

Title: Relief as a Component of Oyster Restoration

Background: Many references describe the substantial vertical relief that once characterized the oyster reefs in Chesapeake Bay and its tributaries. Often cited is the observation of a visitor in 1701 who said, “The abundance of oysters is incredible. There are whole banks of them so that the ships must avoid them...” Dr. William Brooks lamented the ongoing destruction of these reefs in his 1892 book “The Oyster,” and recently researchers have tried to reconstruct from old surveys what these reefs might have looked like (see slide #1). One assessment noted that reefs can influence sediment transport, flow patterns, benthic communities, energy regimes, nutrient cycling, biodiversity, and particle dispersion.

Given the rich documentation of high relief reefs in the Bay, it follows that restoring three-dimensionality should be central to oyster restoration. This was the recommendation of the 1999 Chesapeake Research Consortium report “Chesapeake Bay Oyster Restoration: Consensus of a Meeting of Scientific Experts” (slide #2), which included the following:

*Essential Components of Oyster Restoration Efforts*

- *Three-dimensional reefs, standing substantially above the bottom, are essential for oyster reproductive success, for predator protection and to create habitat for other organisms.*
- *Permanent reef sanctuaries permit the long term growth and protection of large oysters that provide increased fecundity and may lead to development of disease-resistant oysters.*
- *For success, both components, three-dimensional reefs as permanent sanctuaries, are necessary; neither component alone will be sufficient.*

The targeted tributary strategy adopted by state and federal partners pursuant to the President’s Executive Order has scaled up and focused oyster restoration like never before. In 2011 the Fisheries Goal Team tasked a workgroup with identifying a minimum suite of metrics that should be measured across all sanctuary reefs for the purpose of assessing progress toward the Executive Order oyster goal (<http://chesapeakebay.noaa.gov/fisheries-hot-topics/oyster-metrics-report-adopted>). These official metrics describe successful restoration in terms of oyster density, number of year classes present, and percentage coverage in the targeted tributary. There is no metric for relief.

While reef relief is not an official criteria for oyster restoration, various efforts going back decades have attempted to build 3-D reefs under the umbrella of “fishing reefs.” These efforts inherently recognize the importance of relief as fish habitat, but to date they have remained separate programs that for the most part are not conducted on natural oyster bars nor with the intent to proliferate oysters. In the last decade attempts have been made by CBF and others to combine oyster and relief restoration by utilizing concrete reef modules called “reef balls.” In most cases, reef balls are set with oyster spat before deployment on oyster restoration reef sites. Photographic documentation has shown apparently successful creation of oyster reef communities (slide #3), but to date little quantitative documentation of their impact has been gathered.

Update: On May 6<sup>th</sup> CBF organized a team of oyster scientists, marine surveyors and underwater videographers to evaluate reef balls that had been placed in Tangier Sound in 2001 by the Maryland Environmental Service. The reef balls had been placed on shell bottom within the Somerset Sanctuary without being set with spat, and the sanctuary was not planted with seed oysters. Tangier Sound, however, has the most regular natural spatset in Maryland waters.

The objective was to collect data on oysters growing naturally on the reef balls, on the bottom among the reef balls, and on the bottom away from the reef balls to evaluate the effect of the structures on oyster spatset, growth and survival. One reef ball was brought to the surface for examination on deck (slide #4), and the whole process was documented in video. The data collected is still being analyzed, but preliminary observations suggest that oysters were more abundant and present in more year classes on the reef balls. Furthermore, the reef ball was covered in a diverse mix of fouling organisms reminiscent of the 19<sup>th</sup> century natural reefs described by Brooks.

Another, more in-depth study is currently being planned in collaboration with the University of Maryland. The study would evaluate the 8-acre site at the Cook's Point Sanctuary in the Choptank River where 1200 spatset reef balls were placed by CBF and partners over a five-year period. The MD Artificial Reef Initiative under which this work was conducted has tentatively pledged some support for the project, and other sources of funding are being sought.

Fisheries GIT Feedback: The intent of this update is to inform the Fisheries GIT about this work, stimulate discussion about the role of relief in oyster restoration, and elicit any action or recommendations the GIT may feel is appropriate.