Update

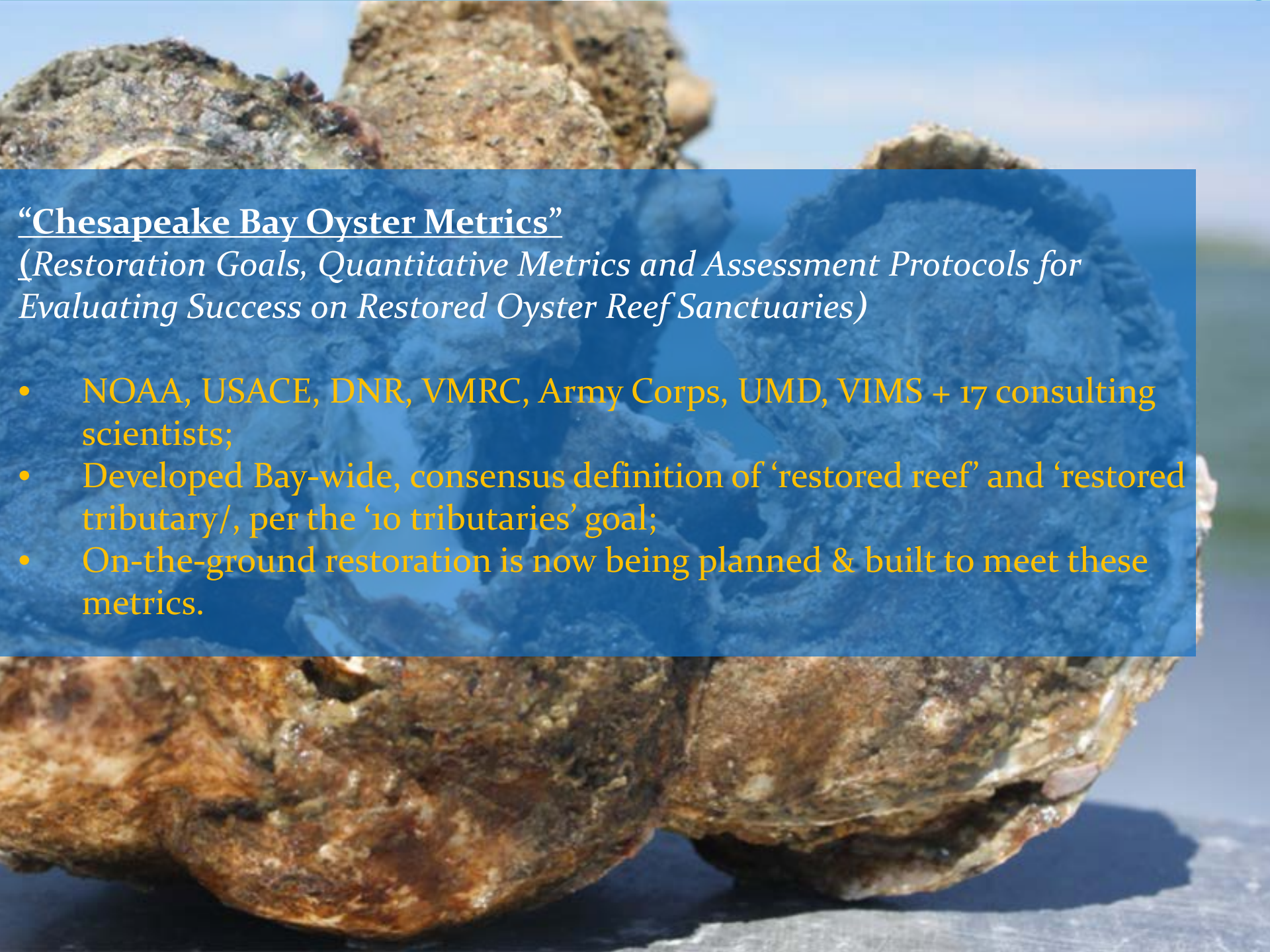
Large-Scale Oyster Restoration in Support of the Chesapeake Bay Agreement Oyster Goal

Stephanie Reynolds Westby, NOAA

Policy Drivers

- 2009 Executive Order 13508
- 2014 Chesapeake Bay Agreement

Restore oyster populations in 10 tributaries by 2025



“Chesapeake Bay Oyster Metrics”
(Restoration Goals, Quantitative Metrics and Assessment Protocols for Evaluating Success on Restored Oyster Reef Sanctuaries)

- NOAA, USACE, DNR, VMRC, Army Corps, UMD, VIMS + 17 consulting scientists;
- Developed Bay-wide, consensus definition of ‘restored reef’ and ‘restored tributary/, per the ‘10 tributaries’ goal;
- On-the-ground restoration is now being planned & built to meet these metrics.

Chesapeake Bay Oyster Metrics

Reef level success criteria:

- Oyster density
- Oyster biomass
- Presence of multiple year classes
- Stable or increasing shell budget, reef height, reef footprint

Tributary level success criteria:

50%- 100% of currently-restorable river bottom meets reef-level criteria.

Oyster Restoration Outcome

Management Strategy

2015–2025, v.1

Chesapeake Bay Program
Science. Restoration. Partnership.

Oyster Outcome:

Restore native oyster habitat and populations in 10 tributaries by 2025 and ensure their protection.

Progress tracked under:

Sustainable Fisheries Goal Implementation Team

Oyster Restoration Outcome

Management Strategy

2015–2025, v.1

Management Approach/ Process:

- Establish workgroups/ select tributaries
- Collect baseline data (sonar surveys to determine hard bottom; oyster population info)
- Set acreage target, per Oyster Metrics
- Develop restoration plan
- Implement restoration
- Monitor; adaptively manage

Maryland

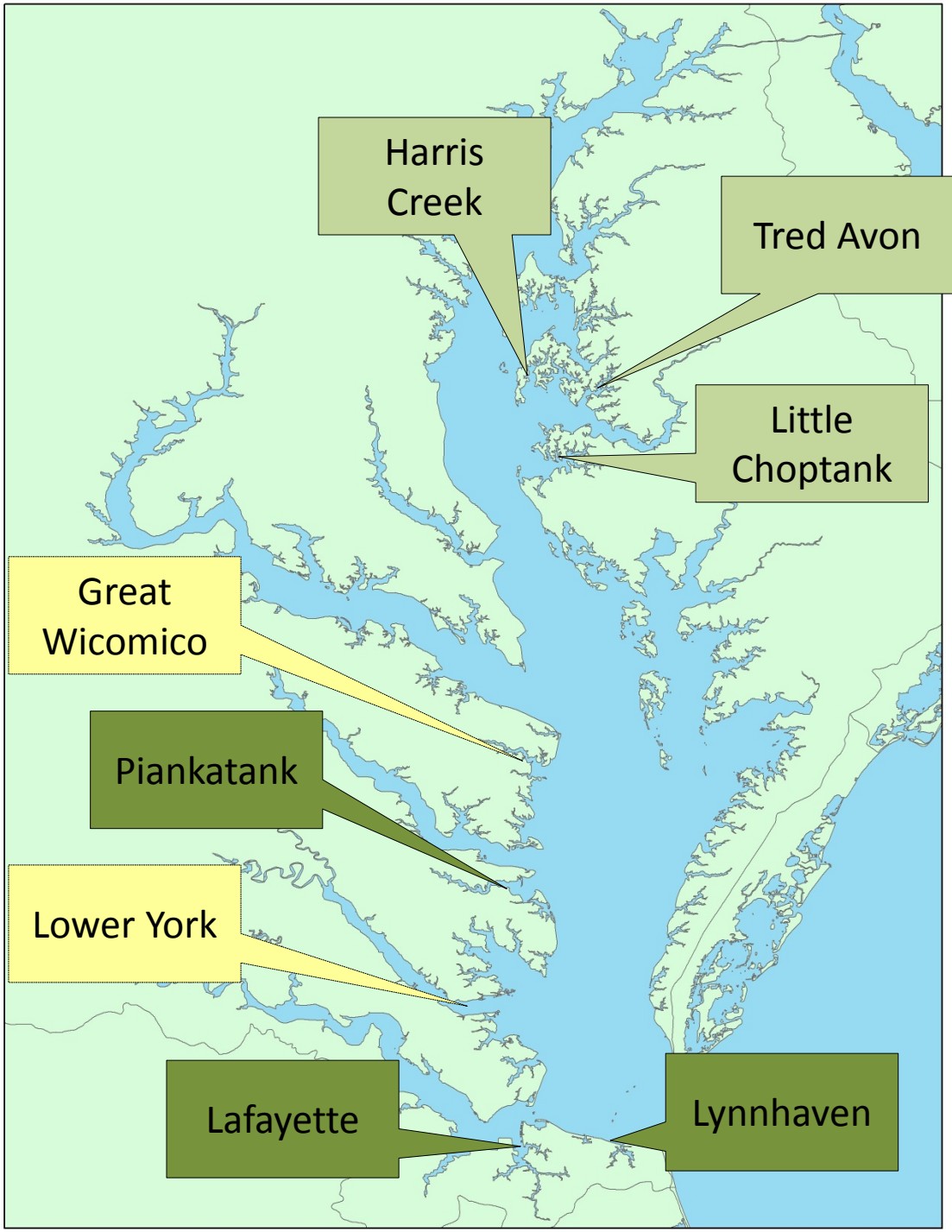
Selected Tributaries:
- **Harris Creek**
- **Little Choptank**
- **Tred Avon**

Where we are in the approach varies by tributary…

Virginia

Selected Tributaries:
- **Lafayette**
- **Lynnhaven**
- **Piankatank**

‘Preliminarily Selected’ Tributaries:
- **Great Wicomico**
- **Lower York**



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Oyster Restoration Outcome Management Strategy 2015–2025, v.1

Key Partners

Maryland Workgroup:

- NOAA
- Army Corps of Engineers- Baltimore
- MD Dept. Natural Resources
- Oyster Recovery Partnership
- Trib-specific consulting scientists

ALL VA Workgroups:

- NOAA
- U.S. Army Corps of Engineers- Norfolk
- Virginia Marine Resources Commission;

Lafayette Workgroup:

- Chesapeake Bay Foundation
- Christopher Newport University;
- Elizabeth River Project;
- The Nature Conservancy;
- Virginia Institute of Marine Science;

Piankatank Workgroup:

- Chesapeake Bay Foundation;
- Christopher Newport University;
- The Nature Conservancy;

Lynnhaven Workgroup:

- Chesapeake Bay Foundation;
- Christopher Newport University;
- City of Virginia Beach;
- Lynnhaven River Now;

Factors Influencing Success:

- Low oyster populations
- Water quality
- Harvest enforcement
- Spat set variability
- Shell loss
- Hard bottom availability
- Public support
- Climate change/ ocean acidification

- Oyster Resource Management/ user group conflicts:
  - Permitting
  - Bottom leasing
  - Designation of oyster sanctuaries
  - Navigation

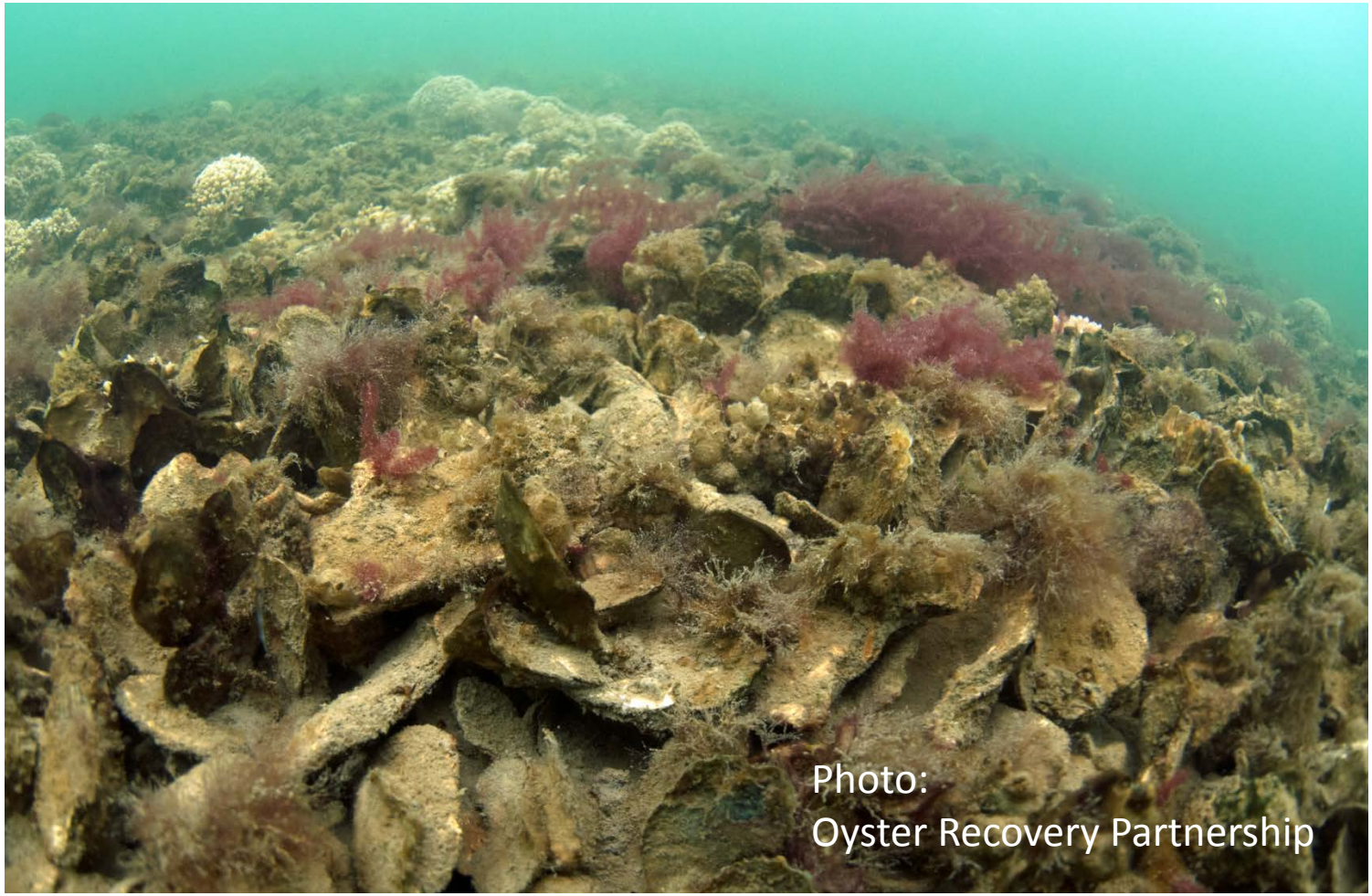
- Resource Availability:
  - Finding
  - Shell/ substrate
  - Hatchery spat supply

How do you build an oyster reef?

seed only

substrate & seed

substrate only



Substrate Placement

Photo:
The Nature Conservancy

Seed Oyster Production

Larvae are produced in a hatchery.

Product produced is ‘spat on shell’.

Larvae are released into tanks filled with old oyster shell.

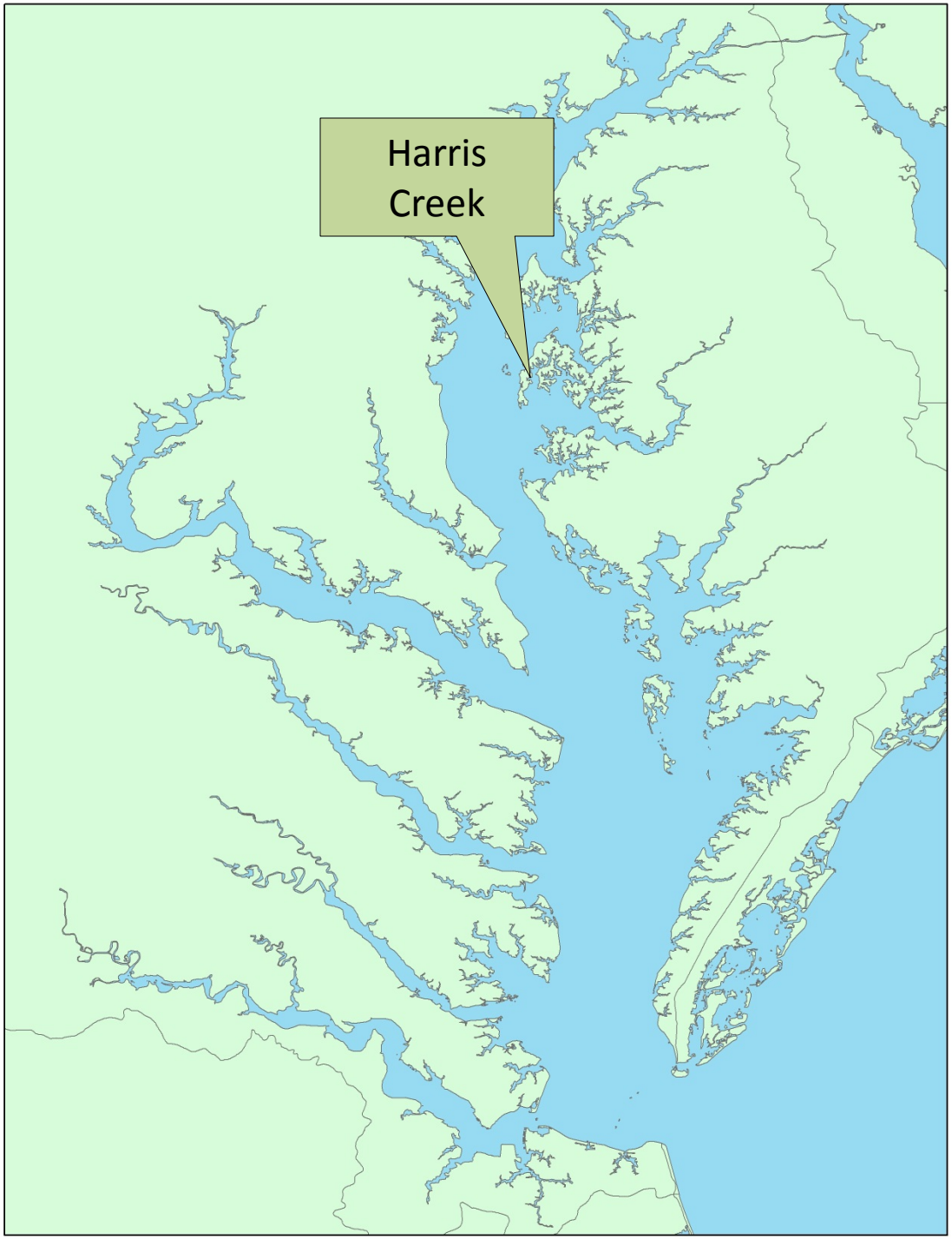
Photos: University of Maryland

Seed Oyster Planting

Substrate Only Reef (Piankatank)

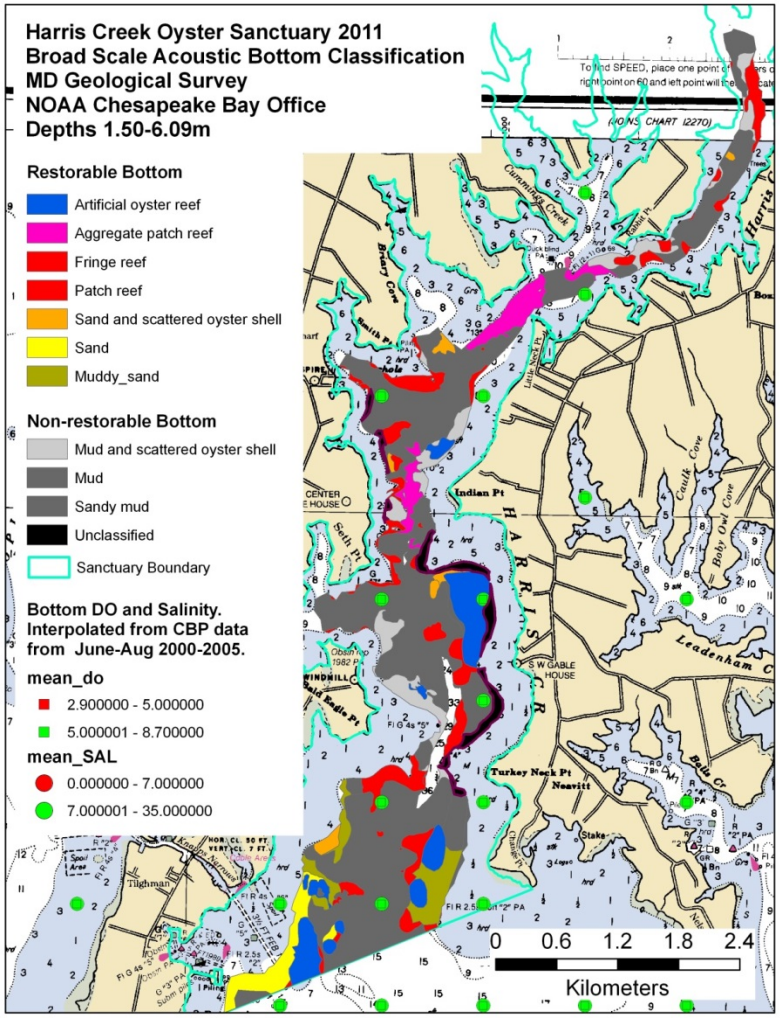
Substrate and Seed Reef
(Before: Tred Avon River; After: Harris Creek)

Harris Creek Case Study

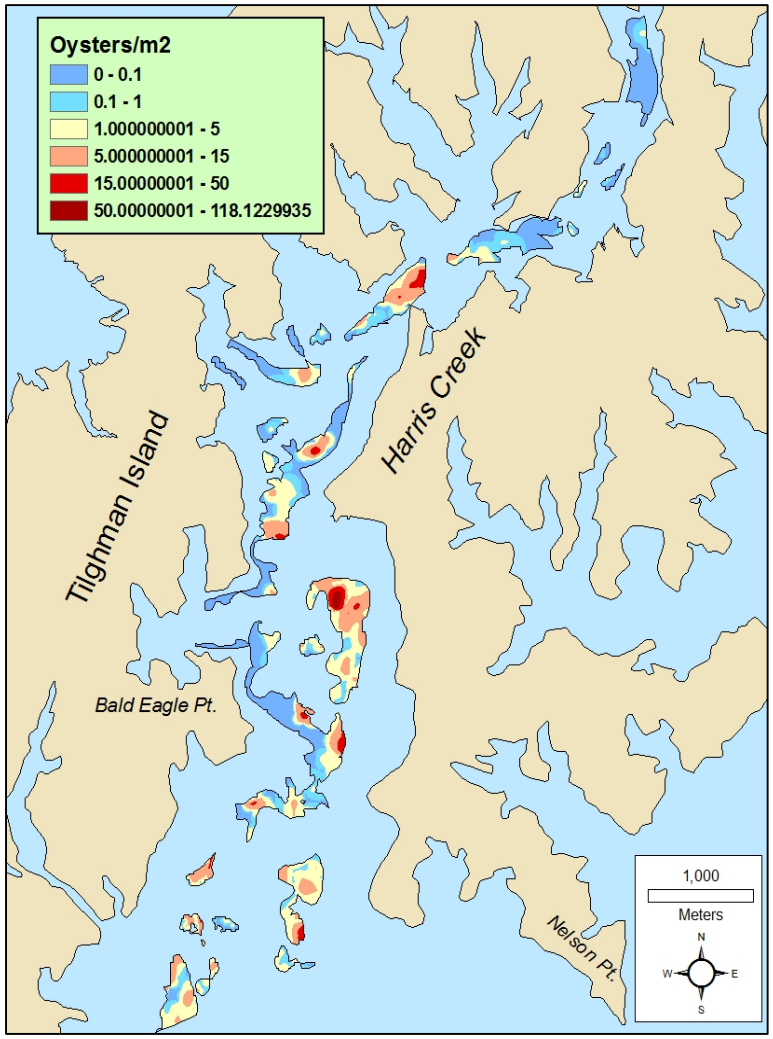


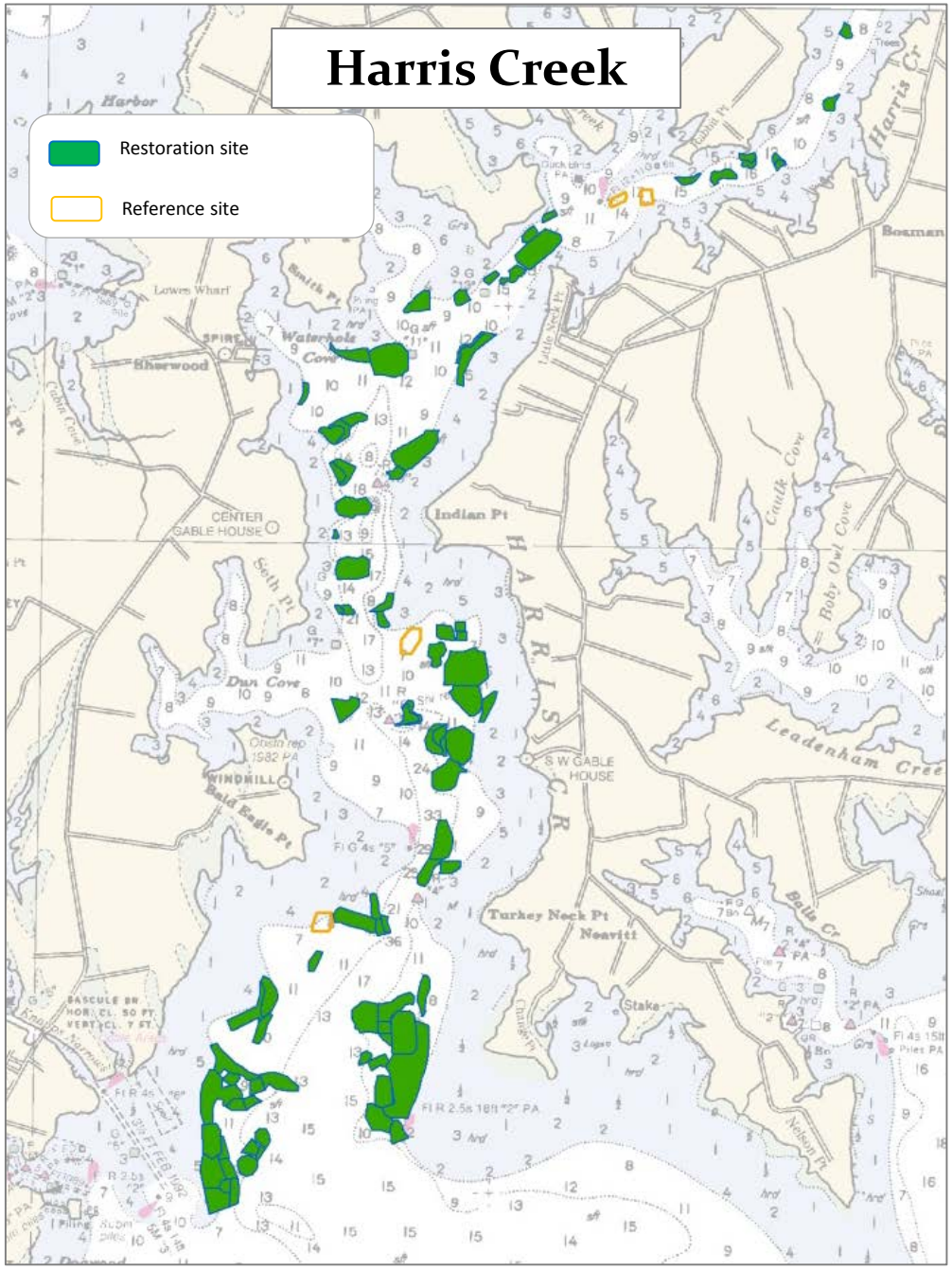
Developing the Harris Creek Oyster Restoration Plan: Data, consultation, public and stakeholder outreach

Sonar survey to find hard river bottom



Oyster population survey





Oyster Restoration Initial Implementation Completed September 2015

- 350 acres (141 hectares)
- 2 billion juvenile oysters
- Started in 2011
- $26.8 million cost

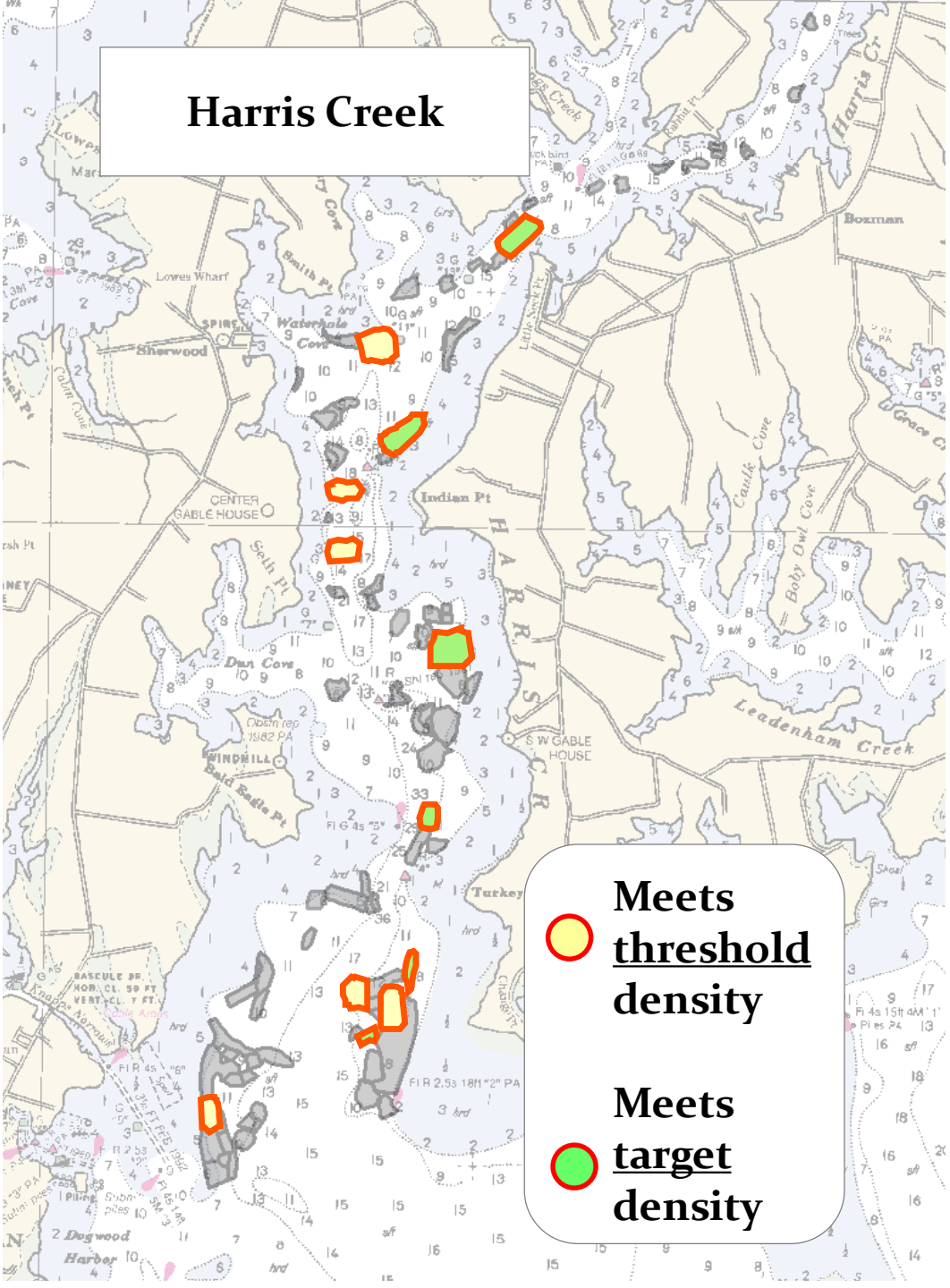
Monitoring

Oyster Metrics success criteria monitoring

- Oyster biomass
- Oyster density
- Presence of multiple year classes
- Reef height
- Reef footprint
- Shell budget
- Each monitored 3 years and 6 years post-restoration

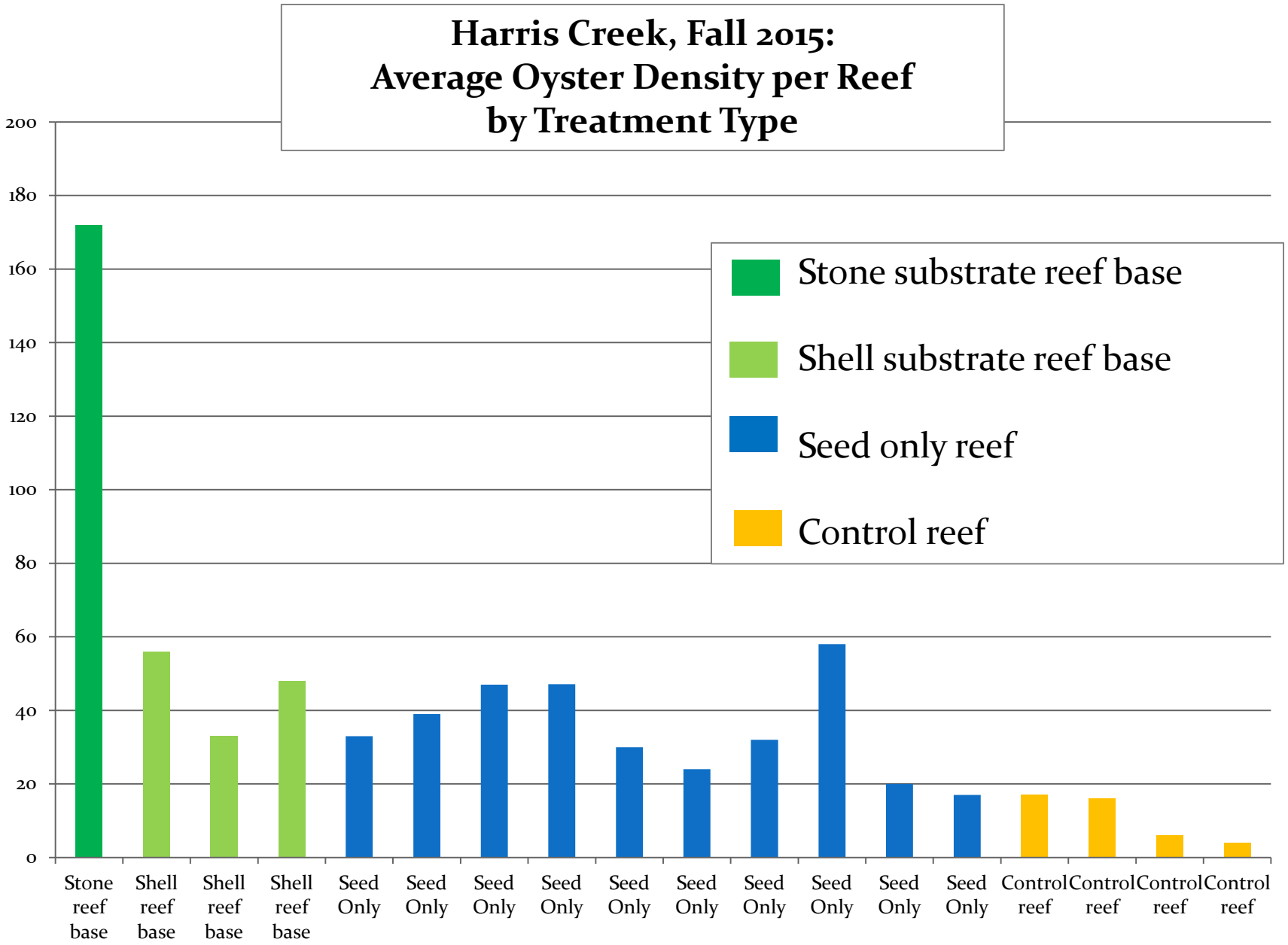
Diagnostic monitoring

- Oyster disease
- Water quality *(available at DNR's Eyes on the Bay web site)*



First cohort:

- 12 reefs (100 acres) planted in 2012; monitored in 2015
- All 12 meet minimum threshold success criteria density
- Half meet target success criteria density
- Second cohort (planted in 2013); monitored fall 2016
- 2016 report due soon; trends are generally better than 2015. cohort.


Harris Creek, Fall 2015:
Average Oyster Density per Reef
by Treatment Type
200
180
160
140
120
100
80
60
40
20
0
Stone substrate reef base
Shell substrate reef base
Seed only reef
Control reef
Stone reef base
Shell reef base
Shell reef base
Shell reef base
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Seed Only
Control reef
Control reef
Control reef
Control reef

Harris Creek, Fall 2015: Average Oyster Density per Reef by Treatment Type

Full 2015 report available at *https://chesapeakebay.noaa.gov/images/stories/habitats/hc3ydcheckinjuly2016.pdf*

Reef #	Restoration Treatment	Fall 2015: Ave live oyster density (# per m^2)	SE Live Density (#per m^2)
18	Stone reef base	172	37.58
1	Shell reef base	56	10.54
13	Shell reef base	33	4.33
2	Shell reef base	48	5.45
3	Seed Only	33	6.32
4	Seed Only	39	5.86
5	Seed Only	47	5.25
6	Seed Only	47	3.96
7	Seed Only	30	4.40
8	Seed Only	24	4.74
9	Seed Only	32	5.86
10	Seed Only	58	4.79
11	Seed Only	20	4.03
12	Seed Only	17	3.92
14	Control reef	17	3.07
15	Control reef	16	7.53
16	Control reef	6	3.25
17	Control reef	4	2.42


Photo:
Oyster Recovery Partnership