

Initial Analysis of Fall 2015 Harris Creek Oyster Density

February 2016



Scientists tracking the health of oyster restoration projects in Harris Creek, Maryland, have made available preliminary data from their ongoing work to monitor progress in that tributary.

The Maryland Oyster Restoration Interagency Workgroup (National Oceanic and Atmospheric Administration [NOAA], chair; U.S. Army Corps of Engineers, Baltimore District [USACE]; Maryland Department of Natural Resources [Maryland DNR]; and the Oyster Recovery Partnership [ORP]) is working toward the 2014 Chesapeake Bay Watershed Agreement goal for state and federal partners to “restore native oyster habitat and populations in 10 Bay tributaries by 2025, and ensure their protection.”

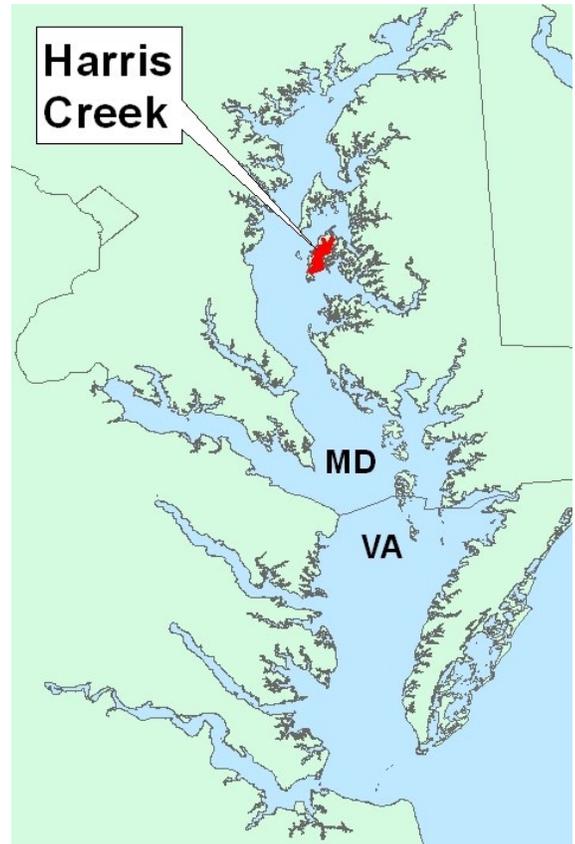
With guidance from consulting scientists and the public, the Workgroup developed a plan to restore more than 350 acres of reefs in Harris Creek (www.chesapeakebay.noaa.gov/images/stories/habitats/harris creek blueprint 1.13.pdf)

Monitoring protocols were also developed to evaluate restoration success (as described in the Chesapeake Bay Oyster Metrics, www.chesapeakebay.noaa.gov/images/stories/fisheries/keyFishSpecies/oyster metrics report final.pdf)

These call for monitoring of reefs three and six years post-restoration. The protocols are based on a suite of metrics that, in combination, will be used to determine whether restoration activities are successful. The first cohort of reefs constructed under the plan was planted with seed primarily in 2012 (12 sites, totaling 102 acres). These reefs were monitored in fall 2015 as part of the first three-year evaluation. While a full report will be released in mid-2016, scientists are able to share initial information about one key success criterion: oyster density.

As defined in the Chesapeake Bay Oyster Metrics, a reef that meets the *minimum threshold* density surpasses the lowest levels that indicate success; a reef that meets the *target* density can be considered completely restored (for the density metric). Specifically, the oyster density criterion is:

- **Minimum threshold:** 30% of the reef area is covered with 15-50 oysters per square meter.
- **Target:** 30% of the reef area is covered with 50 oysters or more per square meter.



Oyster Density Results Summary

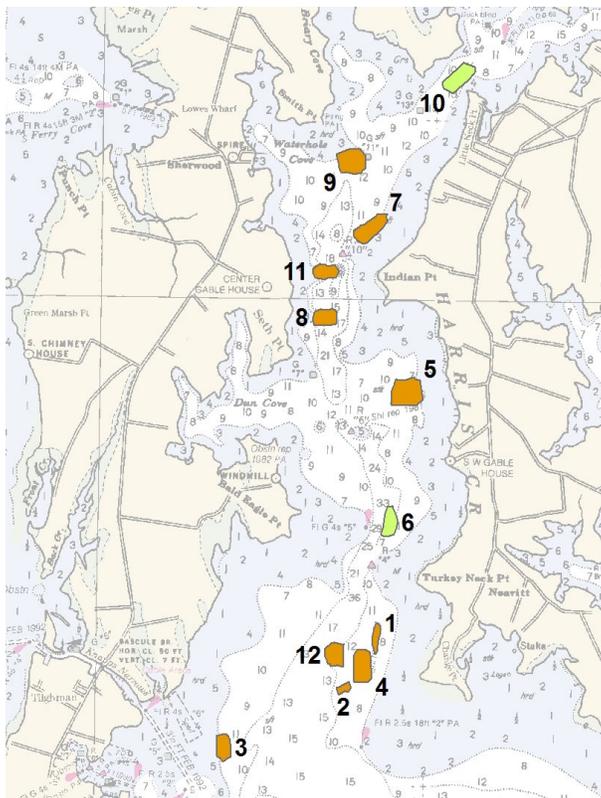
The first cohort of reefs, which were planted primarily in 2012 (12 reefs, totaling 102 acres), were monitored in fall 2015 as part of the three-year evaluation (see Maps A and B and Table 1).

- In 2011, baseline oyster density was measured on 12 reefs before restoration. Two of these reefs (17%) met the Oyster Metrics threshold prior to restoration; none (0%) met the target prior to restoration (see Map A).
- In 2012, these 12 reefs (#1-12 on Maps A and B) were planted with juvenile oysters. The oysters were produced by the University of Maryland's Horn Point facility, and planted by ORP, with funding from NOAA and Maryland DNR. USACE first placed mixed-shell reef-building substrate onto two of these sites (#1 and #2). The other 10 reefs (#3 through #12) received only juvenile oysters (without any reef-building substrate) because they had some existing oysters and/or reef structure before restoration.
- In late 2015, the same 12 reefs (#1-12) were monitored using patent tongs to determine whether each reef met the Oyster Metrics threshold or target oyster density. All 12 reefs (100%) currently meet the Oyster Metrics threshold density, and six (50%) meet the target density (see Map B).

Map A

Prerestoration: Baseline Oyster Density

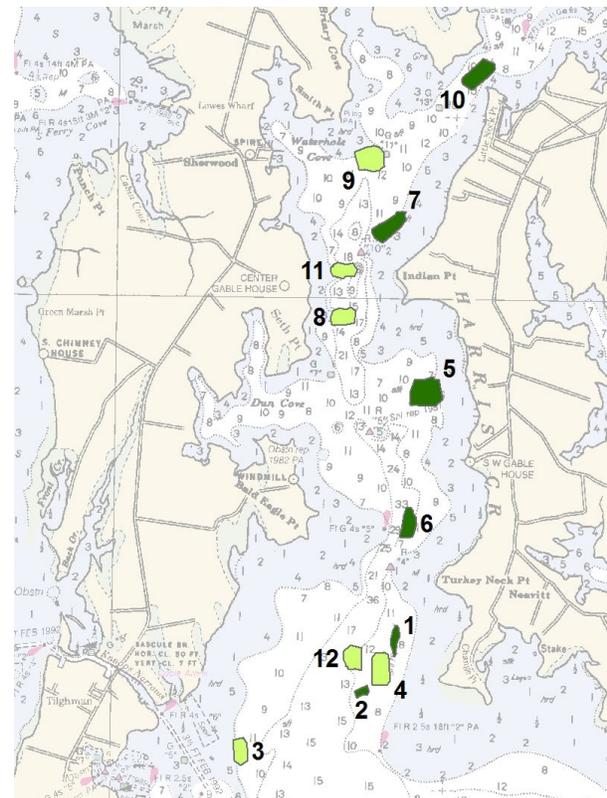
Two reefs (17%) met the threshold prior to restoration; zero reefs (0%) met the target density prior to restoration.



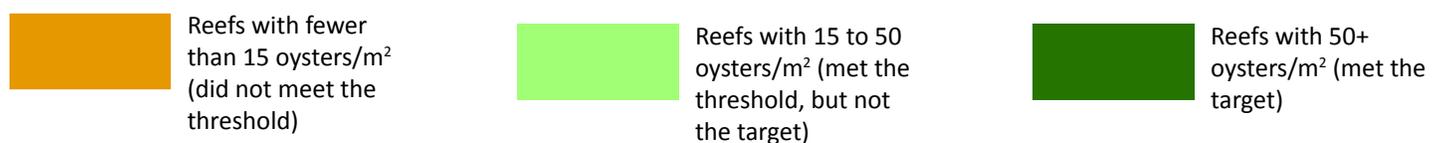
Map B

Postrestoration: Current oyster density

12 reefs (100%) met the oyster density threshold; 6 reefs (50%) met the target density.



Legend

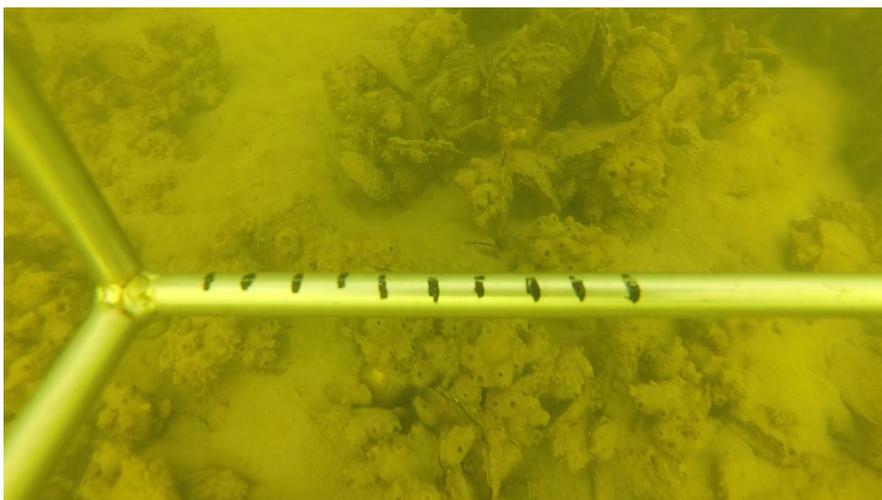
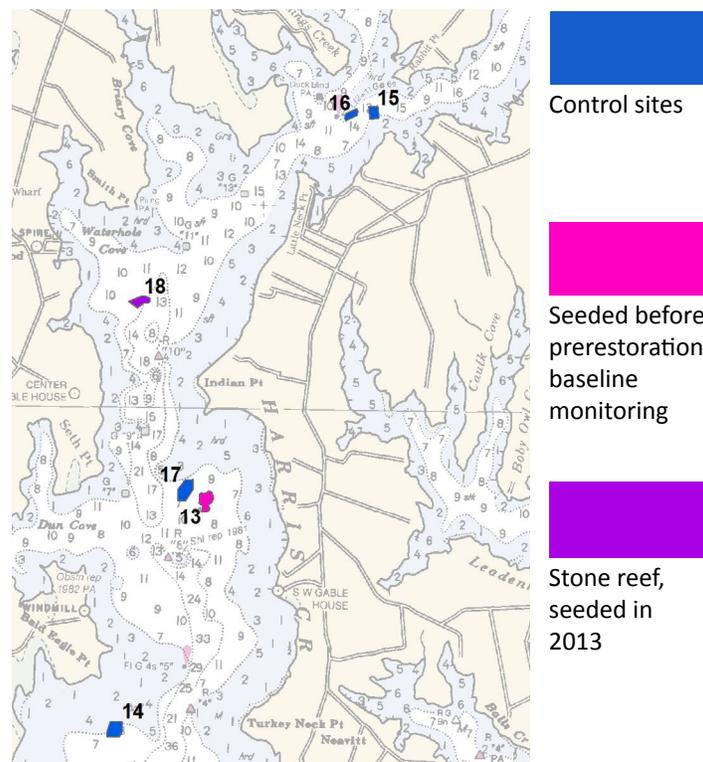


In addition to the first cohort of reefs, six other reefs were also monitored in fall 2015 (see Map C and Table 1).

- Reef #13 was seeded just before prerestoration baseline monitoring was done. Per baseline data, this site met the target density (due to recent seeding). 2015 data show this site currently meets the threshold, but not the target, density.
- Reefs #14-17 are control sites (they received no restoration treatment as a comparison). One of these reefs (#14) met the threshold prior to restoration; none met the target. As of 2015 monitoring, two of these reefs met the threshold (#14 and 15), and none met the target. These sites may have received natural spat set.
- Reef #18 was constructed of stone and seeded in 2013 (a year after the first cohort was seeded). Data show oyster density here in late 2015 was more than three times as high as at any other site monitored in Harris Creek. This was the only stone reef monitored in 2015.

Map C

Additional Sites Monitored in 2015 (Reefs #13-18)



Live oysters on reef #18 (stone substrate reef base, planted in 2013 with hatchery-produced oyster seed). NOAA staff captured this image in October 2015, using an underwater camera fastened to a metal frame. Marks on frame are 1 cm apart.

Table 1

Table 1 shows information about each reef, including average live oyster density. Although there is no set Oyster Metric for average density across the entire reef, these data are informative. For comparison, the average oyster density found on Harris Creek reefs prior to restoration was 2.97 oysters per square meter.

	Reef #	Restoration Treatment	Reef Area (acres)	Year Planted	Prerestoration: Did reef meet threshold density?*	Prerestoration: Did reef meet target density?*	Postrestoration: Did reef meet threshold density?	Postrestoration: Did reef meet target density?	Postrestoration: Average live oyster density across the entire reef (oysters per m ²)
First cohort of treated reefs	1	Substrate (shell) & Seed	3.37	2012	N	N	Y	Y	56
	2	Substrate (shell) & Seed	2.14	2012	N	N	Y	Y	48
	3	Seed Only	6.56	2012	N	N	Y	N	33
	4	Seed Only	11.24	2012	N	N	Y	N	39
	5	Seed Only	15.65	2012	N	N	Y	Y	47
	6	Seed Only	7.19	2011, 2013	Y	N	Y	Y	47
	7	Seed Only	10.95	2012	N	N	Y	Y	30
	8	Seed Only	7.34	2012	N	N	Y	N	24
	9	Seed Only	12.29	2012	N	N	Y	N	32
	10	Seed Only	10.88	2012	Y	N	Y	Y	58
	11	Seed Only	6.53	2012	N	N	Y	N	20
	12	Seed Only	7.83	2012	N	N	Y	N	17
Additional reefs monitored	13	Seed Only (see bullet)	3.4	2011	Y	Y	Y	N	33
	14	none (control site)	3.47	N/A	Y	N	Y	N	17
	15	none (control site)	1.85	N/A	N	N	Y	N	16
	16	none (control site)	1.39	N/A	N	N	N	N	6
	17	none (control site)	4.01	N/A	N	N	N	N	4
	18	Substrate (stone) & Seed	2.35	2013	N	N	Y	Y	172

*Prerestoration conditions were determined from representative patent-tong samples collected at each reef.

Future Monitoring Efforts

- The reef sites monitored in 2015 will be monitored again in 2018 for the six-year check-in.
- Other Harris Creek reefs received substrate and/or seeding in 2013, 2014, and 2015. Each of these sites will be monitored both three and six years after restoration.

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