



# **Land Conservation and Restoration at Naval Weapon Station Yorktown (VA) Providing Multiple Benefits for Installation Resilience and Chesapeake Bay Agreement Goals and Outcomes.**

**Prepared for:  
Chesapeake Bay Program  
Partnership, Federal Facility  
Workgroup**

**Presented by:  
Kevin Du Bois, PWS, PWD, CFM, SCMNRP  
DoD Chesapeake Bay Program Coordinator**

Overall Classification: **UNCLASSIFIED//FOR OFFICIAL USE ONLY**



# Military Mission



*Naval Weapons Station Yorktown (WPNSTA) and Cheatham Annex (CAX) provide quality support for ordnance storage, maintenance, logistics, research and development and support services, expeditionary logistics training and operations, warfare training for Sailors, Marines and other Services; and to serve as a premier recreational destination for service members and dependents.*





# Installation Overview



## History:

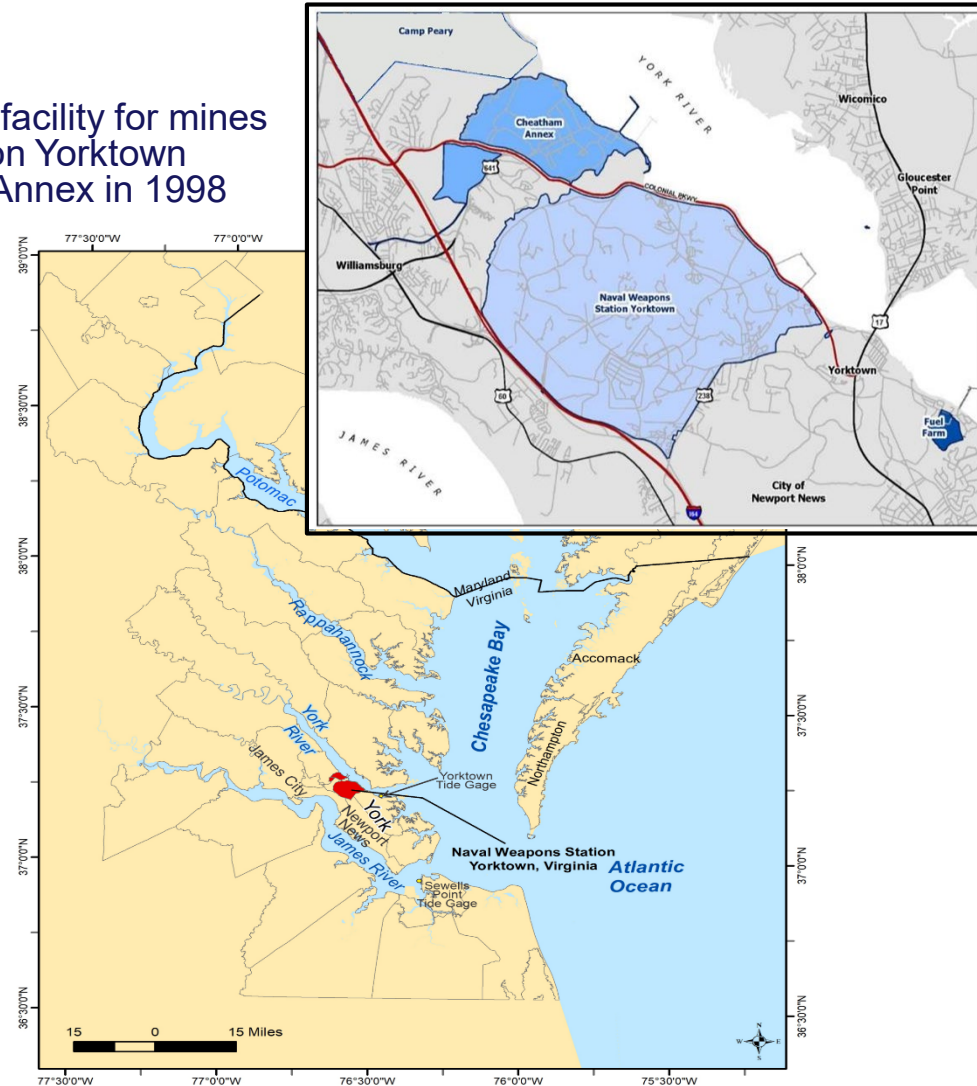
- Procured August 7, 1918 for storage and testing facility for mines
- Name changed in 1958 to Naval Weapons Station Yorktown
- Consolidated Fleet Supply Center at Cheatham Annex in 1998
- ~23,000 tons of ordnance annually

## Attributes:

- Personnel Assigned: ~5,964
- Area of Responsibility: ~14,894 ac
- Facilities: 1,360
- Housing Structures: 362
- Piers: 2 (supply, ordnance)
- Landing Zones: 2
- Training Areas: 13
- Plant Replacement Value: ~\$2.64B

## Primary Tenants: 37

- Navy Munitions Command
- Marine Corps Security Force Regiment
- Military Sealift Command
- Naval Expeditionary Logistics Support Group
- Naval Ophthalmic Support and Training Activity



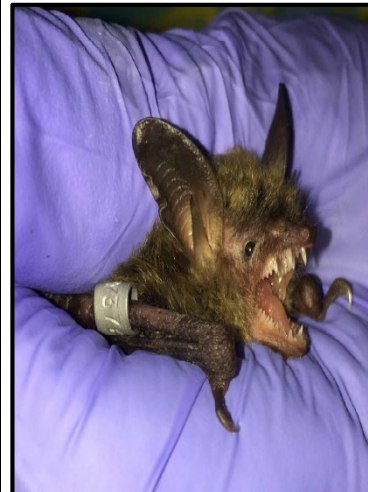
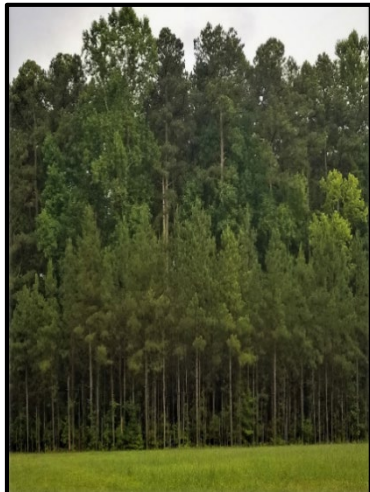


# WPNSTA Yorktown Natural Resources Overview



- 8,765 ac of forested/woodland
- 7,436 ac of estuarine habitats
- 2,963 ac of emergent wetlands
- 1,482 ac of nearshore area
- 186 ac of agriculture
- 96 species at risk
- 61 successional habitat areas ( $\leq 5$  ac)
- 32 mi of shoreline
- 13 vernal pool habitats
- 12 federally protected species
- 8 ecological areas (<3,337 ac)
- 4 state protected species

*WPNSTA Yorktown Integrated Natural Resources Management Plan, Oct 2023*





# REPI Program Overview



- The REPI program fosters multi-agency initiatives and collaboration to preserve compatible land uses near military installations and ranges. These cost-sharing partnerships with state and local governments and private conservation organizations.
- Three-pronged justification:
  1. Limit development or use of the property that is incompatible with the installation's mission and/or;
  2. Preserve habitat to relieve current or anticipated environmental restrictions on military activities and/or;
  3. Maintain or improve military installation resilience
- Funded by annual appropriation.





# REPI Program Overview



- The REPI program has the authority to address climate change hazards and increase military installation resilience under 10 U.S. Code (U.S.C.) § 2684a(a)(2)(B)(ii).
- This authority allows the Military Services and partners to develop off-base natural infrastructure solutions designed to protect critical infrastructure, military personnel, and testing or training operations from climate change impacts.
- When executing a resilience project, installations may also leverage the Intergovernmental Support Agreement (IGSA) or Sikes Act Authorities.





# REPI Program Overview



IGSA (Section 2679 of title 10, U.S.C.):

- Authorizes the Military Departments to enter into agreements with eligible entities to provide, receive, or share installation support activities.
- Under REPI, this authority may be leveraged to fund state and local governments to conduct off-installation natural resource management or military installation resilience improvements that enhance mission effectiveness or create efficiencies.





# REPI Program Overview



## Sikes Authority (16 U.S.C.670c-1):

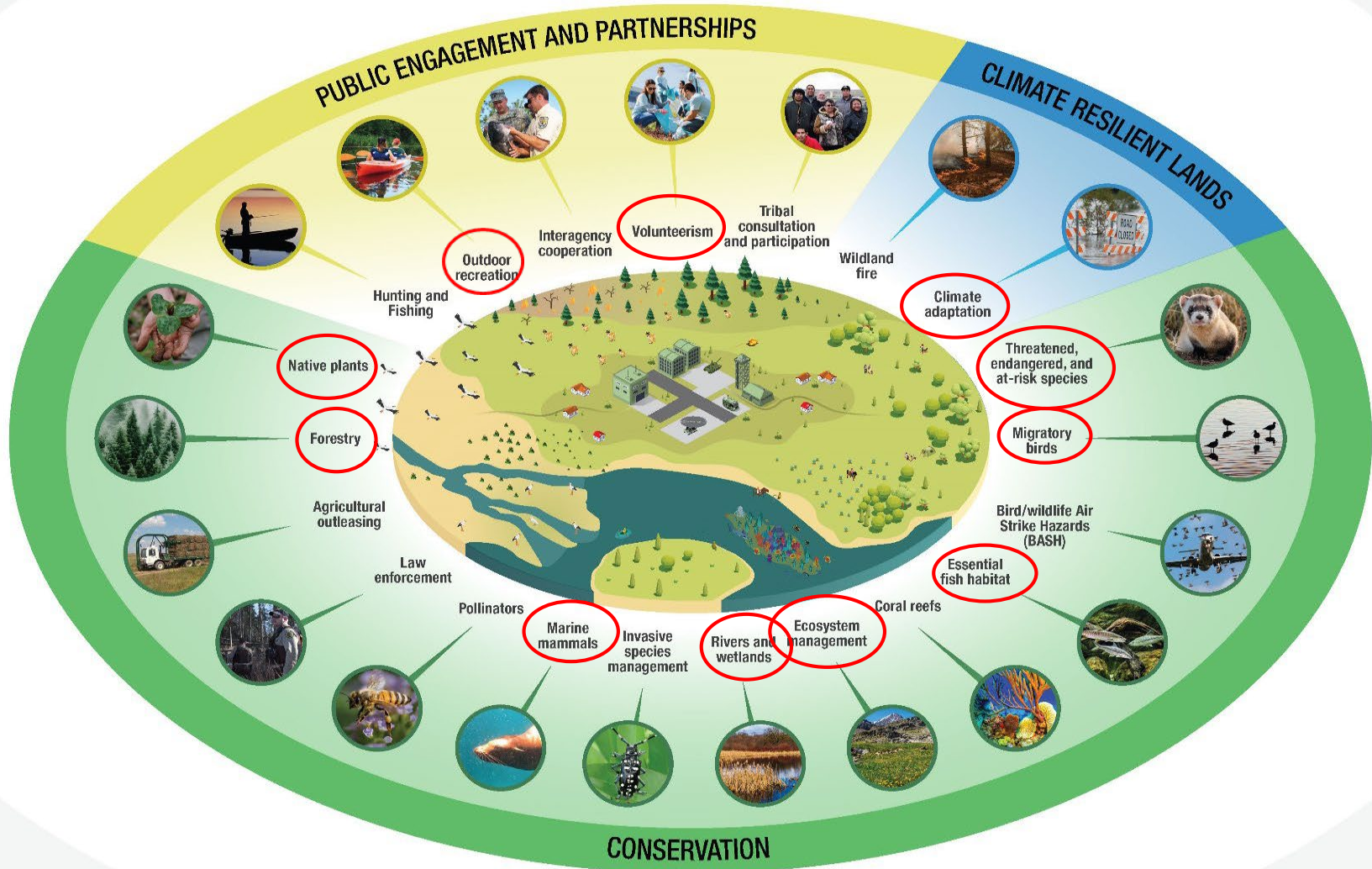
- Primary authority governing DoD management of natural resources on installation.
- May be leveraged to maintain natural infrastructure in support of installation resilience.
- In 2008, amended to allow for maintenance and improvement of natural resources off installation.
- In 2014, amended to allow for “management endowments” intended to cover the future costs of natural resources management.







# DoD Natural Resources Overview





# REPI Program Project Overview

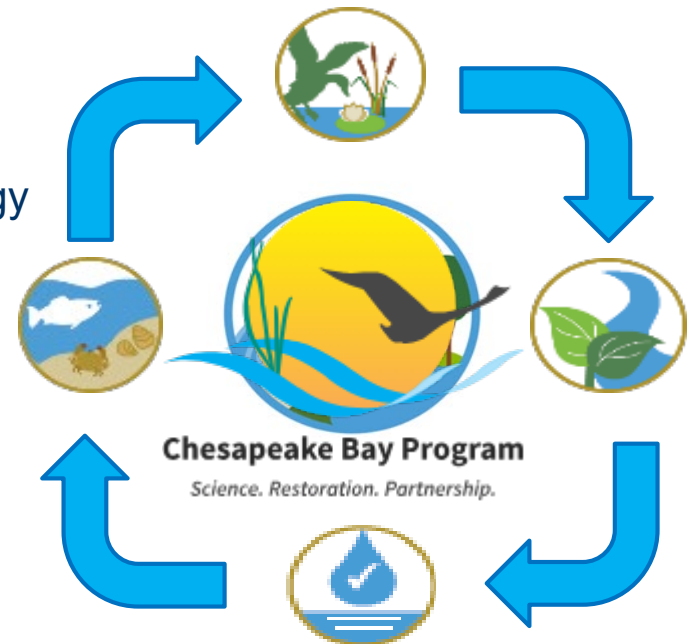


**Purpose:** The full project implemented nearly 4,000 linear feet of living shoreline protection features and restored approximately 3 acres of land. The project not only enhances installation climate resiliency by protecting critical pier and road infrastructure but is also part of a larger collaborative effort to restore and protect the York River shoreline as well as ecosystem services.

**REPI Funds:** \$5M **Partner Contributions:** +\$10M

## Military, Community, & Chesapeake Bay Benefits:

- ✓ Protects pier infrastructure from erosion & wave energy
- ✓ Protects ordnance handling capabilities
- ✓ Protects shoreline and nearshore areas
- ✓ Restores land and marsh habitats
- ✓ Improves force protection
- ✓ Improves water quality
- ✓ Reduces sedimentation
- ✓ Restores oyster populations
- ✓ Enhances recreational and commercial fisheries/seafood
- ✓ Enhances ecosystem services
- ✓ Encourages coordination among federal, state, and local partners

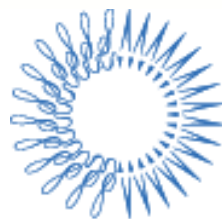




# Project Partners



NFWF



PEW





# Applicable Plans and Programs



- Colonial Parkway Shoreline Management Plan, 2006
- WPNSTA Yorktown Encroachment Action Plan, 2013
- York County Shoreline Management Plan, 2014
- Chesapeake Bay Watershed Agreement, 2014
- WPNSTA Yorktown Installation Development Plan, 2016
- WPNSTA Yorktown Integrated Natural Resources Management Plan, 2018 & 2023
- DoD National Defense Strategy, 2018
- Virginia York River Oyster Recovery Plan, 2019
- Climate Adaptation for DoD Natural Resource Managers, 2019
- Virginia Coastal Resilience Master Plan, 2020
- DoD Climate Adaptation Plan, 2021
- WPNSTA Yorktown Shoreline Management and Coastal Resilience Plan, 2023
- NOAA Virginia Middle Peninsula Habitat Focus Area, 2023





# Project Action Area



Photo Credit: National Park Service



Photo Credit: National Park Service

## Colonial National Historic Park Shoreline Protection & Enhancement Areas



# Project Action Area



Middle Peninsula Habitat Focus Area



# Project Action Area

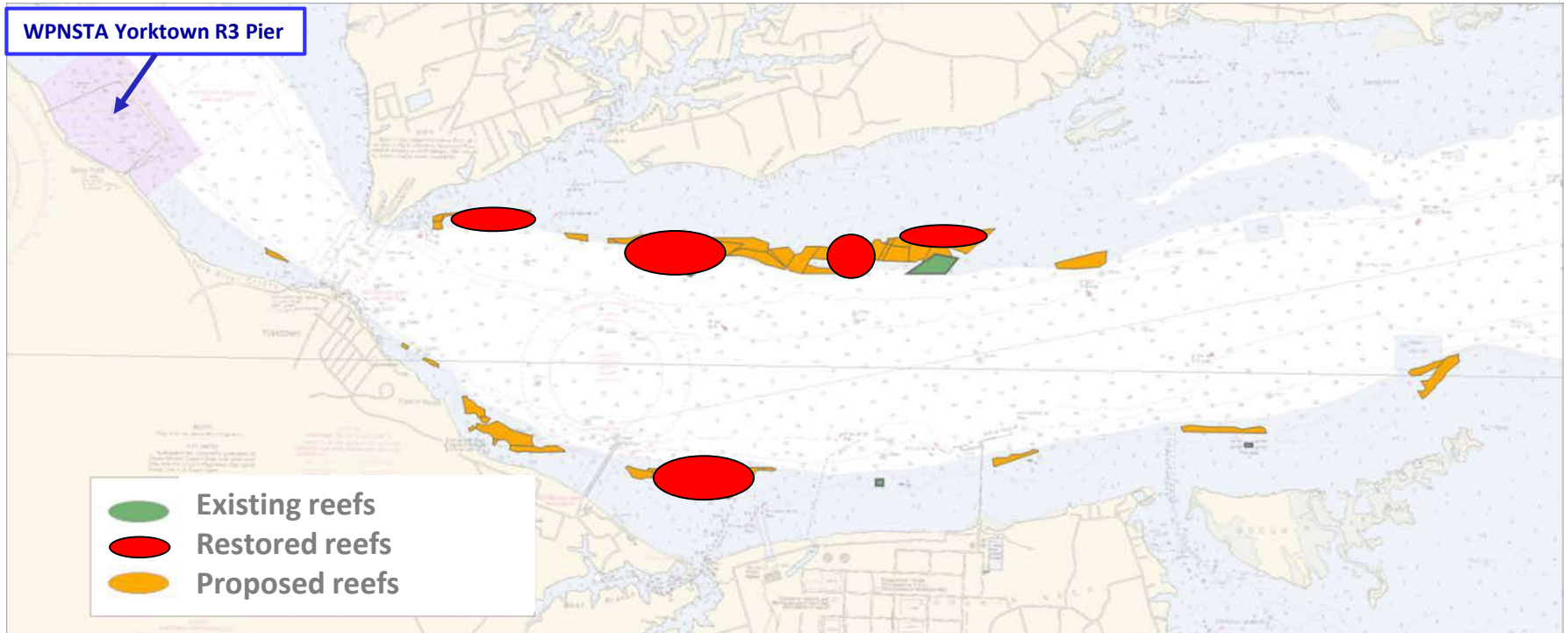


Photo: NOAA Chesapeake Bay Office

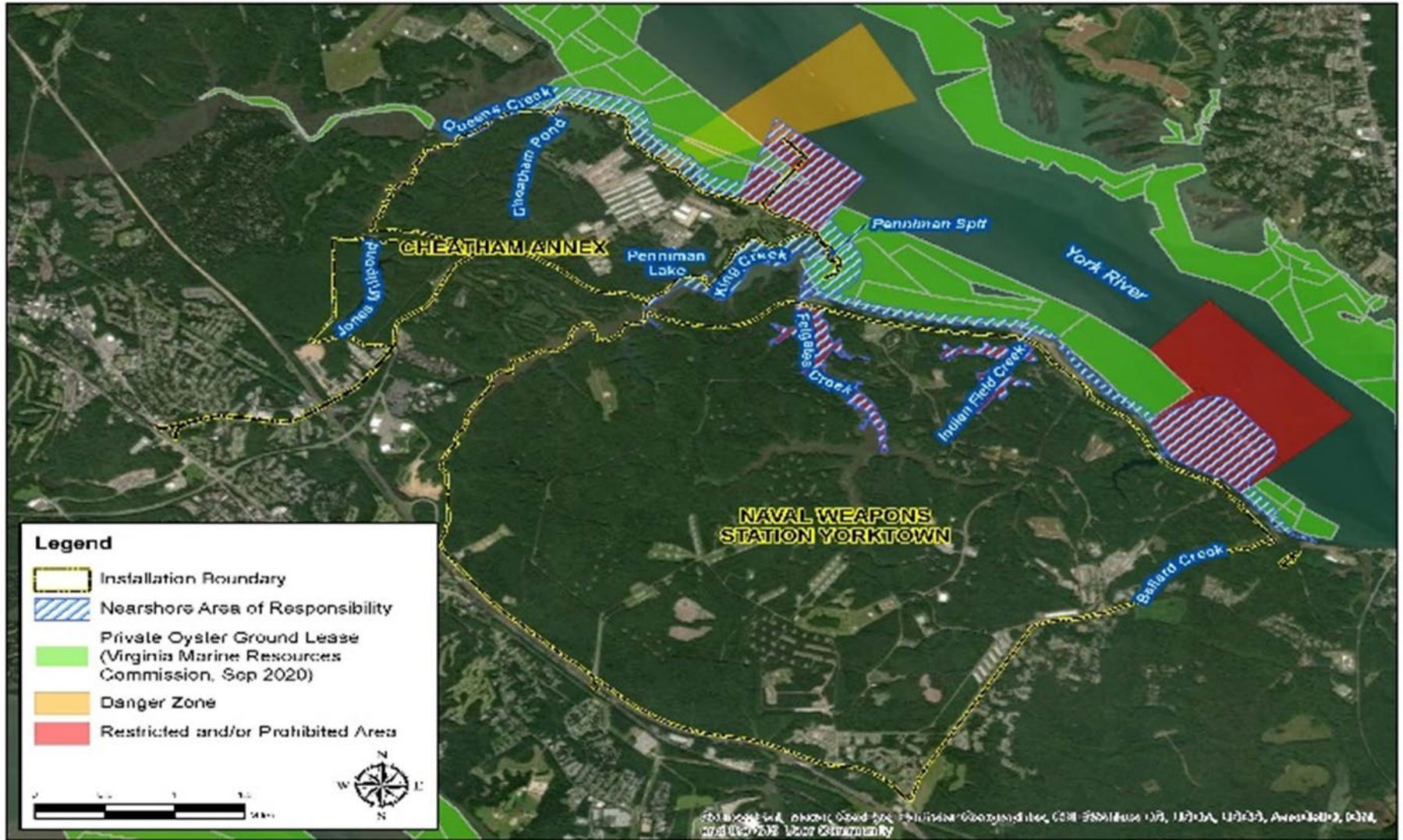


Photo: NOAA Chesapeake Bay Office

## Lower York River Oyster Restoration Area



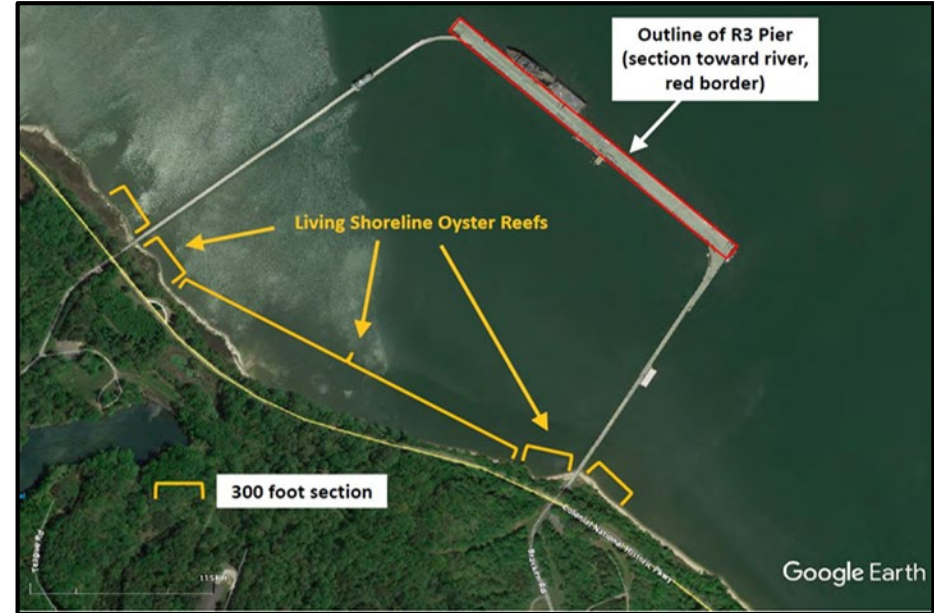
# Project Action Area





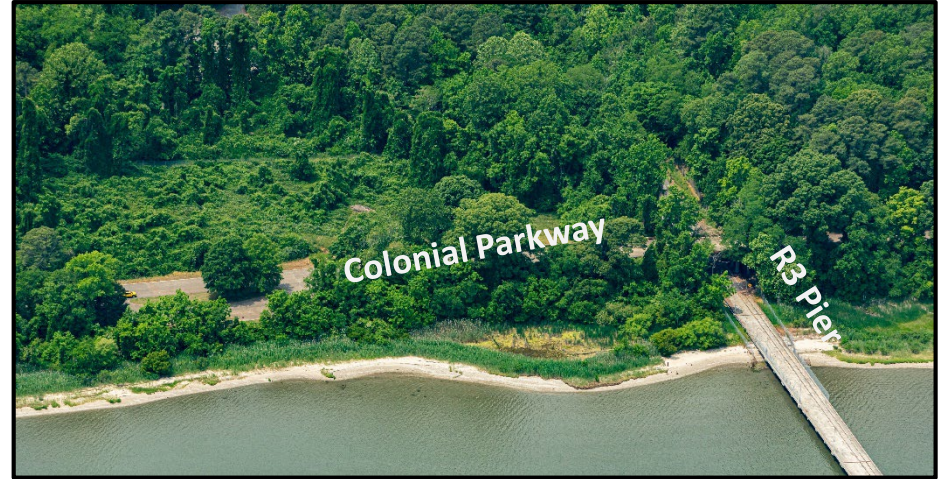


# Project Location: R3 Pier Shoreline





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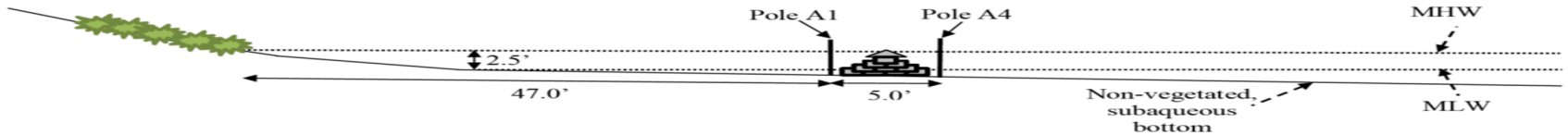




# Phase 1: Living Shoreline Intertidal Oyster Reefs



R3 Pier (Naval Weapons Station Yorktown)  
Living Shoreline Reef Permit,  
Yorktown, VA 23691



Cross-Section View: Not Drawn to Scale; measurements (see Plan View) were made on 9 July 2021

<p>Applicant(s): Virginia Institute of Marine Science Waterway: York River City/County: Yorktown # of Sheets: 2 of 4 Date: 12 July 2021</p>
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<p><b>Option #1:</b> Proposed Oyster Castle Reefs (Dimensions of each Oyster Castle: 1.0' Long x 1.0' Wide x 0.67' High)</p>
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<p><b>Option #2:</b> Proposed Oyster Castle Reefs w/ "Diamond Toppers" (Dimensions See Options #1 and #4 for Oyster Castle and Diamond Reefs, respectively)</p>
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<p><b>Option #3:</b> Proposed Oyster Castle Reefs with Granite (Gabion #4 (4" to 10" diameter)) inserted into designated portions of the oyster castle reefs</p>
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<p><b>Option #4:</b> Proposed Concrete "Diamond" Oyster Reefs (Dimensions of each "Diamond": 3.0' Long x 2.0' Wide x 1.0' High)</p>
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BACI Design\*





# Phase 1: Living Shoreline Oyster Reefs



Intertidal Oyster Reefs Deployed at R3 Pier, Oct 2022-Jun 2023

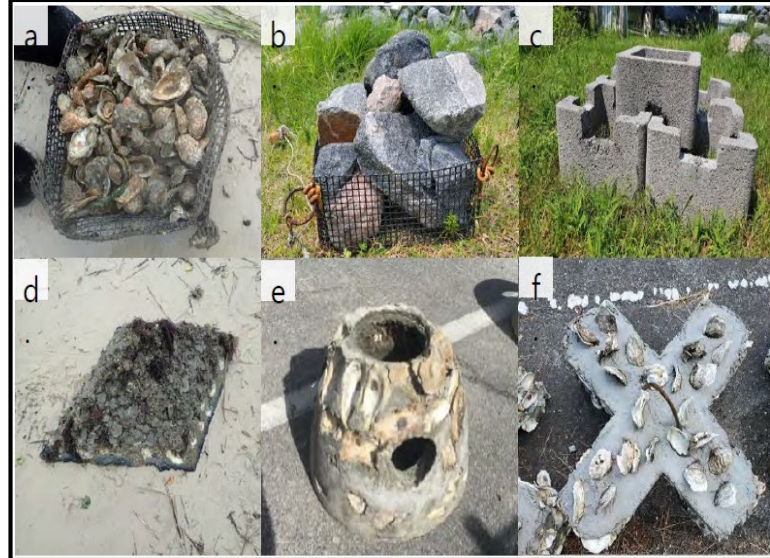


Intertidal Oyster Reefs Deployed at Penniman Spit, Oct 2022-Jun 2023



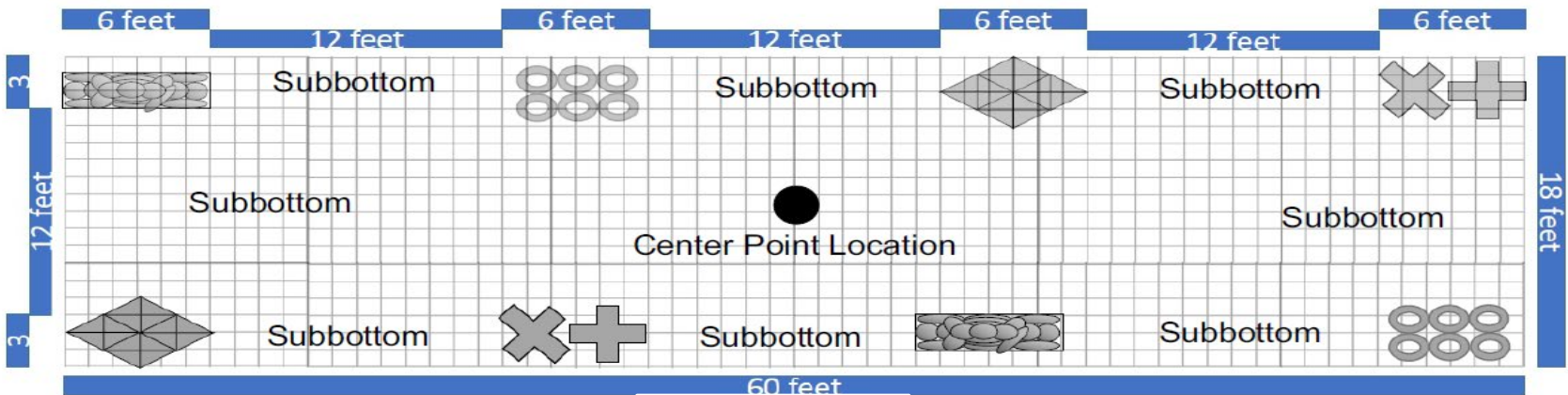


# Phase 1: Living Shoreline Subtidal Oyster Reefs



## 6 Reef Substrates

- a. shell basket
- b. granite basket
- c. oyster castle
- d. diamond
- e. c-dome
- f. x-reef



BACI Design\*



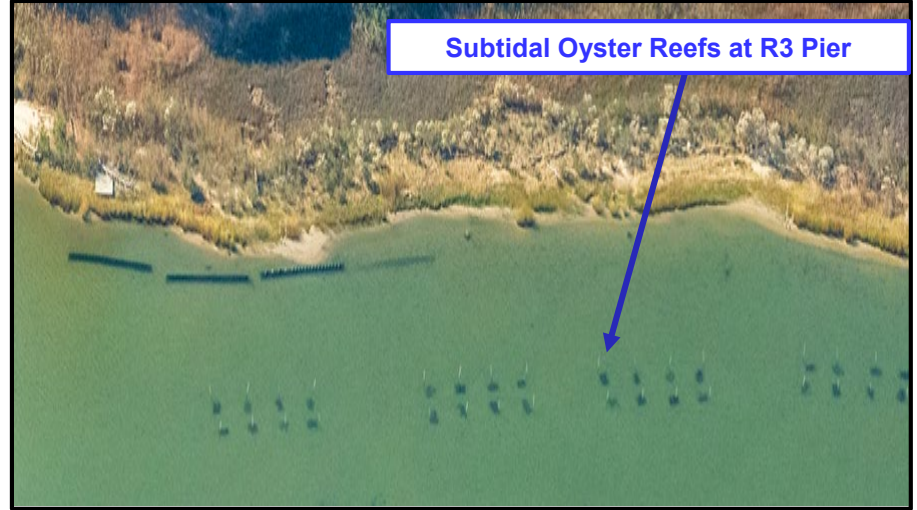
# Phase 1: Living Shoreline Oyster Reefs



Intertidal Oyster Reefs at R3 Pier



Subtidal Oyster Reefs at R3 Pier



Intertidal Oyster Reefs at Penniman Spit





# Phase 1: Living Shoreline Oyster Reefs



Intertidal Oyster Reefs Accreting Sediment

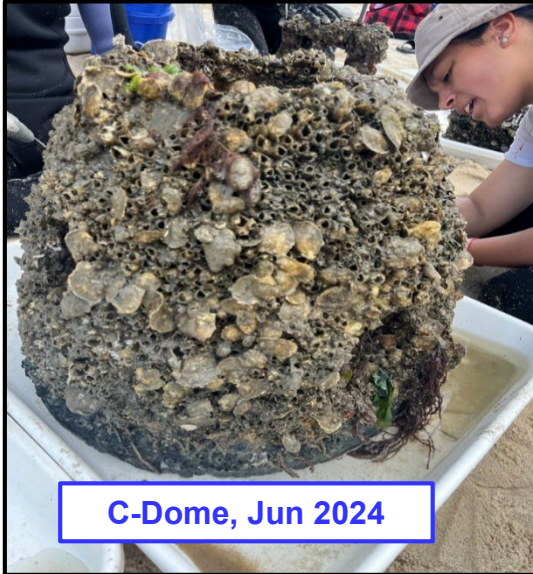


Intertidal Oyster Reefs Performance





# Phase 1: Living Shoreline Oyster Reefs



C-Dome, Jun 2024



Diamond, Jun 2024



X-Reef, Jun 2024



Castel, May 2024



VMIS Field Crew

- High density of oysters, 715-3,800 indiv./m<sup>2</sup>
- High biomass density, 50-513 g AFDQ

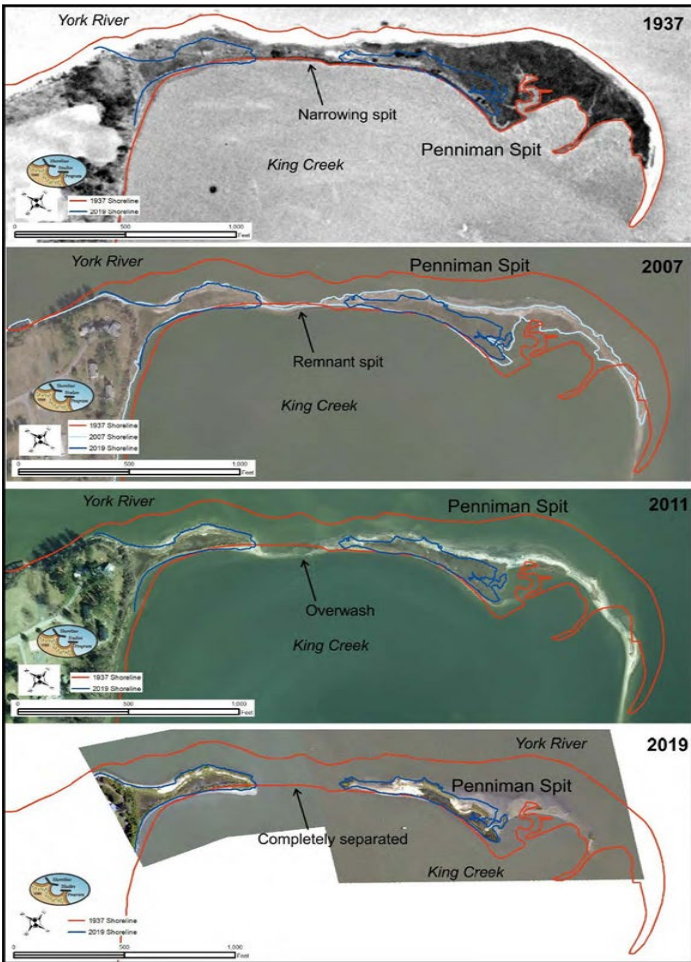




# Project Location: Penniman Spit

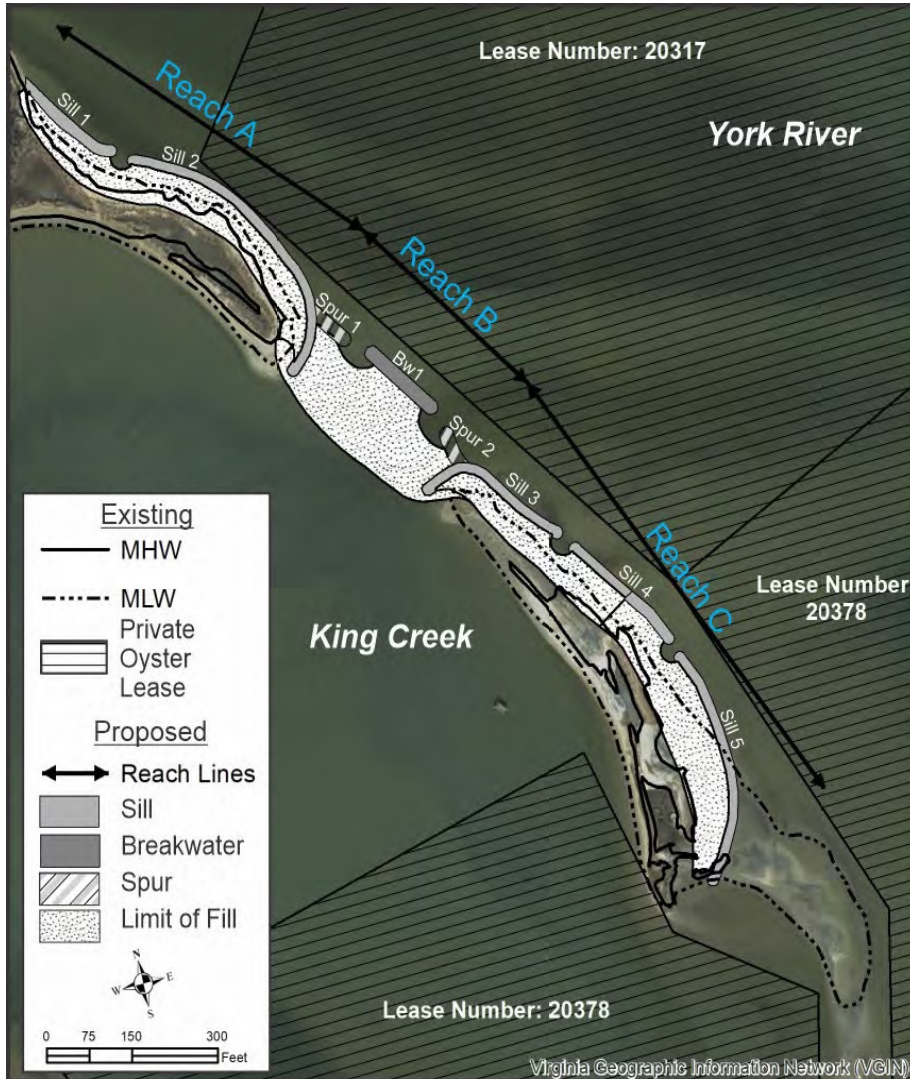


Special Interest Area, York County Shoreline Management Plan 2014  
86% loss in area above MLW, 1937-2019





# Phase 2: Penniman Spit Hybrid Living Shoreline

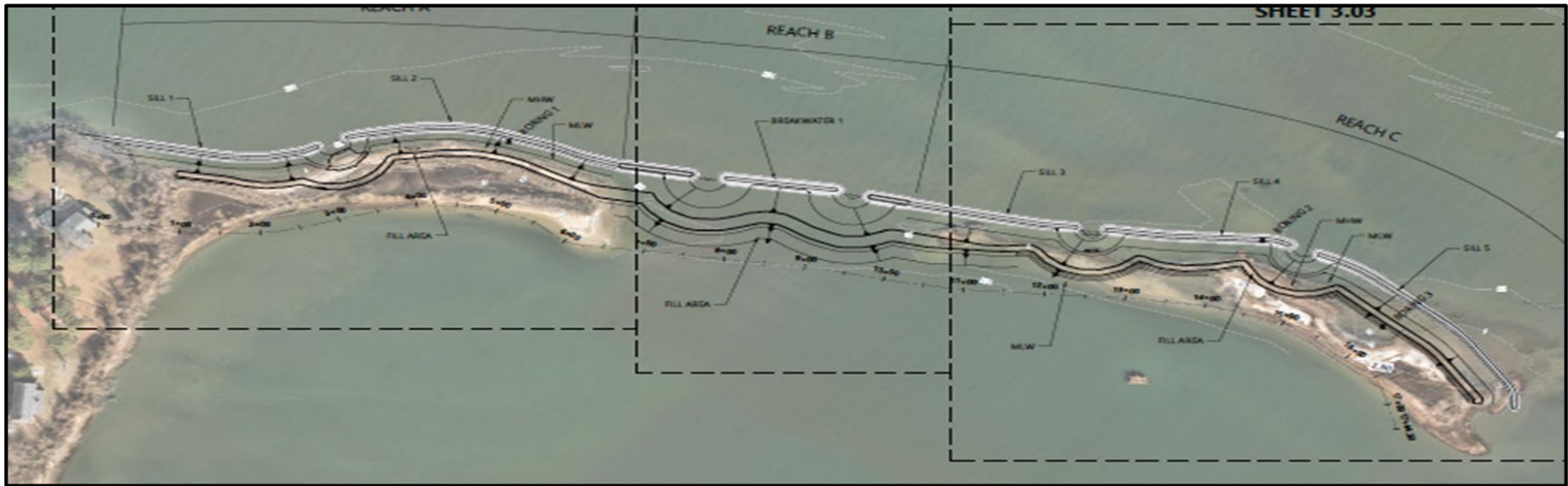
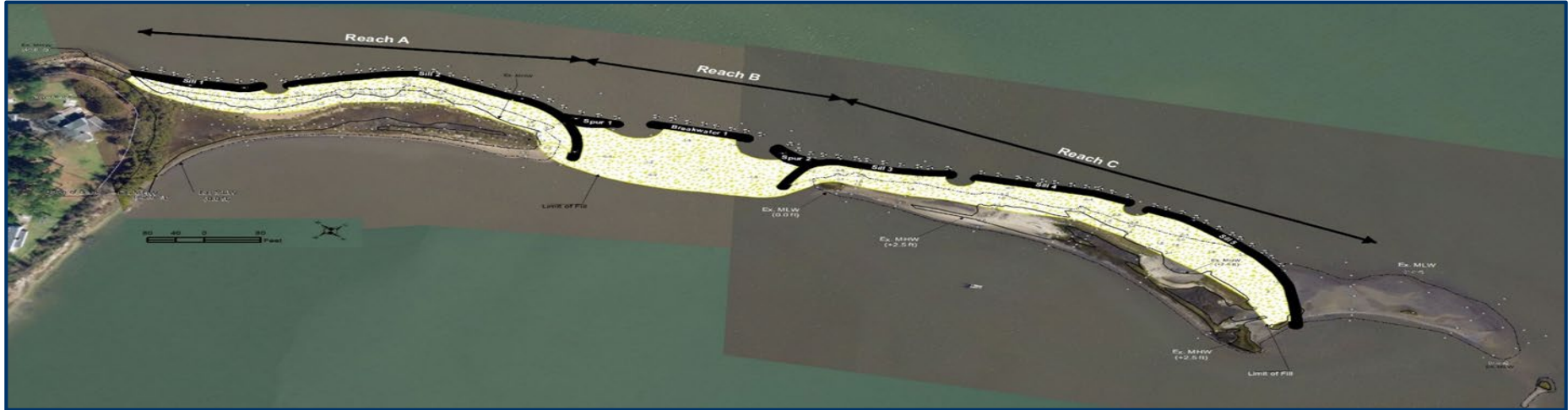


## Climate Resiliency Adaptation Design:

- 5 rock sills with 5 gaps
- 1 rock breakwater
- 2 rock spurs
- Sand fill and marsh grass plantings
- Intertidal oyster reefs, 675 lft
- Subtidal oyster reefs, 576 sqft
- High marsh restoration, 1 acres
- Low marsh restoration, 2 acres
- ~1,200 tons of carbon sequestered



# Phase 2: Penniman Spit Hybrid Living Shoreline





# Phase 2: Penniman Spit Hybrid Living Shoreline



Apr 23



Apr 24



May 24



Jun 24

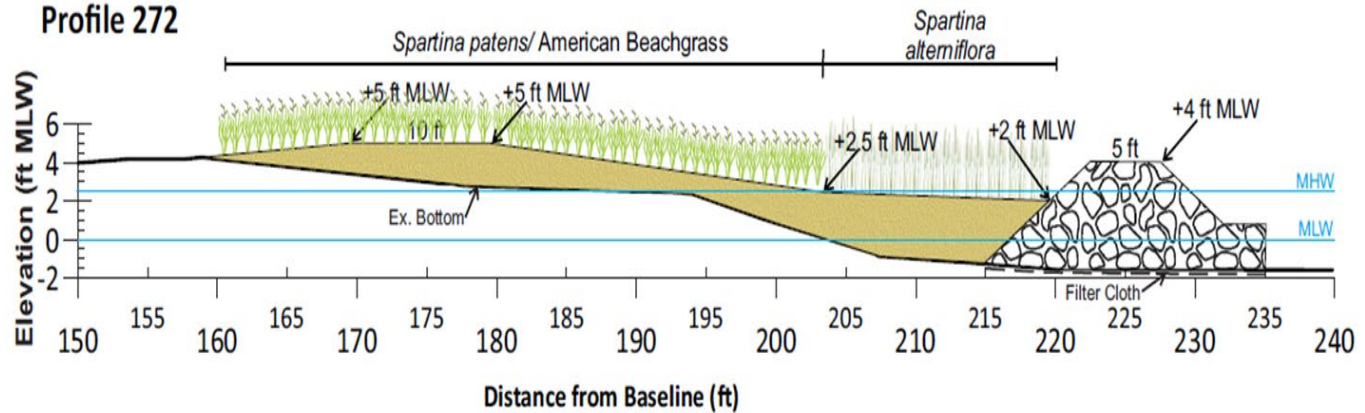


Aug 24



## Climate Resilience Adaptation Design\*

### Sill 1 and 2 Typical Cross-Section Profile 272





# Phase 2: Penniman Spit Hybrid Living Shoreline



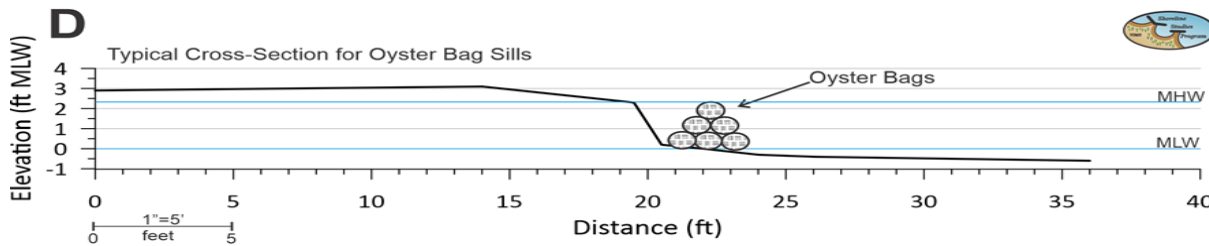
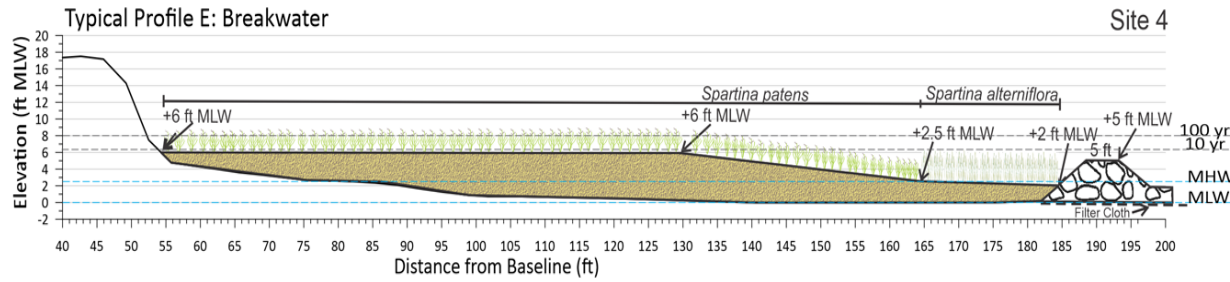
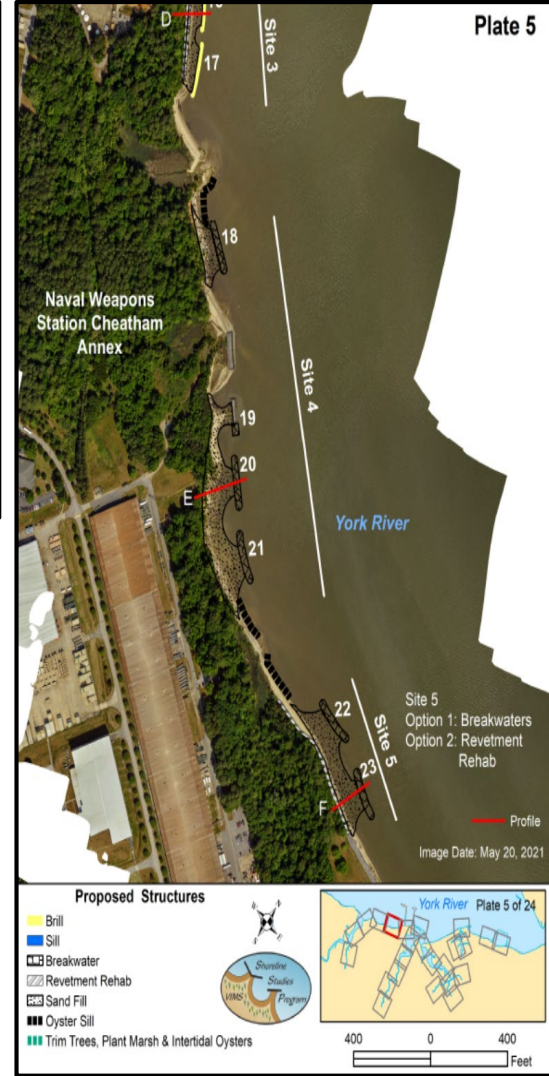
Subtidal Oyster Reefs, Aug 24

Intertidal Oyster Reefs, Aug 24

Reach C - *Spartina alterniflora* and *Spartina atens* plantings, Aug 24



# Phase 3: Monitoring & More Protection





# Hybrid Living Shoreline Recommendations



Reach	Site #	Structure #	Structure Type	Length (ft)	Width (ft)	Typical Profile
Queen's Creek	1	1	Sill	230	17	A
Queen's Creek	1	2	Sill	270	17	A
Queen's Creek	1	3	Sill	275	17	A
Cheatham Annex	2	4	Brill	300	19	B
Cheatham Annex	2	5	Brill	235	19	B
Cheatham Annex	2	6	Brill	525	19	B
Cheatham Annex	2	7	Brill	195	19	B
Cheatham Annex	2	8	Brill	170	19	B
Cheatham Annex	2	9	Brill	155	19	B
Cheatham Annex	2	10	Brill	200	19	C
Cheatham Annex	2	11	Brill	200	19	C
Cheatham Annex	2	12	Brill	215	19	C
Cheatham Annex	2	13	Brill	215	19	C
Cheatham Annex	2	14	Brill	240	19	B
Cheatham Annex	2	15	Brill	280	19	B
Cheatham Annex	3	16	Brill	215	20	D
Cheatham Annex	3	17	Brill	215	20	D
Cheatham Annex	4	18	Breakwater	205	19	E
Cheatham Annex	4	19	Breakwater	45	19	E
Cheatham Annex	4	20	Breakwater	205	19	E
Cheatham Annex	4	21	Breakwater	210	19	E
Cheatham Annex	5	22	Breakwater	210	20	F
Cheatham Annex	5	23	Breakwater	210	20	F
Cheatham Annex	6	24	Brill	240	19	B
Cheatham Annex	6	25	Brill	165	19	B
King Creek	7	26	Sill	120	16	G
King Creek	7	27	Sill	160	16	G
King Creek	7	28	Sill	155	14	H
King Creek	7	29	Sill	110	14	H
R3 Pier	8	30	Sill	140	15	I
R3 Pier	8	31	Sill	130	15	I
R3 Pier	9	32	Sill	120	15	J

Oyster Recommendations by Reach	Length (feet)
<b>Queens Creek</b>	
Oyster Sills	888
Intertidal Oysters	3,996
<b>York River to Cheatham Annex</b>	
Oyster Sills	595
Intertidal Oysters	2,437
<b>King Creek</b>	
Oyster Sills	5,266
Intertidal Oysters	5,898
<b>Felgates Creek</b>	
Oyster Sills	2,158
Intertidal Oysters	15,480
<b>Indian Field Creek</b>	
Oyster Sills	348
Intertidal Oysters	9,956

*Naval Weapons Station Yorktown  
Shoreline Management and Coastal  
Resiliency Plan, Sep 2023*

*Total Cost: \$9M - \$12M; Design,  
Permit, & Build*



# Nature-Based Coastal Resilience In Action



## Werowocomoco Sills

Through Time

7 years post- construction



22 April 2015



27 Apr 2016



Sill 1

4 years post-  
construction

26 Oct 2020



16 Aug 2023

**VIMS** | WILLIAM & MARY  
VIRGINIA INSTITUTE OF MARINE SCIENCE





# Acknowledgements



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