



Manokin River Oyster Sanctuary Draft Blueprint

as drafted by the Maryland Oyster
Interagency Workgroup

Manokin Sanctuary

Location- lower Eastern Shore, emptying into the Tangier Sound

High salinity area (>14 ppt)

Sanctuary created in 2010

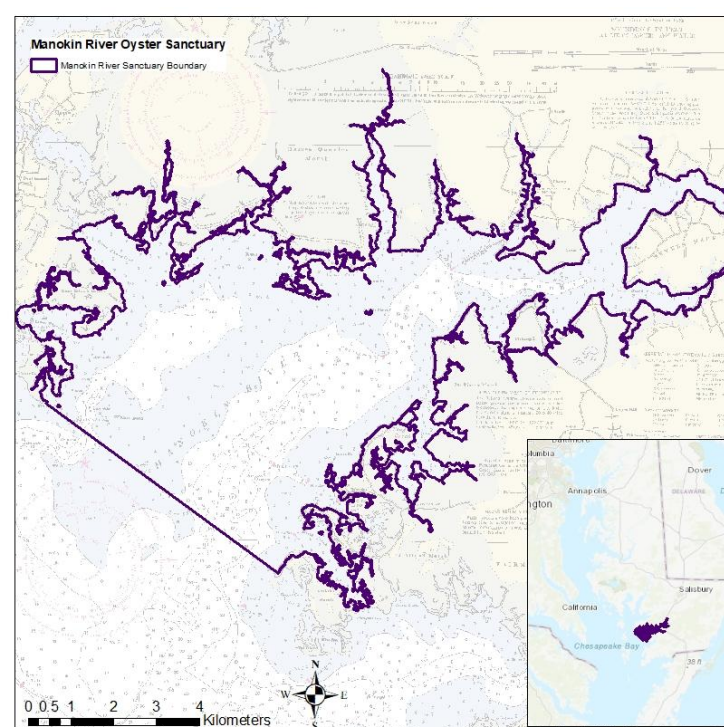
Surface acres: 16,320

Historic Oyster Bottom: Yates bars 5,015 acres (plus amendments 11,040 acres)

2014 Chesapeake Bay Agreement- MD committed to restoring oyster populations in 5 tributaries in MD's portion of the Chesapeake Bay by 2025.

DNR recommended as the 5th large scale tributary for restoration towards fulfilling the Chesapeake Bay Agreement in September 2018.

It was accepted as the 5th MD tributary by the Fisheries Goal Implementation Team in June 2019.



Oyster Metrics

A successfully restored reef should have:

- 'Minimum threshold' of 15 oysters and 15 grams dry weight per m² covering at least 30 percent of the target restoration area at six years post restoration;
- 'Target' of 50 oysters and 50 grams dry weight per m² covering at least 30 percent of the target restoration area at six years post restoration;
- Two or more oyster year classes present; and
- Stable or increasing spatial extent, reef height, and shell budget.

A successfully restored tributary is one where:

- 50 to 100 percent of the currently restorable oyster habitat (CROH) has oyster reefs that meet the reef-level metrics above (restorable habitat is defined as the area that, at a minimum, has appropriate bottom quality and water quality for oyster survival), ***and***
- 8 to 16 percent of historic habitat (Yates Bars), and preferably more, has oyster reefs that meet the reef-level metrics above.

CROH

Determining Currently Restorable Oyster Habitat (CROH):

1. River Extent: 16,320 acres
2. Depth Interval: 4 to 20 feet
3. Benthic Habitat: Coastal Marine Ecological Standards using 2012 Maryland Geologic Survey and 2012, 2015, 2017 and 2018 patent tong data. A 2019 sonar survey conducted by NOAA was done to verify the bathymetry
4. Water Quality: > 5.0 ppt salinity and 5.0 mg/l dissolved oxygen

Total of **585.7 acres** of CROH

(50% = 292.8 acres)

HOH



Historic Oyster Habitat (HOH) is based on the Historic Yates Bars

5,015 acres of Yates Bars in Manokin sanctuary

8% to 16% of HOH is **401 to 802 acres**



Restoration Target

Need to meet both minimum requirements:

- 50% CROH = 292 acres
- 8% HOH = 401 acres

Restoration Target = **441 acres**

Includes a 10% buffer in case a site fails restoration oyster metrics



Areas Removed

Submerged Aquatic Vegetation areas removed

Exclusion Zones removed- under private docks or on leases, pound net areas and fall survey key and disease bars

Proximity Buffers removed- 150' leases, 250' active pound nets, 250' navigational aids, 50' docks for seed only restoration, 250' docks for substrate and seed restoration

300' buffer of an extended channel entrance going into Rumbley

Small area suitable for restoration isolated on the northern side of the river (12 acres)



Restoration Treatments

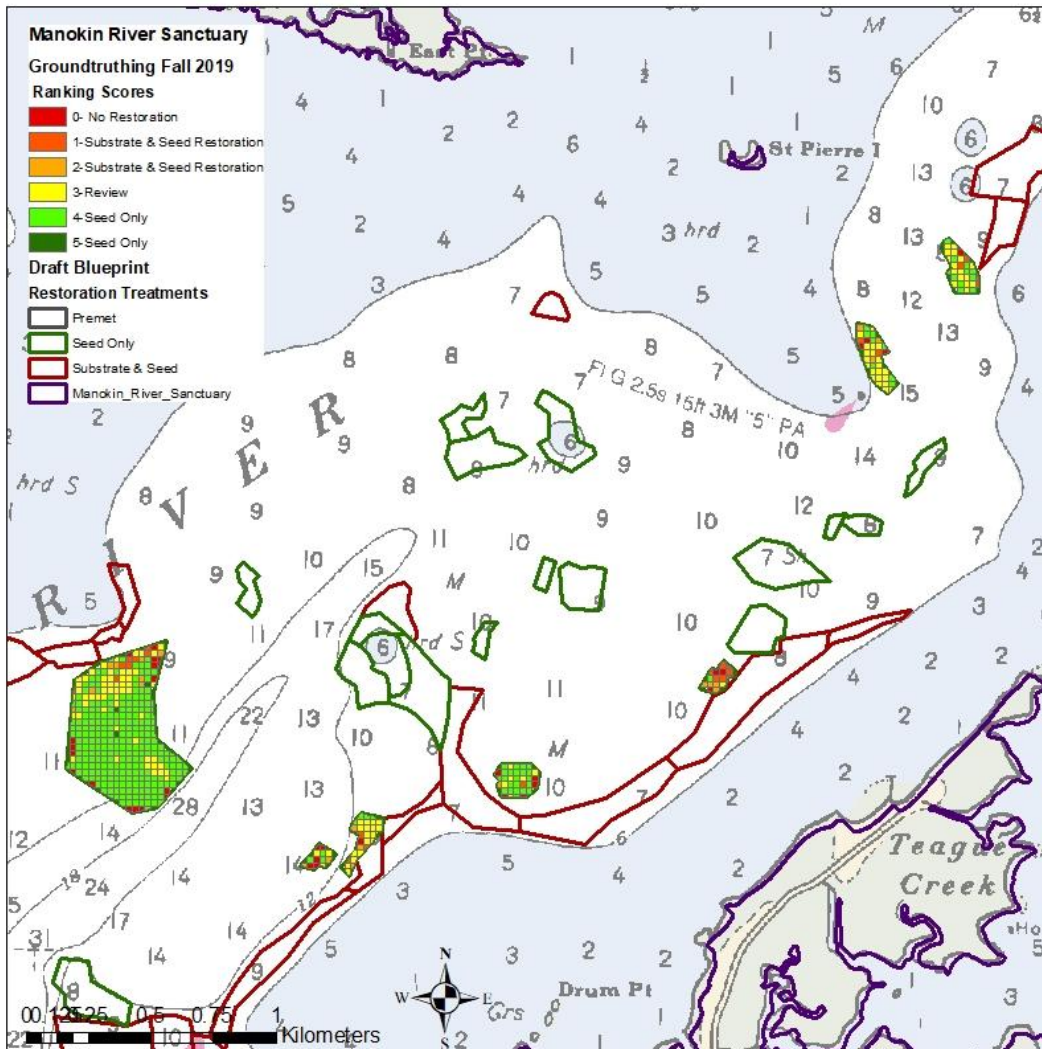
Seed Only - hard substrate reef base, 5-50 oysters per square meter

Substrate and Seed - hard substrate, <5 oysters per square meter

Premet - already meets the Oyster Metrics density and biomass targets >50 oysters and grams per square meter

Control - Reefs left unrestored (untreated) to serve as comparisons to restored (treated) reefs

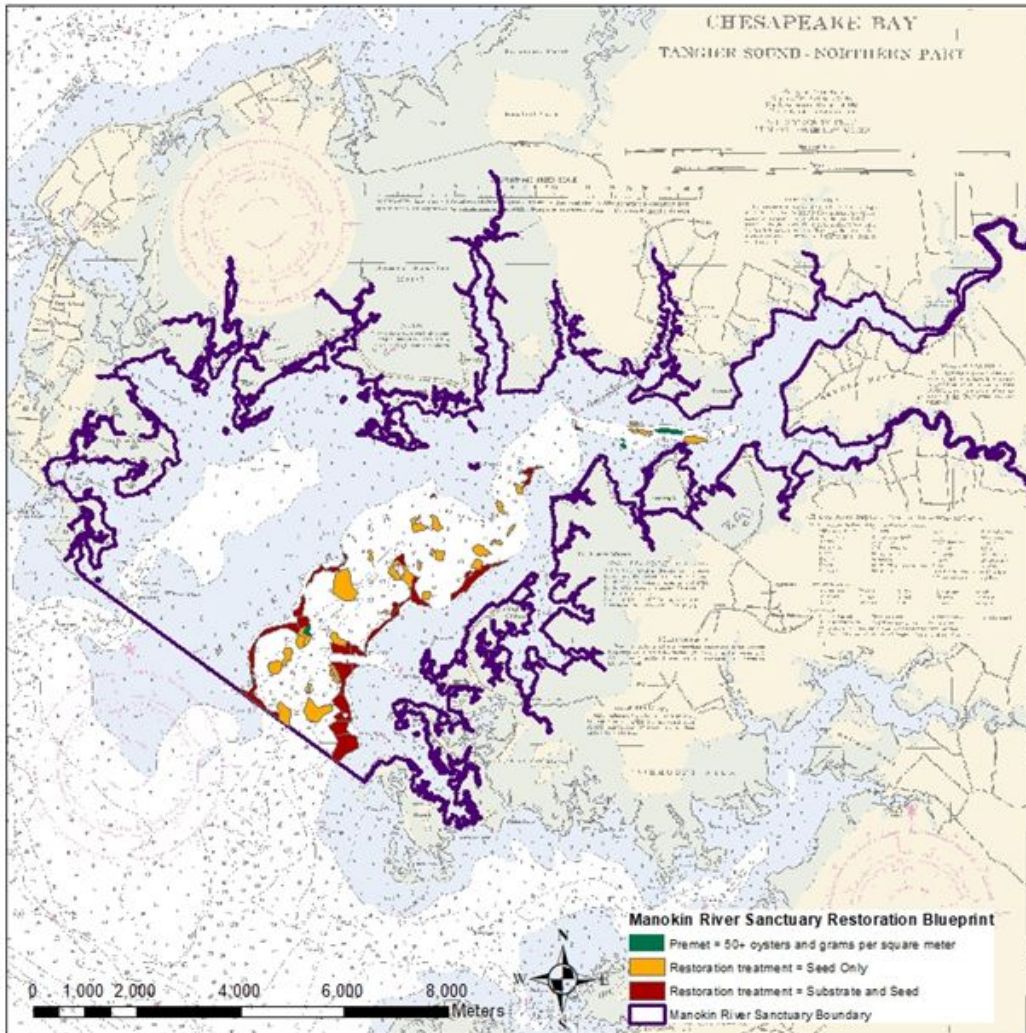
Pre-Construction Groundtruthing Survey



5 Benthic Habitat Components Evaluated

1. % exposed shell
2. Substrate type-
primary and
secondary
3. Surface sediment-
depth in centimeters
4. Density live oysters
5. Surface shell volume

Blueprint Map



Restoration Acres Available

Seed Only: 284 acres

Substrate and Seed: 333 acres

Premet: 20.1 acres (preliminary)

Total Available: 637 acres

**Restoration Target: 441 acres
(75.5% CROH)**



Cost Estimates

Cost estimate for target restoration area (441 acres):

- Seeding Cost: \$14,594,000
- Substrate Construction: \$15,070,000
- Total: \$29,664,000

*Based on restoration treatment acreages of 137 acres for substrate and seed construction, 284 acres of seed only and 20 acres of premet reefs.

**Cost estimates do not include monitoring. These estimates are subject to change based on groundtruthing survey results. Seeding cost estimates are conservative, including second seeding on all restoration areas.



Projected Timeline

Projected Timeline	Patent Tong Groundtruthing Survey (acres)		Restoration Treatment Schedule (acres)		
	Seed Only	Substrate and Seed	Seeding Seed Only Sites	Substrate Sites Construction	Seeding Substrate Sites (August-September) *
Fall 2019	75	-	-	-	-
Spring 2020	-	100	50	-	-
Fall 2020	75	-	-	-	-
Winter 2020/21	-	-	-	75	-
Spring 2021	-	100	75	-	-
Summer 2021	-	-	-	-	75
Fall 2021	75	-	-	-	-
Winter 2021/22	-	-	-	75	-
Spring 2022	-	100	75	-	-
Summer 2022	-	-	-	-	75
Fall 2022	80	-	-	-	-
Spring 2023	-	-	80	-	-

*Seeding acreage will depend on recruitment study

Next Steps

1. Side scan sonar bottom survey
2. Determine the acreage of currently restorable oyster habitat
3. Oyster patent tong groundtruth survey- ongoing
4. Develop a draft blueprint (plan) for restoring the sanctuary
5. **Review of draft blueprint by scientist and community consultants, leaseholders in the sanctuary, and OAC**
6. **Define the restoration goal (target acreage)**
7. **Finalize blueprint, obtain substrate planting permits, and implementation**

Please provide comments on draft blueprint to
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