The Site, Desktop Exercise, Prep for Tomorrow

CBLP CHESAPEAKE BAY Landscape Professional

Living Shoreline Collaborative

Common Knowledge of Living Shoreline Implementation Best Practices & Resources

CBLP SHORELINES Certificate Course

Site Feasibility & Evaluation	Design	Permitting	Construction	Maintenance Monitoring Management
Meet Client & ID Problem	Select Solution	Complete & Submit JPA Part 5 CBPA Info	Pre-Construction Feasibility, Site Visits, Consults, Permits	Establishment
Site Assessment	Conceptual Designs	Site Visits & Meetings w/ Regulators & Boards	Site Prep, Protection Materials	Typical Regular Tasks
Consult Technical Advisors & Regulators	Consult Client, Contractor Consult Regulators, TAs	Address Comments & Conditions for Approval	Construction & Inspections	Management
Consider Solutions	ID Impacts & Permits Required			Monitoring & Verification
	Develop final drawings for Permit Application			

Day 2 Overview

- Introductions, Plan for the Day
- Homework Review & Prep for Field Assessments
- 15 minute break and move outside
- Field Assessment Stations in small groups
- Advisory Panel Discussion
- 30 minute lunch break
- Design Options
- Contractor Panel - Implementation Best Practices
- Construction Feasibility
- Breakout Groups - Living Shoreline Solution Feasibility
- Plan for tomorrow & Social

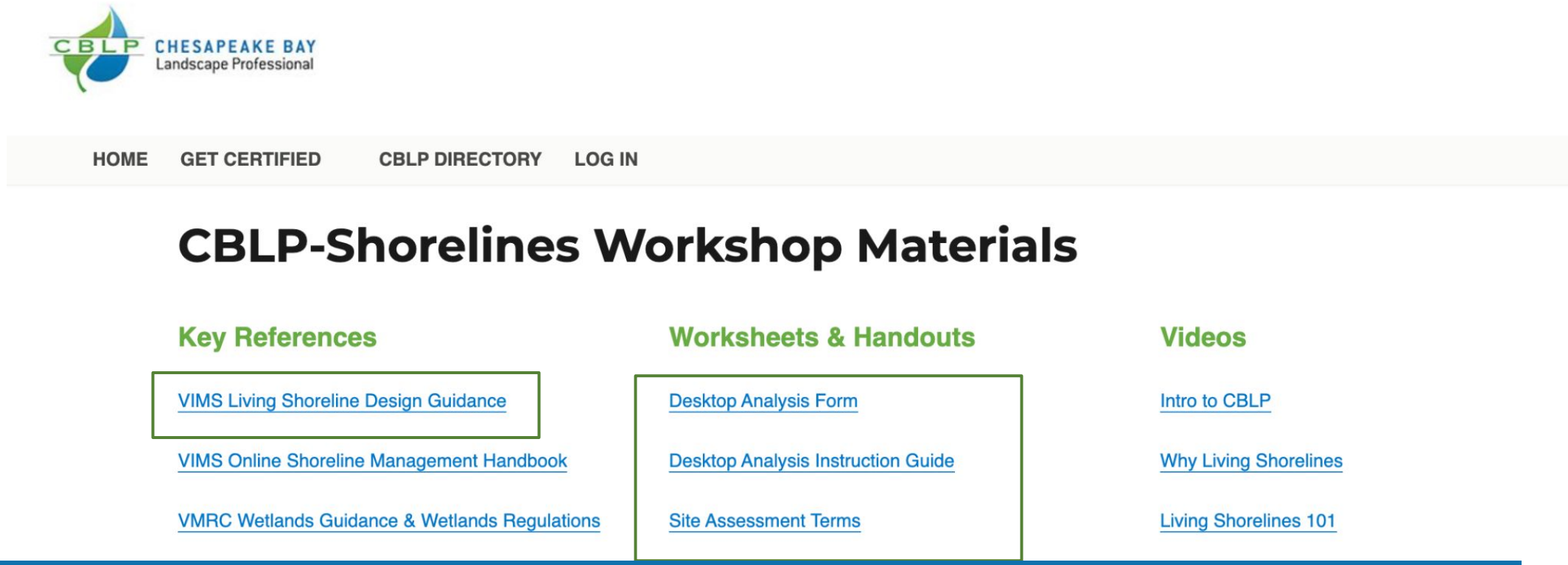
Today's Instructors/Speakers

- Karen Duhring, VIMS
- Aaron Wendt, DCR SEAS
- Rachael Peabody, VMRC
- Mary Mantey, ERP
- Ellen Grimes, CRM
- Jim Cahoon, Bay Environmental
- Ryan Walsh, JRA
- Tracy Skrabal

CBLP Staff

- Beth Ginter
- Shereen Hughes
- Stacie McGraw
- Jason Swope

Pre-Class Work for Day 2



- Review & be familiar with VMRC Group 1 and Group 2 General Permits
- Using the Desktop Analysis Guide, complete the Desktop Analysis Form for the area outlined in red on the Base Map. Bring a printed copy of the form to class.

Pre-Class Work for Day 2

DESKTOP ANALYSIS									
	Shore orientation:	N NE NW E W S SE SW				Shore Length:	ft	Shore Width:	ft
	Average Fetch:	Very High (> 15 miles)		High (5-15 miles)		Medium (1-5 miles)	Low (0.5 - 1 mile)	Very Low (< 0.5 miles)	
	Longest Fetch:	mi	Direction:		Shore Morphology:	Pocket	Straight	Headland	Irregular
	Depth Offshore:	ft	Nearshore Morphology:		Bars	Tidal Flats	Other:		
	Tide Data	MLW:	MHW:	MTL:	Mean Tide Range:		1.5x Mean Tide Range: *(calculate using MTR)*		
	Storm Surge:	10 yr		50 yr		100 yr		Average Salinity:	PSU
	Expected SLR:	10 yr		20 yr		50 yr		Saltwater	Freshwater
	Erosion Rate:	___ Very high accretion (> +10 ft/yr) ___ High accretion (+10 to +5 ft/yr) ___ Medium accretion (+5 to +2 ft/yr) ___ Low Accretion (+2 to +1 ft/yr) ___ Very Low Accretion (+1 to 0 ft/yr)			___ Very High Erosion (> -10 ft/yr) ___ High Erosion (-5 to -10 ft/yr) ___ Medium Erosion (-2 to -5 ft/yr) ___ Low Erosion (-1 to -2 ft/yr) ___ Very Low Erosion (0 to -1 ft/yr)		Is Submerged Aquatic Vegetation (SAV) present?	YES	NO
	Design Wave:	Height		Period		Proximity to Navigation Channel:			
	Note easements or utilities located in the project area:								
	Notes:								

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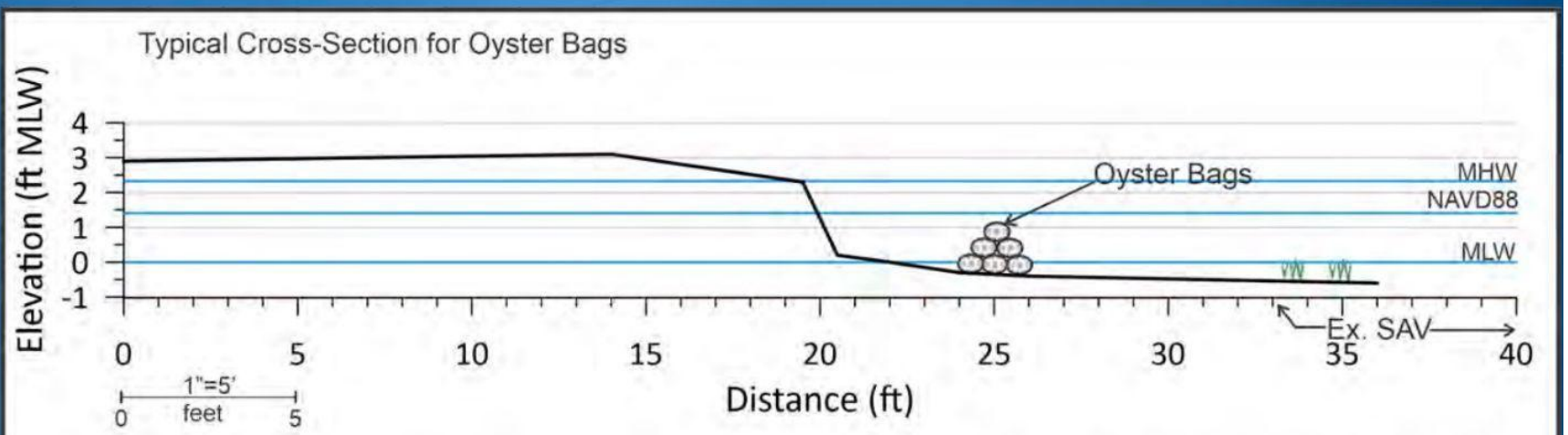
LS Site Assessment Base Map
Orientation
S & SW
Perpendicular to
Shoreline
Shore Length 300 ft est.
Shore Width 15 ft est.
East Ocean View LS 3
9520 20th Bay St
Shoreline Management
Project Area
Assumed Property
Boundary
Google Earth
Fishing pier
N
100 ft


LS Site Assessment Base Map
Longest Fetch: 0.37 Miles SW to 0.43 Miles ENE Under Bridge
Avg Fetch: (0.12+0.12+0.13+0.14+0.21)/5 = 0.14 Miles - Very Low
Little Creek
Little Creek
East Ocean View LS 3
9520 20th Bay St
?
?
Small Jobs Moving & Etc
Jessy's Taqueria
WPC Womack Professional Cleaning
Acme Floor Covering, Inc
U & I Home Decorating
Bolt Laundry Service
9604 18th Bay Street
Lola's Beach Cantina
BK BeauteLLC
Harrison Process Service
Police Association of Virginia
Just Braids by Sharon Solomon
Kind crabs & fish
SailTime Chesapeake Bay
Google Earth
N

Choose your datum, be consistent

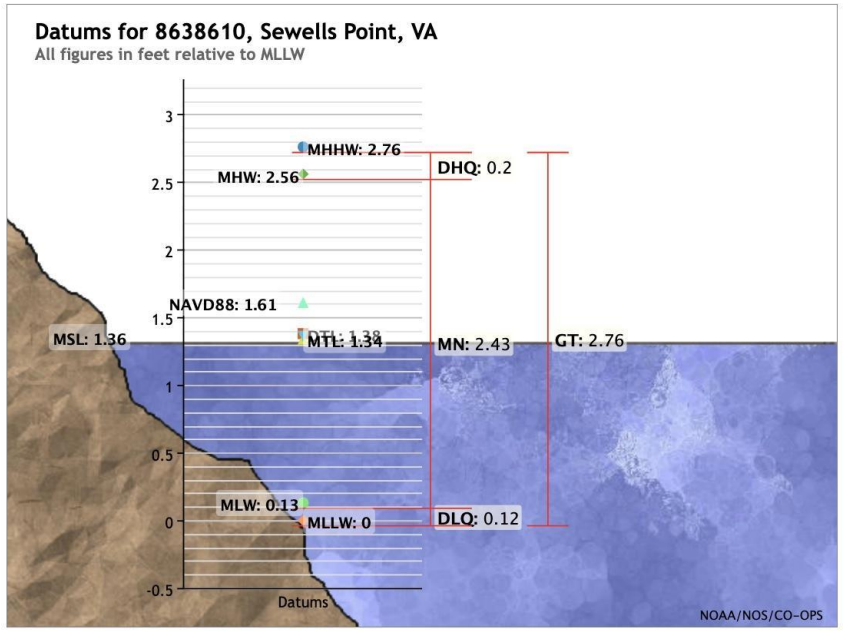
1) VIMS - Mean Low Water (MLW)
2) CORPs - Mean Low Low Water (MLLW)
3) Land Topography - NAVD88



If you collect your survey data in NAVD88, at this site at the mouth of the York River, the conversion between NAVD88 and MLW from our Google Earth app is in the 1.4-1.6 ft range. Because our location is nearer to the 1.2-1.4 range, we used 1.4 ft as our conversion. That means that NAVD88 is 1.4 ft above MLW at this site. To convert survey data to MLW, add 1.4 ft to all of your survey elevations.

Example: a point that is 2 ft above NAVD88 (+2 ft NAVD88) will be at +3.4 ft MLW.
a point that is 2 ft below NAVD88 (-2 ft NAVD88) will be at -0.6 ft MLW

Conversion elevations differ by location so it is important to check the conversion app for each site.



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Sources: VIMS Living Shoreline Design Site Assessment Tools Training & NOAA https://tidesandcurrents.noaa.gov/datums

Desktop Analysis - Datum NAVD88

DESKTOP ANALYSIS

Shore orientation(s):	N NE NW E W S● SE SW●			Shore Length:	~ 300 ft	Shore Width:	~ 15 ft	
Average Fetch:	Very High (> 15 miles)	High (5-15 miles)	Medium (1-5 miles)	Low (0.5 - 1 mile)	Very Low (< 0.5 miles)●			
Longest Fetch:	0.42 mi	Direction:	ENE	Shore Morphology:	Pocket	Straight	Headland	Irregular
Depth Offshore:	2 ft	Nearshore Morphology:		Bars	Tidal Flats	Other:		
Tide Data	MLW: -1.678	MHW: 0.752	MTL: -0.468	Mean Tide Range:	2.5 ft	1.5x Mean Tide Range: *(calcula*	1.942 ft	
Storm Surge:	10 yr: 5.1 ft		50 yr: 6.5 ft		100 yr: 7.1 ft		Average Salinity:	21 PSU
Expected SLR:	10 yr: 1.19 ft (2033)		20 yr: 1.77 ft (2043)		50 yr: 4 ft (2073)		Saltwater	Freshwater
Erosion Rate:	___ Very high accretion (> +10 ft/yr) ___ High accretion (+10 to +5 ft/yr) ___ Medium accretion (+5 to +2 ft/yr) ___ Low Accretion (+2 to +1 ft/yr) ___ Very Low Accretion (+1 to 0 ft/yr)			___ Very High Erosion (> -10 ft/yr) ___ High Erosion (-5 to -10 ft/yr) ___ Medium Erosion (-2 to -5 ft/yr) ___ Low Erosion (-1 to -2 ft/yr) _●__ Very Low Erosion (0 to -1 ft/yr)		Is Submerged Aquatic Vegetation (SAV) present?	YES	NO
Design Wave:	Height	N/A	Period	N/A	Proximity to Navigation Channel:		~ 5000 ft	
Note easements or utilities located in the project area:								
Notes:								
	elevations in NAV88 based on NOAA online vertical datum transformation from MLLW (0.0) to NAVD88 (-1.808 ft)							

Under Bridge
NAVD88
NAVD88
NAVD88

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Desktop Analysis - Datum MLW

DESKTOP ANALYSIS

Shore orientation(s):	N NE NW E W S• SE SW•			Shore Length:	~ 300 ft	Shore Width:	~ 15 ft	
Average Fetch:	Very High (> 15 miles)	High (5-15 miles)	Medium (1-5 miles)	Low (0.5 - 1 mile)	Very Low (< 0.5 miles)•			
Longest Fetch:	0.37 mi	Direction:	SW	Shore Morphology:	Pocket	Straight	Headland	Irregular
Depth Offshore:	2 ft	Nearshore Morphology:		Bars	Tidal Flats	Other:		
Tide Data	MLW: 0.13	MHW: 2.56	MTL: 1.34	Mean Tide Range:	2.5 ft	1.5x Mean Tide Range: *(calcula*	3.75 ft	
Storm Surge:	10 yr: 5.1 ft (6.78 ft)		50 yr: 6.5 ft (8.18 ft)		100 yr: 7.1 ft (8.78 ft)		Average Salinity:	21 PSU
Expected SLR:	10 yr: 1.19 ft (2033)		20 yr: 1.77 ft (2043)		50 yr: 4 ft (2073)		Saltwater	Freshwater
Erosion Rate:	___ Very high accretion (> +10 ft/yr) ___ High accretion (+10 to +5 ft/yr) ___ Medium accretion (+5 to +2 ft/yr) ___ Low Accretion (+2 to +1 ft/yr) ___ Very Low Accretion (+1 to 0 ft/yr)			___ Very High Erosion (> -10 ft/yr) ___ High Erosion (-5 to -10 ft/yr) ___ Medium Erosion (-2 to -5 ft/yr) ___ Low Erosion (-1 to -2 ft/yr) _•__ Very Low Erosion (0 to -1 ft/yr)		Is Submerged Aquatic Vegetation (SAV) present?	YES	NO
Design Wave:	Height	N/A	Period	N/A	Proximity to Navigation Channel:		~ 5000 ft	
Note easements or utilities located in the project area:								
Notes:								

NAVD88 (MLW Datum)

NAVD88

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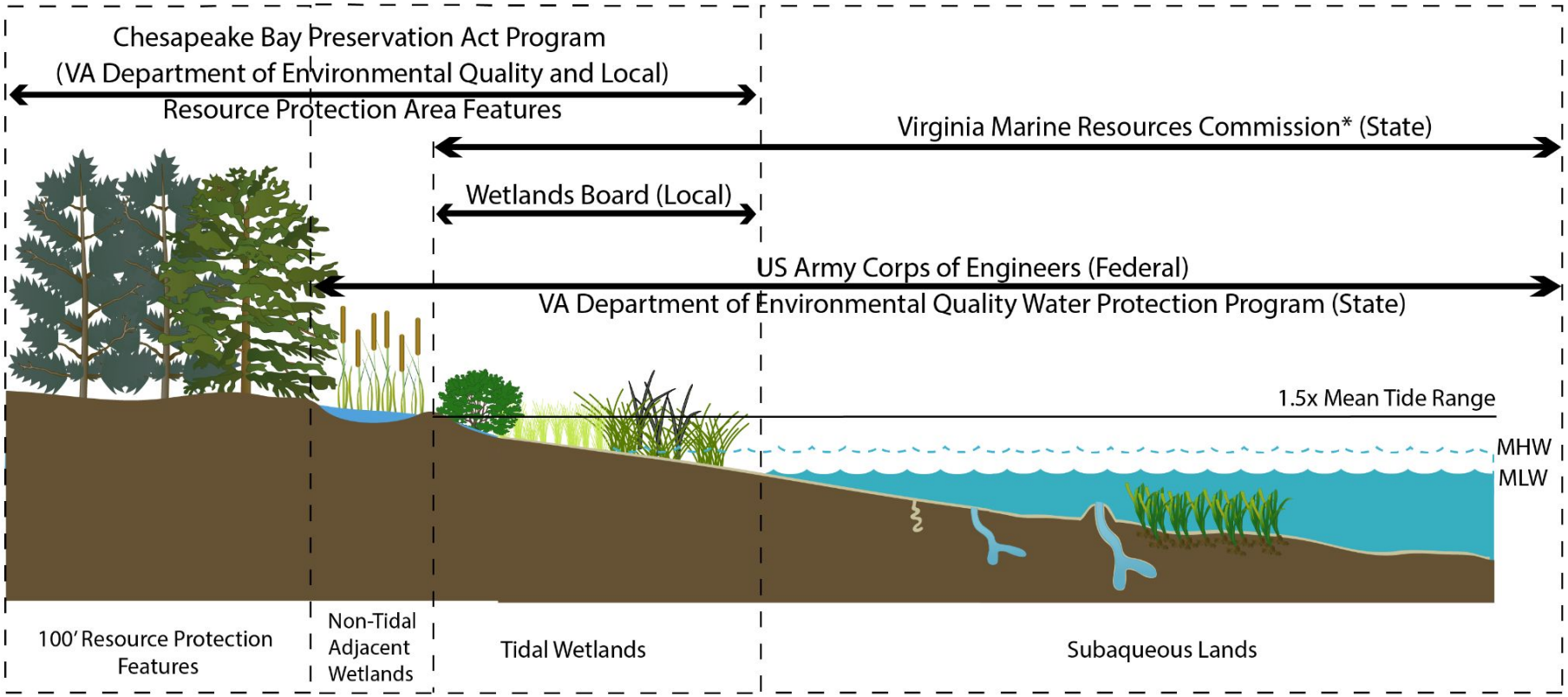
Measurement		MLLW Datum (0.0 ft)	NAVD88 Datum (0.0 ft)
Depth Offshore	2 ft		
Mean Low Water (MLW)		0.13	-1.68
Mean High Water (MHW)		2.56	0.75
Mean Tide Level (MTL)		1.34	-0.47
Mean Tide Range (MTR)		2.50	2.50
1.5x MTR		3.75	1.94
Storm Surge 10 yr		3.62	5.10
Storm Surge 50 yr		5.02	6.50
Storm Surge 100 yr		5.62	7.10
Sea Level Rise 10 yr		-0.29	1.19
Sea Level Rise 20 yr		0.29	1.77
Sea Level Rise 50 yr		2.52	4.00
Proximity to Navigation Channel	5000 ft		

Virginia Jurisdictional Boundaries Tidal Waters



VMRC – Below MLW

- Subaqueous
- (Group 2) 30' or less channelward encroachment from MLW

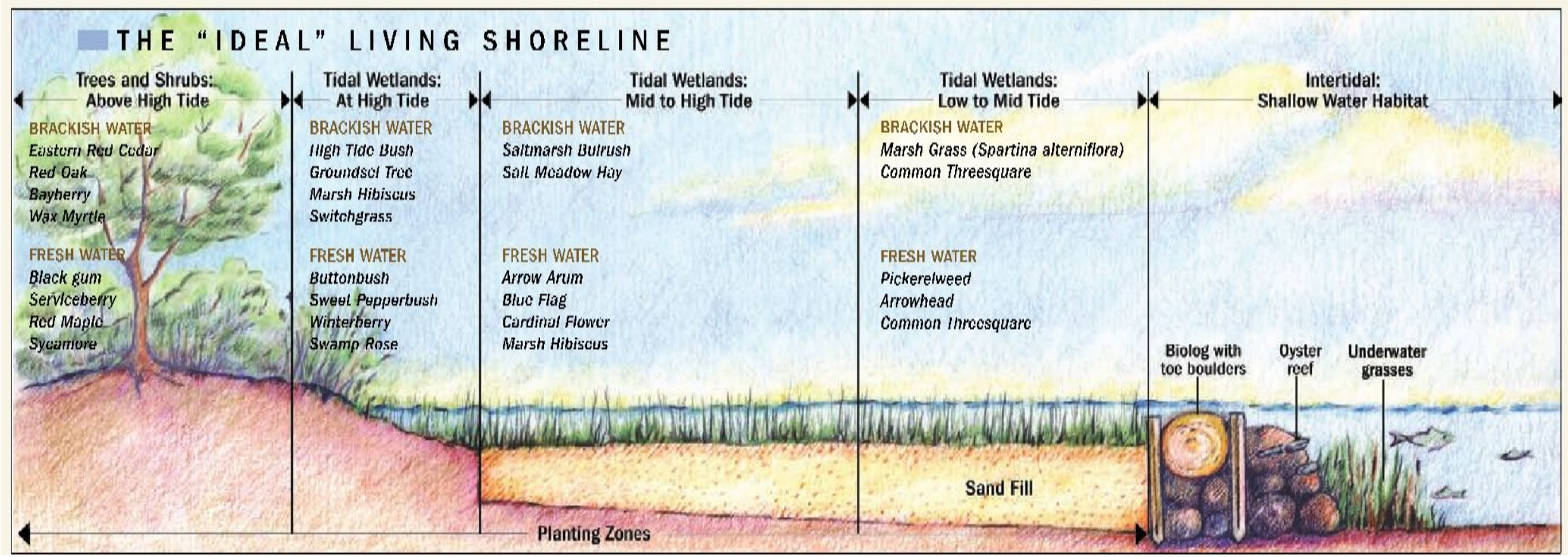
Wetland Board above MLW to 1.5x Mean Tide Range

USACE – All

CBPA

- MLW + 100 ft Buffer
- 100 ft buffer from wetlands edge inland

Living Shoreline Natural Communities - Elevations & Biological Benchmarks



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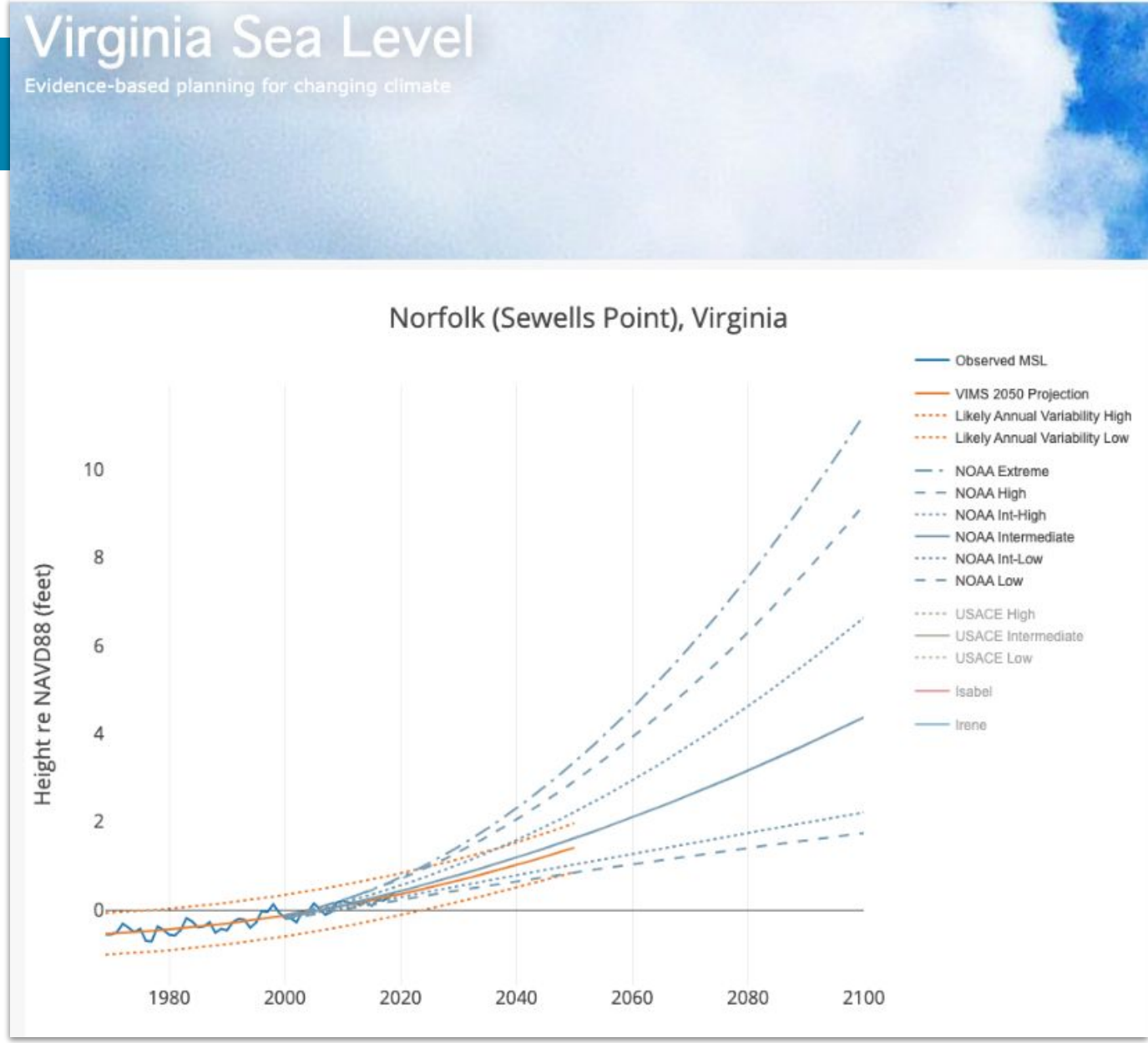
Source: Living Shorelines for the Chesapeake Bay Watershed, CBF 2011

Predicted Sea Level Rise



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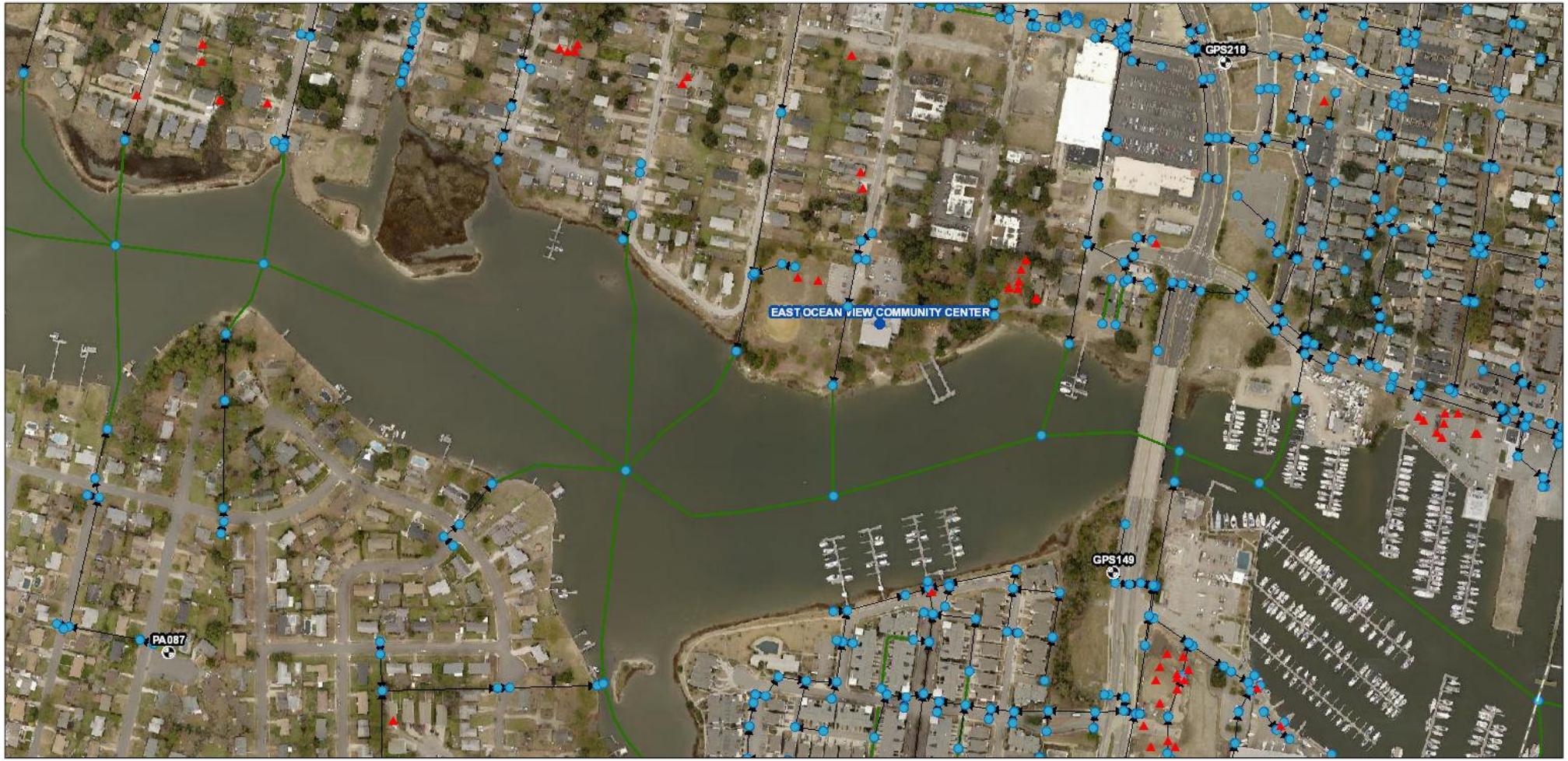
http://adaptva.org/info/virginia_sea_level.html


Shoreline Change Data
by Shoreline Studies Program at Virginia Institute of Marine Science (VIMS).
Shoreline Studies Web Page
(Base image from 2021)
Swipe layer
Shorelines
Layer List
Layers
Shorelines
1937/38 Bay Shoreline
1949 Ocean Side Shoreline
2009 Bay Shoreline
2017 Bay and Ocean Side Shorelines
End Point Shoreline Change Rates
EPR_Pts_1937_2009
EPR Points 1937/38 and 2017
Very High Accretion: > +10 (ft/yr)
High Accretion: +10 to +5 (ft/yr)
Medium Accretion: +5 to +2 (ft/yr)
Low Accretion: +2 to +1 (ft/yr)
Very Low Accretion: +1 to 0 (ft/yr)
Very Low Erosion: 0 to -1 (ft/yr)
Low Erosion: -1 to -2 (ft/yr)
Medium Erosion: -2 to -5 (ft/yr)
High Erosion: -5 to -10 (ft/yr)
Very High Erosion:> -10 (ft/yr)
EPR Points 1949 and 2017
Eastern Shore Oceanside Habitat Polygon
Eastern_Shore_Marsh_1949
Eastern_Shore_Marsh_2017
1937_Aerial_Imagery
Northampton County 1949 Imagery
Accomack County 1949 Imagery
VBMP2002_WGS
100ft
-76.196 36.927 Degrees
Virginia Geographic Information Network (VGIN) | Acknowledgement of the Virginia Institut

City of Norfolk



2/14/2023, 5:05:39 PM

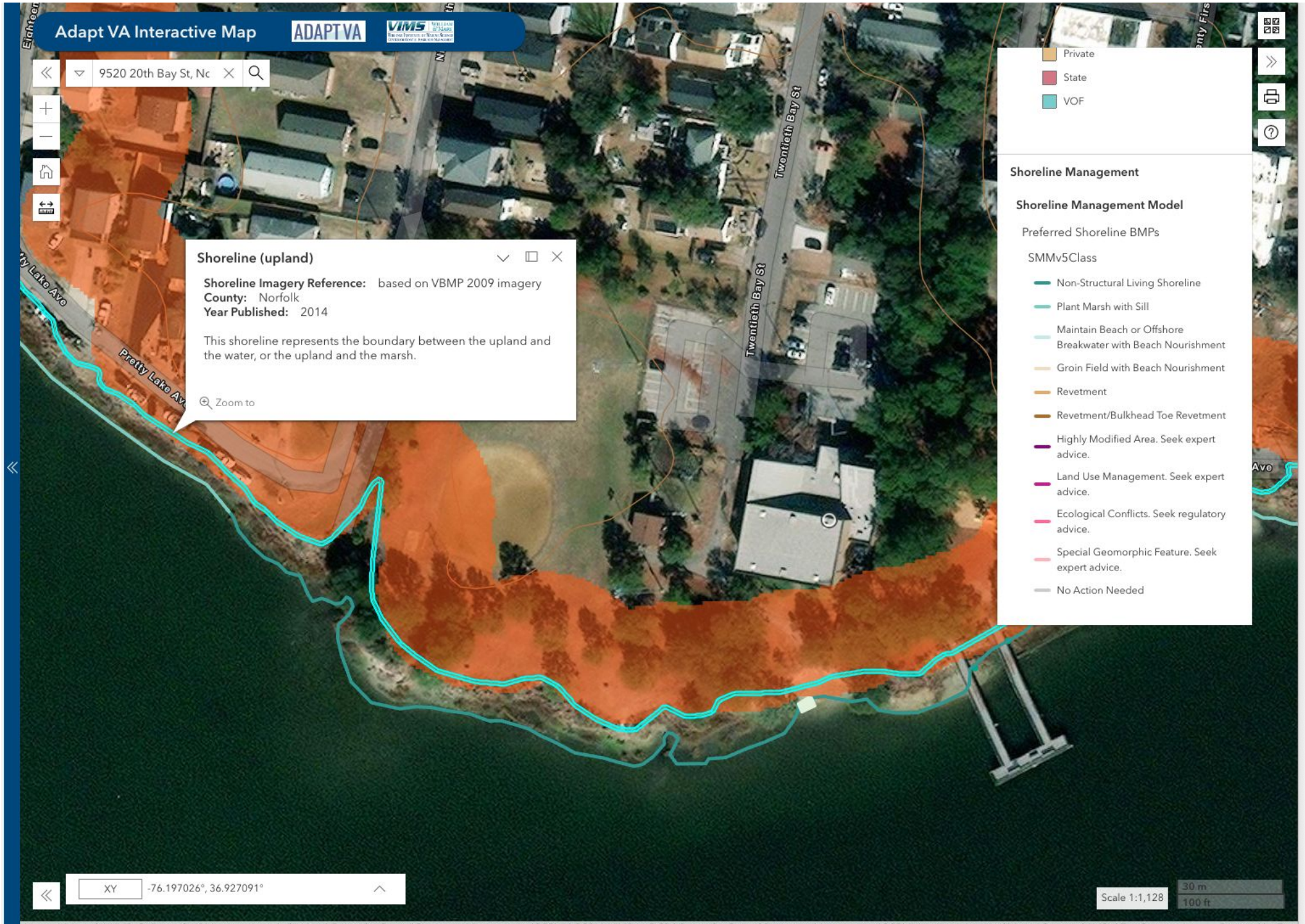
Survey Control Monuments
Storm Pipes
Storm Ditches
City Facilities
Stormwater BMP
Limit of Moderate Wave Action (LiMWA)
Storm Structures

1:4,514

0 237.5 475 950 ft
0 70 140 280 m

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, City of Norfolk GIS Bureau

City of Norfolk GIS Bureau | Zone features: Corresponding county of the Commonwealth of Virginia
Data consistency: Atkins North America | Maxar | VITA, Esri, HERE, Garmin, iPC |


Adapt VA Interactive Map
ADAPT VA
VIMS
9520 20th Bay St, Nc
Private
State
VOF
Shoreline Management
Shoreline Management Model
Preferred Shoreline BMPs
SMMv5Class
Non-Structural Living Shoreline
Plant Marsh with Sill
Maintain Beach or Offshore Breakwater with Beach Nourishment
Groin Field with Beach Nourishment
Revetment
Revetment/Bulkhead Toe Revetment
Highly Modified Area. Seek expert advice.
Land Use Management. Seek expert advice.
Ecological Conflicts. Seek regulatory advice.
Special Geomorphic Feature. Seek expert advice.
No Action Needed
Shoreline (upland)
Shoreline Imagery Reference: based on VBMP 2009 imagery
County: Norfolk
Year Published: 2014
This shoreline represents the boundary between the upland and the water, or the upland and the marsh.
Zoom to
Twentieth Bay St
Twentieth Bay St
Pretty Lake Ave
Pretty Lake Ave
XY
-76.197026°, 36.927091°
Scale 1:1,128
30 m
100 ft

Identify Shoreline Problems

Blend property owner concerns with expert observations & opinions

Is flooding or erosion the main problem?

Is erosion happening? If so, where? Can it be tolerated and left alone to let nature take its course?

If there is active erosion, what forces might be causing it?

Can simple behavior adjustments solve erosion problem?

- Changing water access points
- Less frequent mowing
- Horticulture practices

Establish goal(s) for intervention project

Collect Site Specific Information to Inform

Design, Permit Application, Cost Estimates, Monitoring

See Section 4 on the JPA for the full list of permitting requirements

- Linear feet of project
- Width of project
- Total Wetland Conversion
- Height of scarp
- Material for toe or sill
- Material quantities
- Relative fetch
- Coordinates and Address
- Tidal info (MLW, MHW, and direction of EBB and Flood)
- Name of body of water
- Property Boundaries
- Length of sill (if needed)
- Area of sand fill
- Distance to a landmark (benchmark)
- North arrow

Slides by Mary Mantey, ERP

ELIZABETH RIVER PROJECT

Develop Shoreline Profile *Natural Features*

	Riparian Buffer & Bank	High Marsh Dry Beach	Low Marsh Wet Beach	Nearshore
Natural Features & Plants	Forested - undisturbed	Backshore Trees	Low Marsh perennials	Submerged Aquatic Vegetation
	Forested – disturbed	High Marsh Perennials		Shellfish Reefs
	Perennials & Grasses Only	Dune Perennials		Sand Bars
	Turf Grass		Sand & Mud Flats	Tidal Flats
Fewer Plants	Bare Soil	Dry Sand	Wet Sand	Deep Water
	Developed or Armored			

Source: VIMS Living Shoreline Design Guidelines 2017

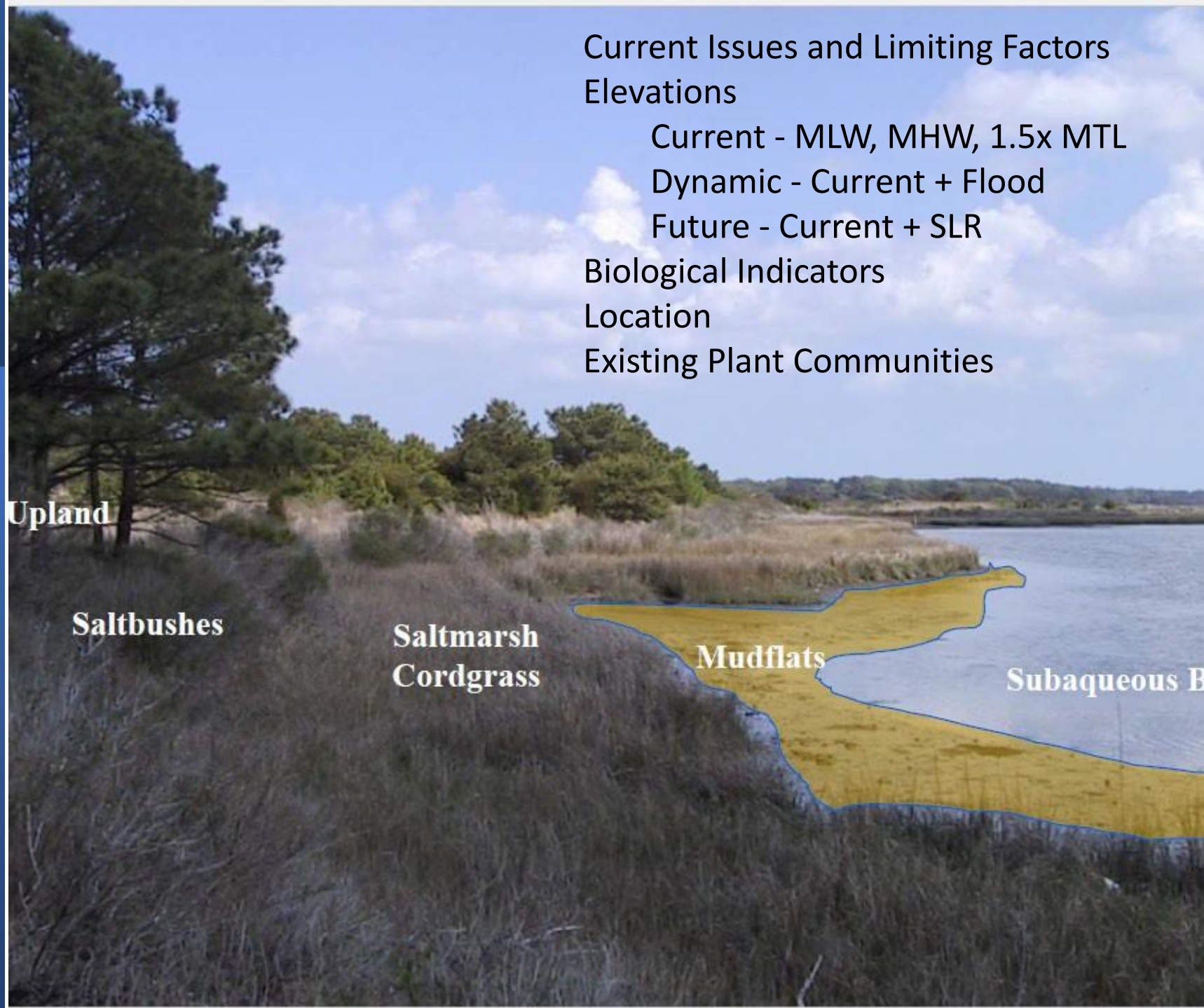
VMRC – Below MLW
Subaqueous

Wetland Board above
MLW - high marsh

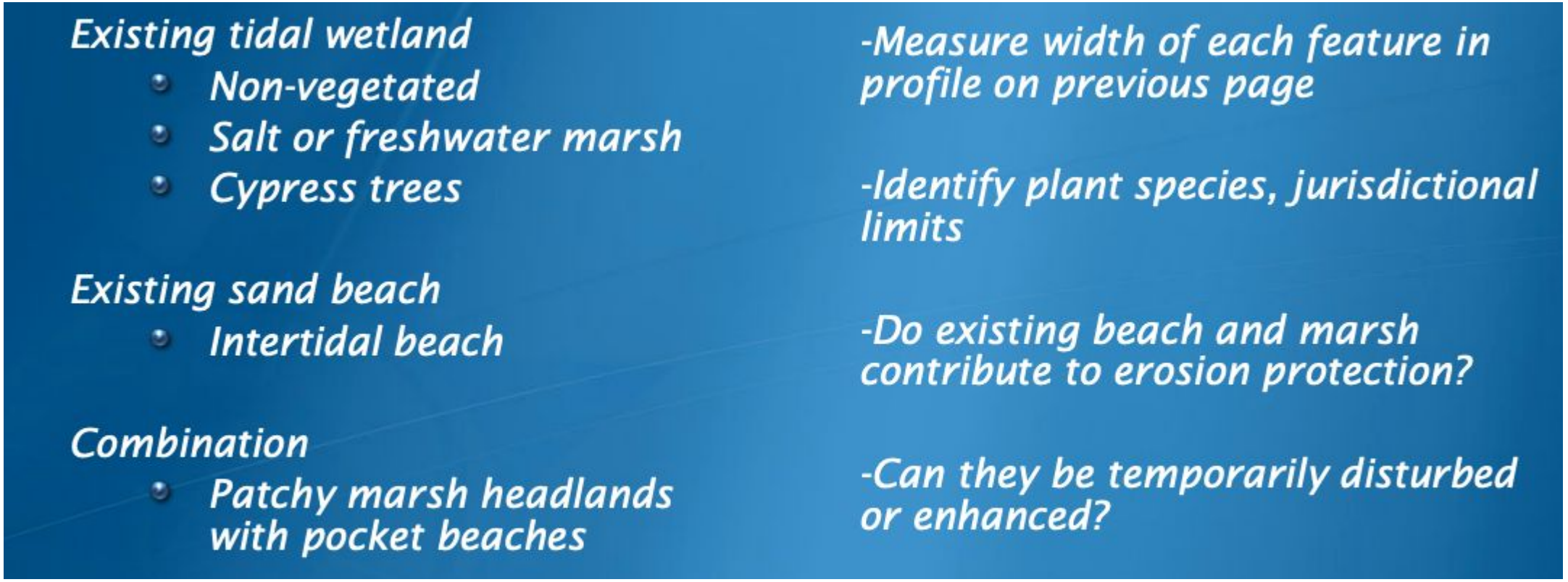
USACE – All

CBPA - High Marsh +
100 ft Buffer

Slides by Mary Mantey, ERP



Shore Zone Width and Elevation



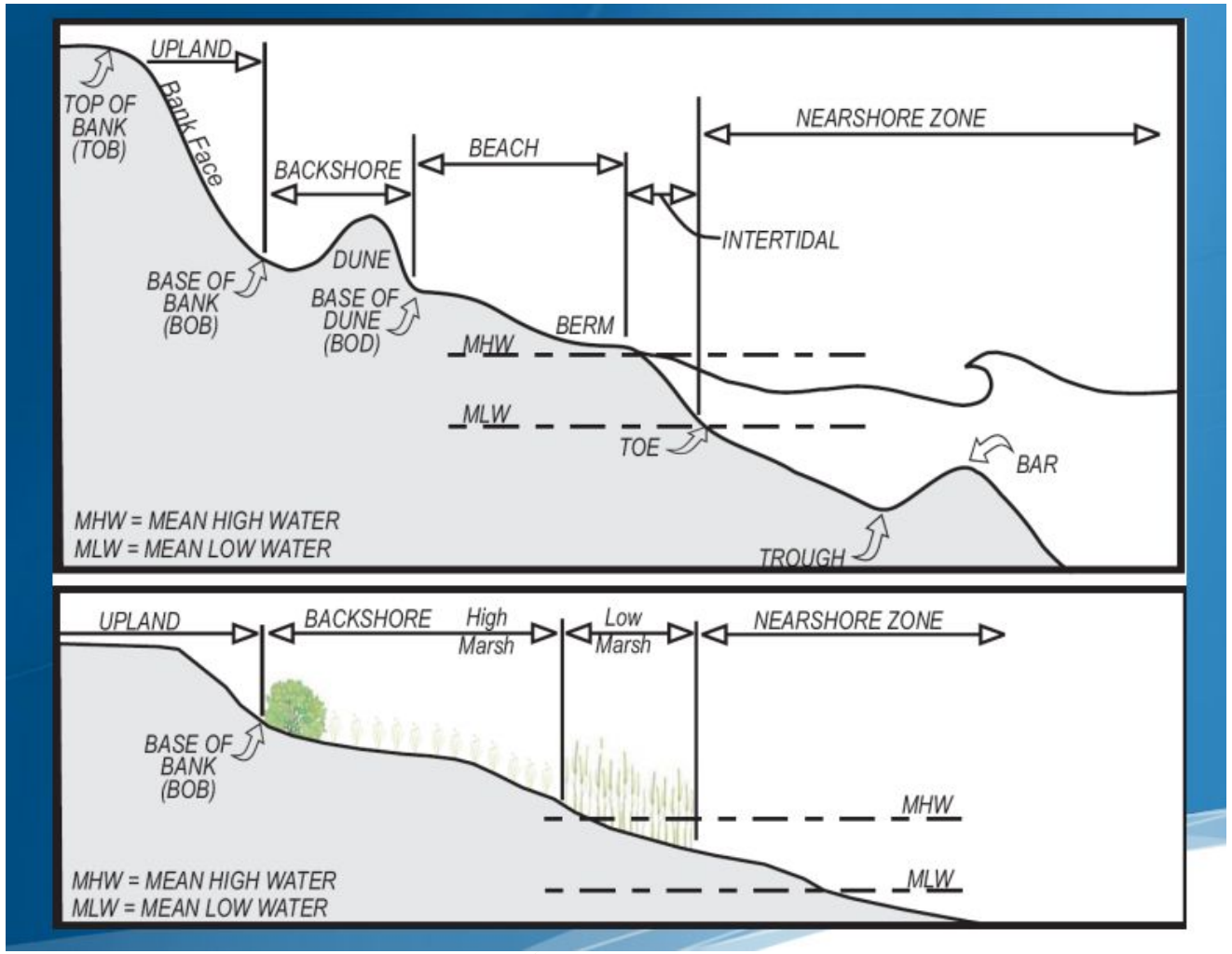
Key Reference Source: Determining Site Specific Parameters for Living Shoreline Design 2022 VIMS Presentation

Backshore Width and Elevation

Existing high marsh • *Saltmeadow hay* • *Phragmites* • *Salt bushes*	*Measure width of each feature in profile*
Existing supratidal beach > MHW • *Overwash sand* • *Primary & secondary dune features*	*Identify plant species, jurisdictional limits*
Backshore terrace • *Bank slumping* • *Upland grasses and trees*	*Do existing features contribute to erosion protection?* *Can they be temporarily disturbed or enhanced?*

Key Reference Source: Determining Site Specific Parameters for Living Shoreline Design 2022 VIMS Presentation

Combined Shore and Backshore Zone Width and Elevation



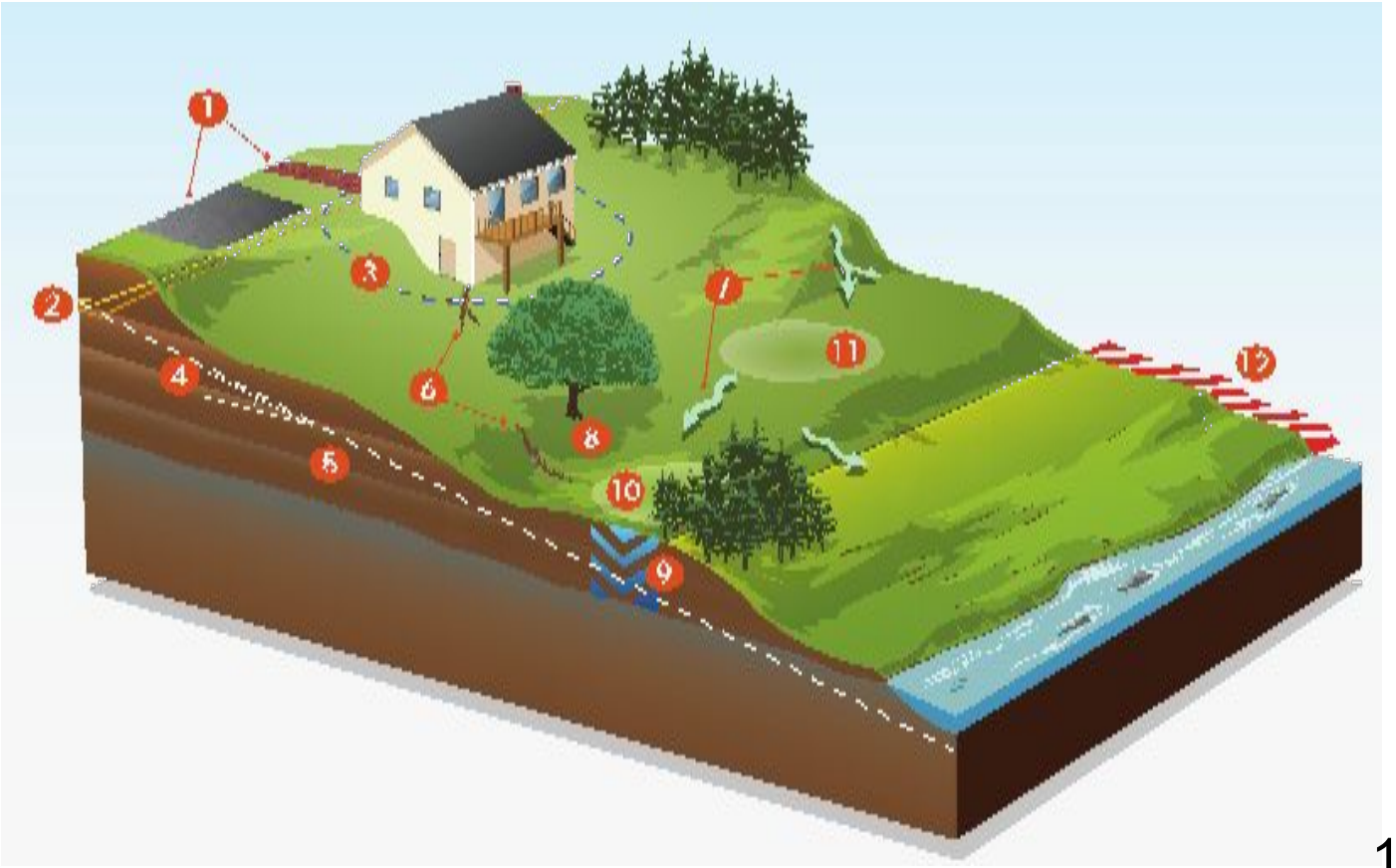
Key Reference Source: Determining Site Specific Parameters for Living Shoreline Design 2022 VIMS Presentation

Develop Shoreline Profile *Human Uses*

	Riparian Buffer & Bank	High Marsh Dry Beach	Low Marsh Wet Beach	Nearshore
Human Uses	Visible & underground infrastructure	Existing defense structures		Docks – Piers – Boathouses
	Riparian access structures	Recreation uses		Navigation channels
	Stormwater management	Water access improvements & uses		Boat wakes
	Formal landscape			
	Natural landscape			

Source: VIMS Living Shoreline Design Guidelines 2017

Whole Site Evaluation



Source: Anne Arundel County Watershed Stewards Academy Rainscapes Manual Appendix A

1) Location and Orientation of Impervious Surfaces
2) Utilities and Easements
3) Proximity to Structures
4) Slope
5) Soil Type
6) Erosion Problem Areas
7) Flow Paths
8) Location and Health of Existing Trees/Canopy & Vegetation
9) Depth to Groundwater (and seeps)
10) Sun and Shade Conditions
11) Available Space
12) Proximity to sensitive environmental areas

Monitoring Plan Considerations

Document Baseline Conditions *to compare with future monitoring data*

Delineate erosion problem areas

Delineate existing natural features to remain *as part of a living shoreline system*

Establish normal tide & storm water levels *based on observed site conditions*

Establish biological benchmarks *Elevation ranges occupied by natural features*

Site Assessment Stations

Participants will work in small groups on guided Site Assessments

- Fill in the Site Assessment Forms
- Make Notes on Maps

Shore Zone (Jim Cahoon/Mary Mantey) - Group 1

Buffer/Backshore & Biological Benchmarks (Karen Duhring/Aaron Wendt) - Group 2

Whole Property/Upland (Shereen/Stacie) - Group 3

Site Access/Utilities/Fixed Benchmarks (Tracy Skrabal/Ellen Grimes) - Group 4

Any Questions?

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Small Group Discussions

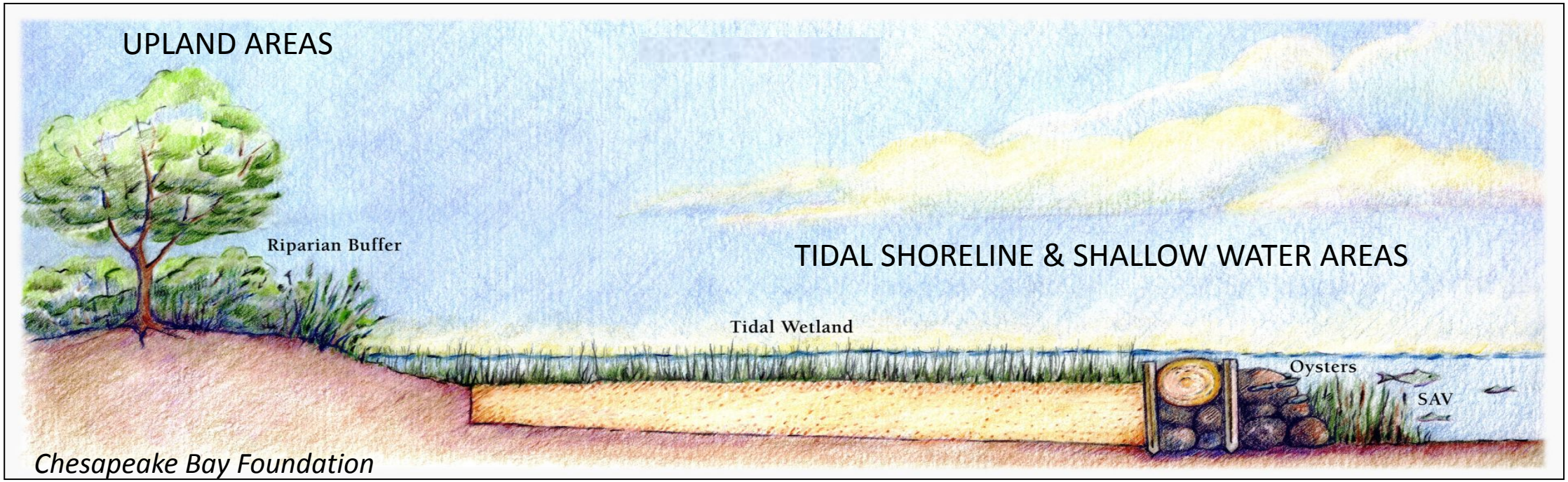
- How does site assessment data inform design?
- What level of protection is needed to meet goals?
- Which type of living shoreline is feasible for this site? What conditions might impact that feasibility?

Decide on the type of sill for Project
Structural or Non-Structural
Inform Design, Construction Feasibility, Permit Application

Slides by Mary Mantey, ERP

ELIZABETH RIVER PROJECT

Living Shoreline Potential Practices



Stormwater management

Riparian buffer enhancement

Bank grading & re-planting

Conservation landscaping

Sand fill & beach nourishment

Tidal marsh & beach planting

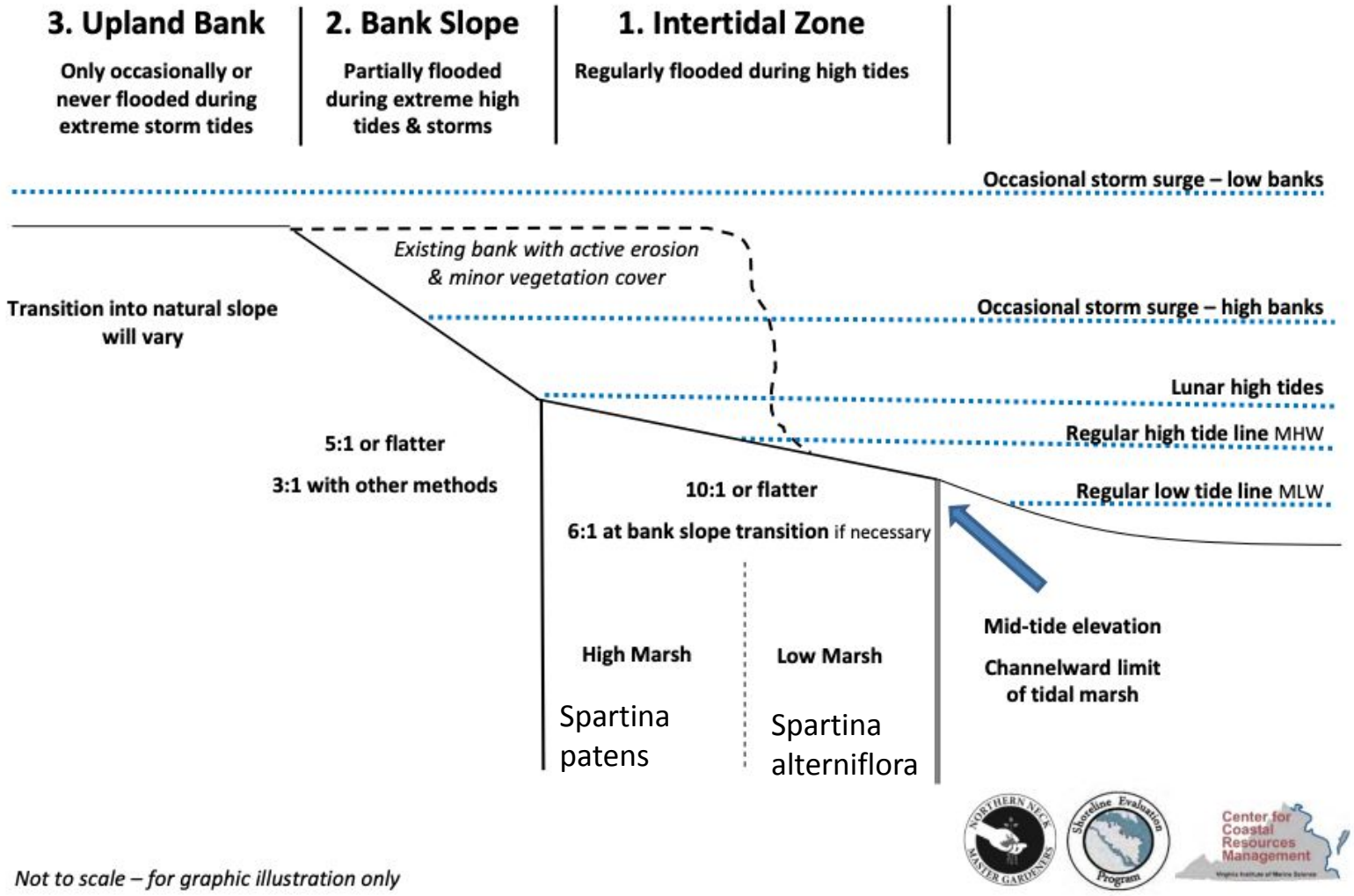
Coir logs

Stone sills

Oyster reef structures

Offshore breakwaters

Bank Grading and Planting Zones



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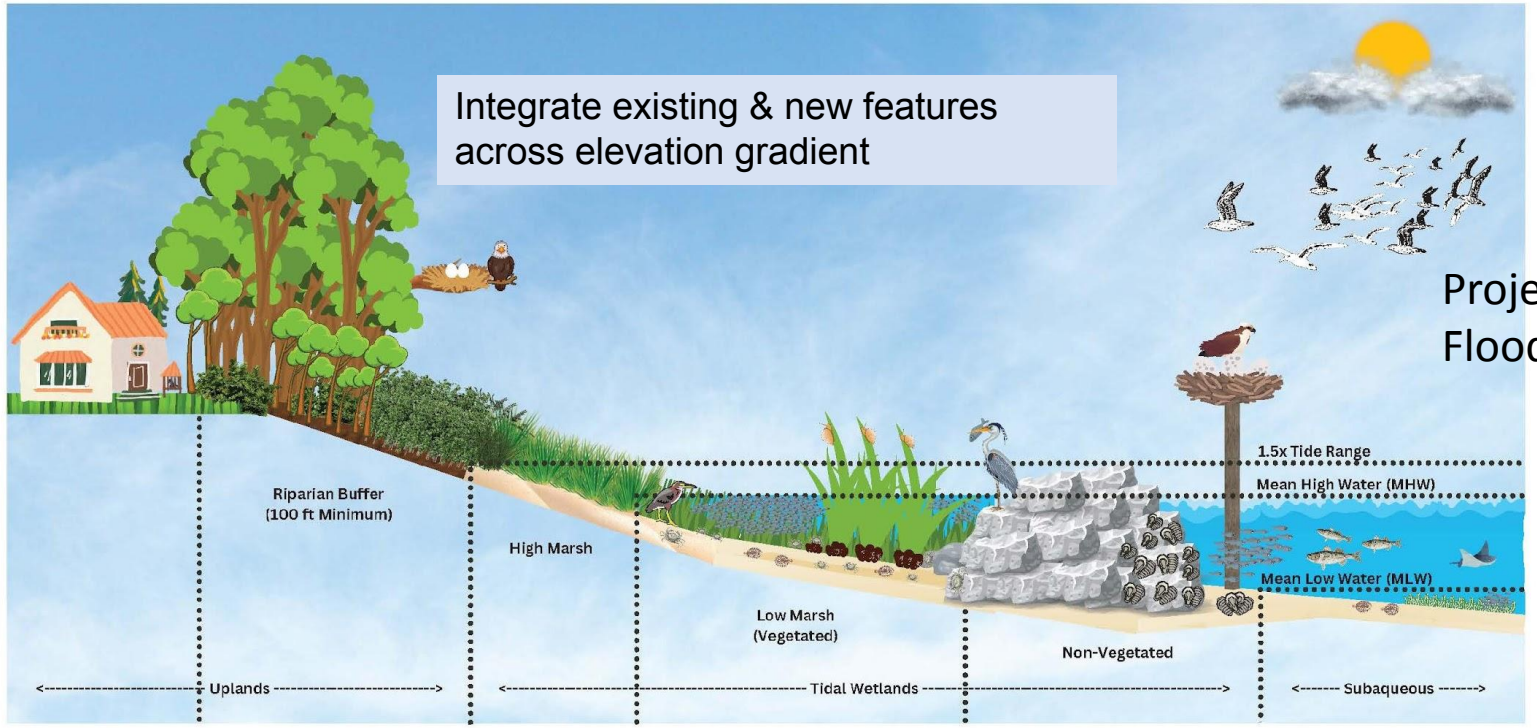
Source: General Site Evaluations and Guidelines for Non-Structural Practices, Karen Duhring

Living Shoreline Potential Practices + Future Conditions



Projected Sea Level Rise?
Flood/Hazard Elevations?

M. Whalen VIMS

UPLAND

Stormwater management

Conservation landscaping

Bank grading & re-planting

TIDAL WETLAND

Protect existing marsh

Sand fill & beach nourishment

Planted tidal marsh & beach

SHALLOW WATER

Stone & oyster sills

Offshore breakwaters

Pre-Class Work for Day 3

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HOME GET CERTIFIED CBLP DIRECTORY LOG IN

CBLP-Shorelines Workshop Materials

Key References

VIMS Living Shoreline Design Guidance

VIMS Online Shoreline Management Handbook

VMRC Wetlands Guidance & Wetlands Regulations

Worksheets & Handouts

Desktop Analysis Form

Desktop Analysis Instruction Guide

Site Assessment Terms

Videos

Intro to CBLP

Why Living Shorelines

Living Shorelines 101

Regulatory Context of Shorelines

Designing for Sea Level Rise

Planting Considerations for Living Shorelines

Prior to Day 3

- Watch the following videos:
  - Designing for Sea Level Rise
  - Planting Considerations for Living Shorelines
- Review Common Maintenance Tasks

Day 2

Living Shoreline Design Options

Design & Construction Feasibility

Common Knowledge of Living Shoreline Implementation Best Practices & Resources

CBLP SHORELINES Certificate Course

Site Feasibility & Evaluation

Meet Client & ID Problem

Site Assessment

Consult Technical Advisors & Regulators

Consider Solutions

Design

Select Solution

Conceptual Designs

Consult Client, Contractor

Consult Regulators, TAs

ID Impacts & Permits Required

Develop final drawings for Permit Application

Permitting

Complete & Submit JPA Part 5 CBPA Info

Site Visits & Meetings w/ Regulators & Boards

Address Comments & Conditions for Approval

Construction

Pre-Construction Feasibility, Site Visits, Consults, Permits

Site Prep, Protection, Materials, Planting

Construction & Inspections

Maintenance Monitoring Management

Establishment

Typical Regular Tasks

Management

Monitoring & Verification

Day 3 Overview

- Begin Outside - Check in at 9:45
- Plan for the Day
- Materials and Survey Tools Demo
- 10 minute bathroom break (if available)
- Demo Stations in small groups (Plants, Tools, Maintenance/Monitoring
- 30 minute lunch break
- Best Practices for Permit Drawings
- Concept Drawing Activity
- Practical Monitoring Protocol and Plan
- Develop Maintenance/Monitoring Plans in Small Groups
- Introduce Assignment Prepare Drawings/Design/JPA

Instructors/Speakers

- Karen Duhring, VIMS
- Aaron Wendt, DCR SEAS
- Mary Mantey, ERP
- Jim Cahoon, Bay Environmental
- Ryan Walsh, JRA
- Tracy Skrabal

CBLP Staff

- Beth Ginter
- Shereen Hughes
- Stacie McGraw
- Jason Swope

Thank you!

CBLP CHESAPEAKE BAY Landscape Professional

Living Shoreline Collaborative

WETLANDS WATCH