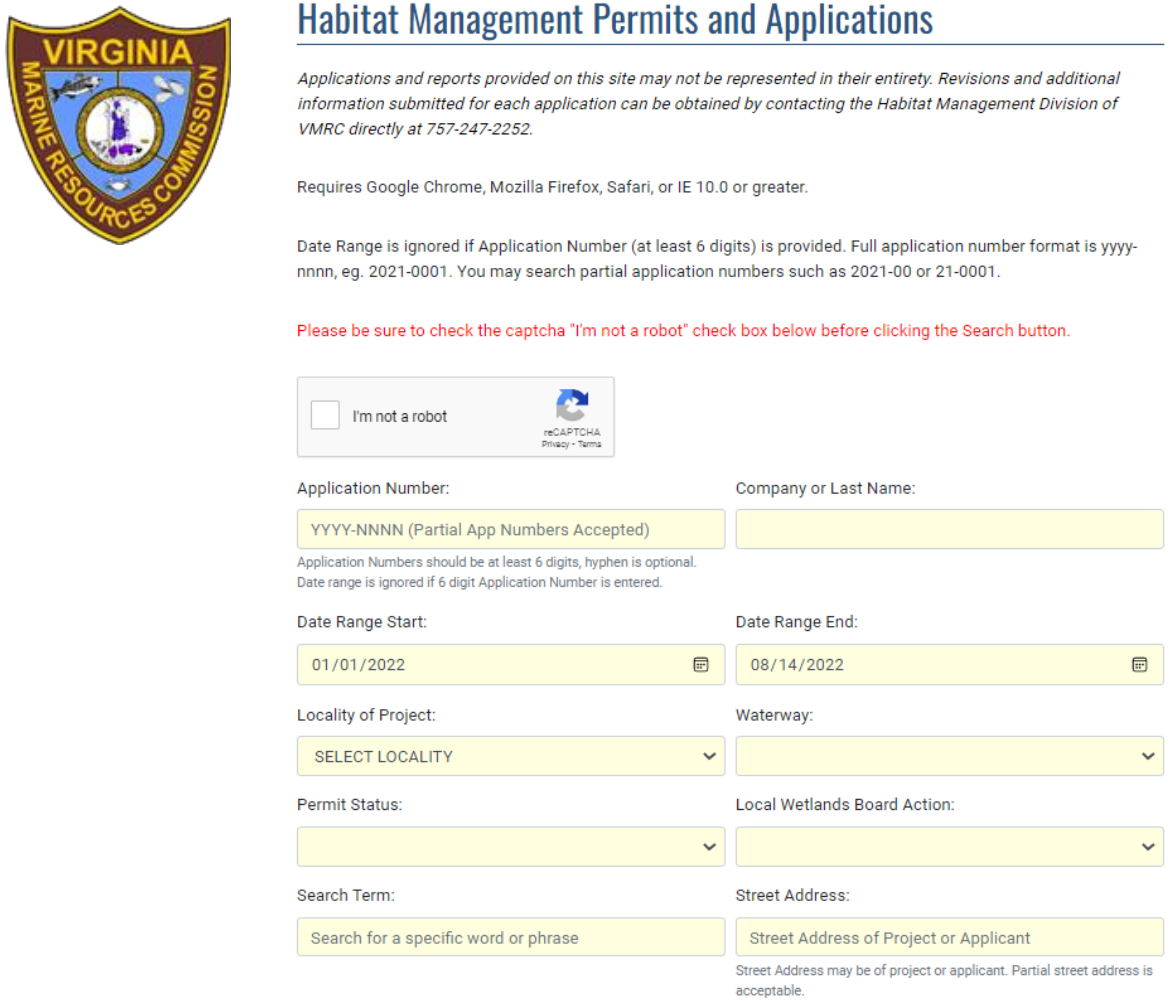


Habitat Management Permits and Applications

Applications and reports provided on this site may not be represented in their entirety. Revisions and additional information submitted for each application can be obtained by contacting the Habitat Management Division of VMRC directly at 757-247-2252.

Requires Google Chrome, Mozilla Firefox, Safari, or IE 10.0 or greater.

Date Range is ignored if Application Number (at least 6 digits) is provided. Full application number format is yyyy-nnnn, eg. 2021-0001. You may search partial application numbers such as 2021-00 or 21-0001.

Please be sure to check the captcha "I'm not a robot" check box below before clicking the Search button.

I'm not a robot

Application Number: YYYY-NNNN (Partial App Numbers Accepted)

Application Numbers should be at least 6 digits, hyphen is optional. Date range is ignored if 6 digit Application Number is entered.

Company or Last Name:

Date Range Start: 01/01/2022

Date Range End: 08/14/2022

Locality of Project: SELECT LOCALITY

Waterway:

Permit Status:

Local Wetlands Board Action:

Search Term: Search for a specific word or phrase

Street Address: Street Address of Project or Applicant

Street Address may be of project or applicant. Partial street address is acceptable.

Searchable by

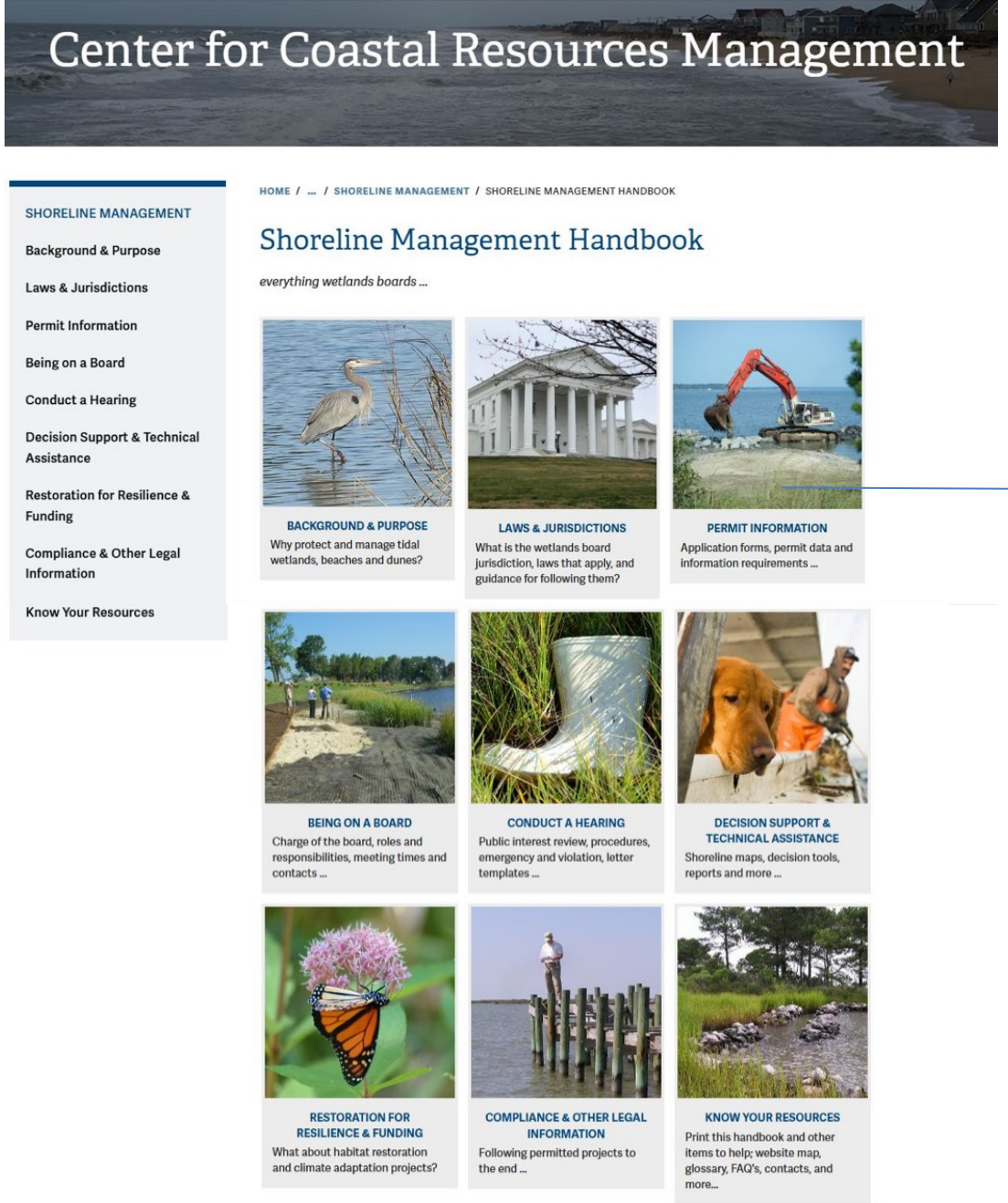
Application Information

Location

Project Type

Requires Google Chrome, Mozilla Firefox, Safari, or IE 10.0 or greater

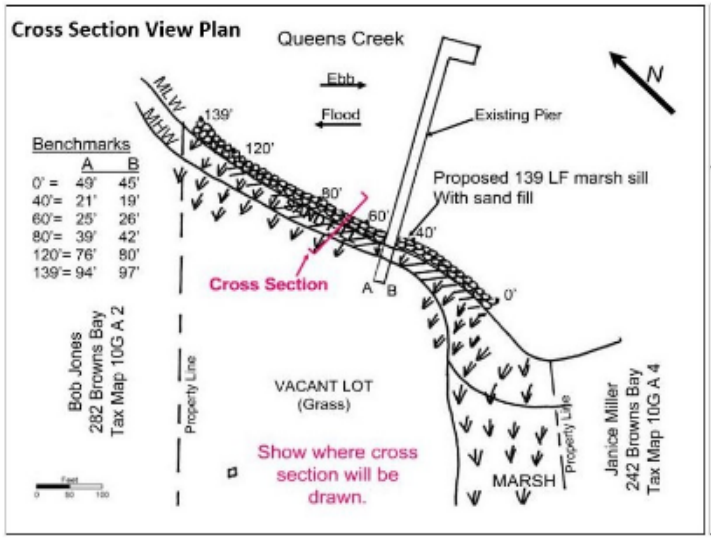
Turn off pop-up blocker

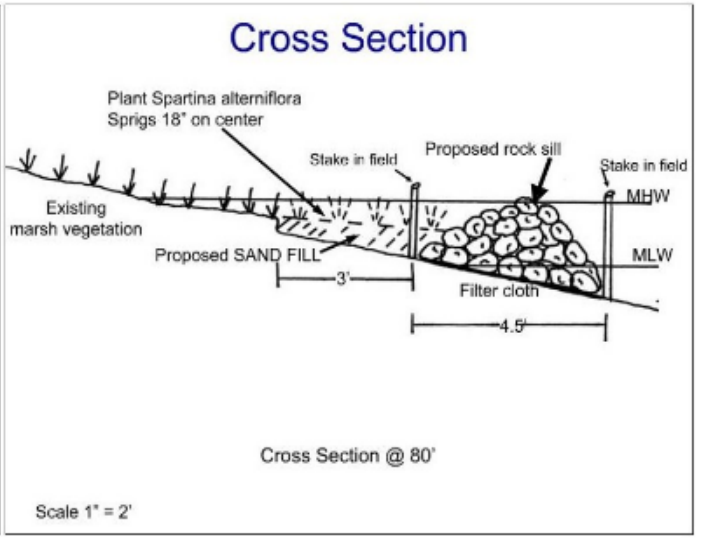


Joint Permit Application Required Information

Applications are determined complete by the permitting authority. **In order to be complete**, the application must at a minimum include the following:

Part 1 – General Information
Part 2 – Signatures
Part 3 – Appendices
Part 4 – Project Drawing
Part 5 – Chesapeake Bay Preservation Act Information
Living Shoreline Statement





https://www.vims.edu/ccrm/advisory/ccrmp/handbook/index.php

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Virginia Coastal Resources Tool

About



7,858 miles



6,237 miles

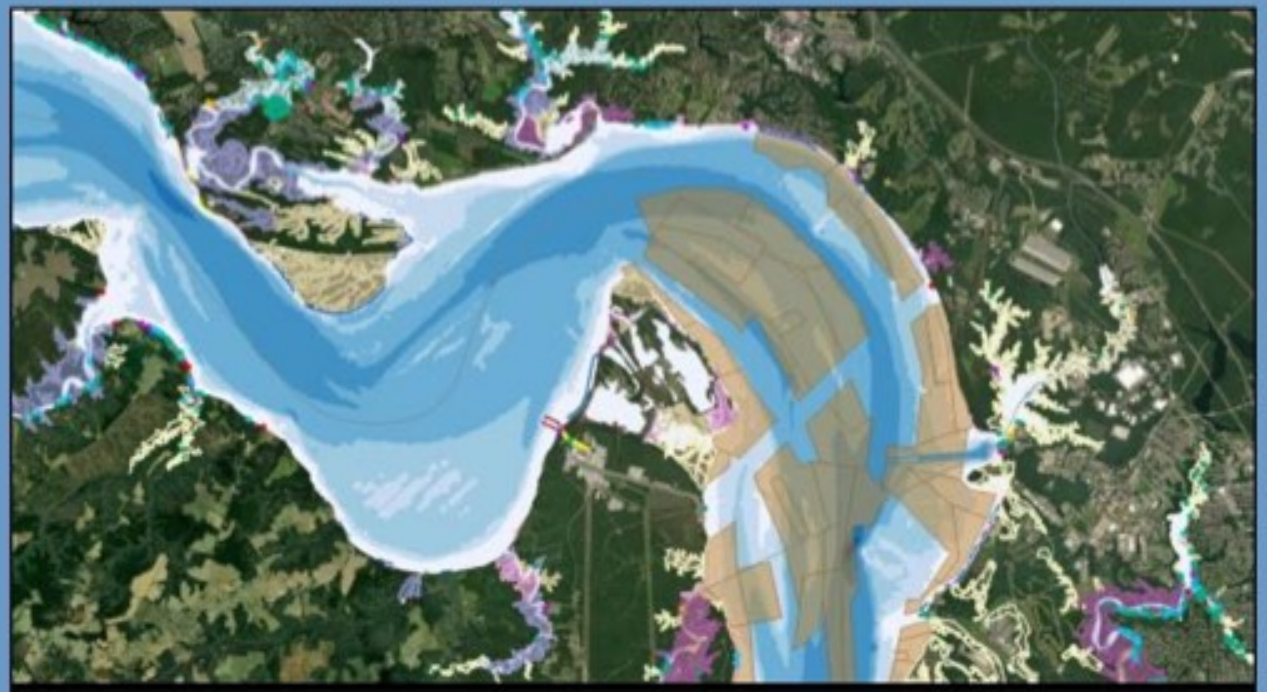


68 miles



1,058 miles

EXPLORE YOUR COASTAL COMMUNITY



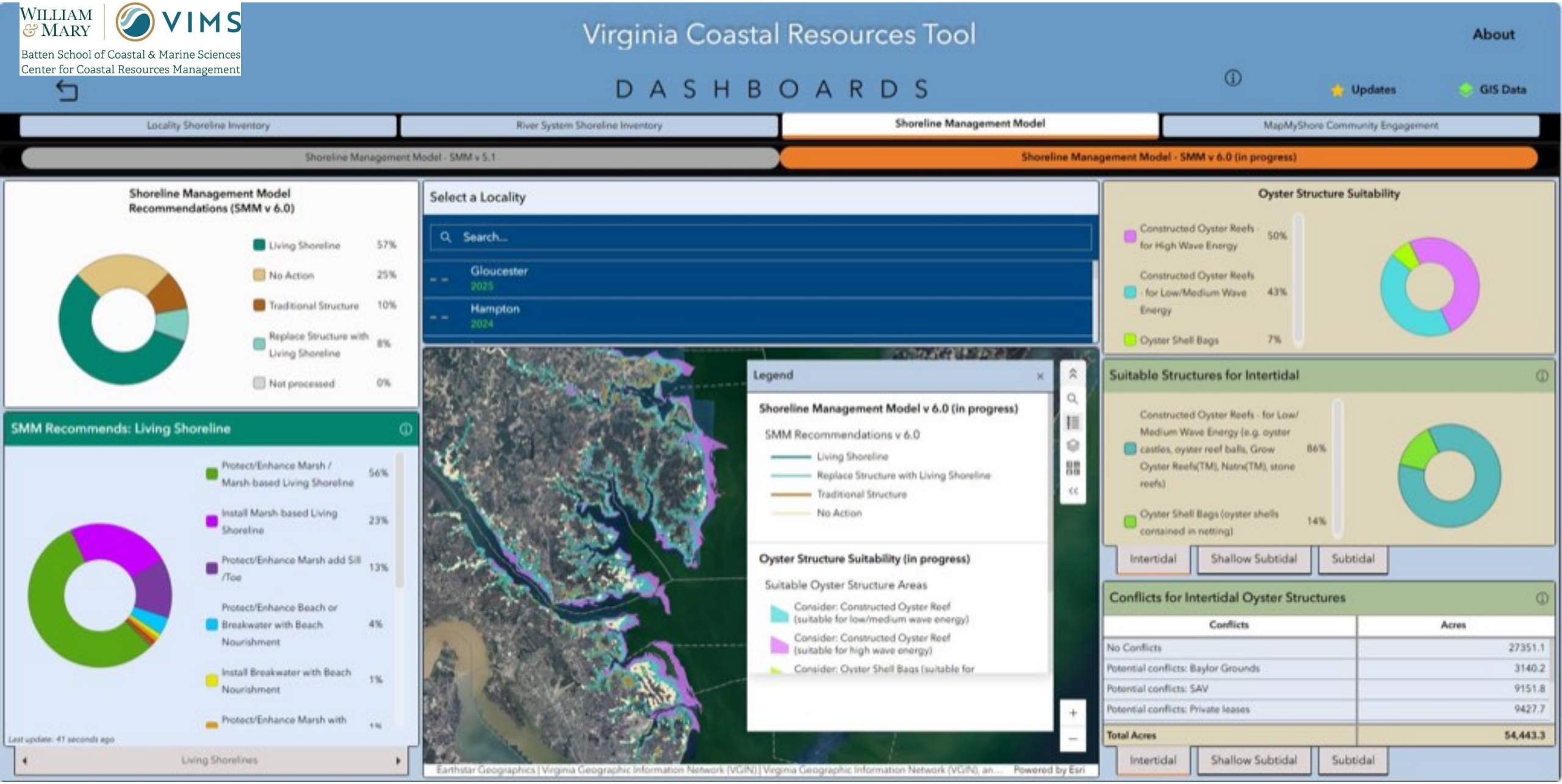
Virginia Coastal Viewer

Explore shoreline conditions throughout coastal Virginia. View animated sea level rise scenarios through 2100; compare 2 different



Dashboards

The dashboards allow you to quickly view summary information for shoreline inventory by locality or river system. The inventory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Virginia Coastal Resources Tool
About
DASHBOARDS
Updates
GIS Data
Locality Shoreline Inventory
River System Shoreline Inventory
Shoreline Management Model
MapMyShore Community Engagement
Shoreline Management Model - SMM v 5.1
Shoreline Management Model - SMM v 6.0 (in progress)
Shoreline Management Model Recommendations (SMM v 6.0)
Living Shoreline 57%
No Action 25%
Traditional Structure 10%
Replace Structure with Living Shoreline 8%
Not processed 0%
SMM Recommends: Living Shoreline
Protect/Enhance Marsh / Marsh-based Living Shoreline 56%
Install Marsh based Living Shoreline 23%
Protect/Enhance Marsh add Sill /Toe 13%
Protect/Enhance Beach or Breakwater with Beach Nourishment 4%
Install Breakwater with Beach Nourishment 1%
Protect/Enhance Marsh with
Last update: 41 seconds ago
Living Shorelines
Select a Locality
Search...
Gloucester
2025
Hampton
2024
Legend
Shoreline Management Model v 6.0 (in progress)
SMM Recommendations v 6.0
Living Shoreline
Replace Structure with Living Shoreline
Traditional Structure
No Action
Oyster Structure Suitability (in progress)
Suitable Oyster Structure Areas
Consider: Constructed Oyster Reef (suitable for low/medium wave energy)
Consider: Constructed Oyster Reef (suitable for high wave energy)
Consider: Oyster Shell Bags (suitable for
Earthstar Geographics | Virginia Geographic Information Network (VGIN) | Virginia Geographic Information Network (VGIN), an... Powered by Esri
Oyster Structure Suitability
Constructed Oyster Reefs - for High Wave Energy 50%
Constructed Oyster Reefs - for Low/Medium Wave Energy 43%
Oyster Shell Bags 7%
Suitable Structures for Intertidal
Constructed Oyster Reefs - for Low/Medium Wave Energy (e.g. oyster castles, oyster reef balls, Grow Oyster Reefs(TM), Natrx(TM), stone reefs) 86%
Oyster Shell Bags (oyster shells contained in netting) 14%
Intertidal
Shallow Subtidal
Subtidal
Conflicts for Intertidal Oyster Structures
Conflicts
Acres
No Conflicts 27351.1
Potential conflicts: Baylor Grounds 3140.2
Potential conflicts: SAV 9151.8
Potential conflicts: Private leases 9427.7
Total Acres 54,443.3
Intertidal
Shallow Subtidal
Subtidal

Annual Workshops

- Lectures
- Field Sessions on VIMS campus
- Previous workshops online http://www.vims.edu/ccrm/outreach/workshops/index.php





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