CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

FACT SHEET

January 2016

CBF PUBLIC POLICY POSITION ON THE USE OF OYSTERS TO COMPLY WITH THE BAY TMDL

The Chesapeake Bay Foundation (CBF) believes there is a narrow opportunity to use aquacultured oysters to comply with the Bay Total Maximum Daily Load (TMDL). The narrow application is due to the limitations of the science and associated uncertainties with pollutant removal; the limited experience with nutrient trading, even with "traditional" nonpoint source best management practices (BMPs); and the fact that localities have not yet fully exploited existing pollution reduction tools and approaches. At this time, CBF is opposed to the use of oysters for Clean Water Act permit compliance. CBF also opposes the use of oysters for TMDL compliance except under limited oyster aquaculture scenarios. CBF believes the constraints listed below can help guide the discussion on the use of aquacultured oysters to achieve non-permitted reductions for the TMDL.

Background

The pollution removal capacity of the native Chesapeake Bay oyster (*Crassostrea virginica*) is widely acknowledged. There are two mechanisms by which oysters can remove nutrients from tidal areas and both involve the indirect removal of nutrients. In the first case, oysters indirectly remove nitrogen and phosphorus by consuming particulate organic matter and phytoplankton (algae) from the water column. Then, some of these nutrients are incorporated into the tissues and shells of oysters. When oysters are harvested, the nutrients are permanently removed from the system.

In the second case, some of the nutrients are deposited by the oysters on the surface of sediments in the form of feces and pseudofeces. Under the right conditions, the nitrogen in these biodeposits can be transformed through a series of microbial-mediated processes known as nitrification and denitrification into nitrogen gas which diffuses out of the sediments and back to the atmosphere where it is no longer available for phytoplankton growth.[1] Regardless of the specific pathways involved, the capacity of restored oyster reefs to alter nitrogen cycles and enhance denitrification rates is potentially one of the most valuable services these ecosystems can provide.[2] [3] However, there is a considerable amount of variability in denitrification rate and the factors affecting this variability are not well understood.[4]

Chesapeake Bay Foundation Policy Recommendations:

The use of oysters in lieu of land-based controls should be confined to aquaculture oysters and the nutrient reduction benefits limited to removal rates due to incorporation of N and P into oyster biomass.
At present, survival, viability and recruitment on oyster reefs is highly variable and the risk of failure is correspondingly high. On the other hand, survival and nutrient uptake of aquaculture oysters is fairly easy to monitor and quantify. Similarly, uptake of N and P by oysters into their body tissue can be easily measured and quantified.

The use of oysters in lieu of land-based controls should be limited to helping achieve the load allocations of the Bay TMDLs.
CBF does not currently support the use of oysters to achieve the waste load allocations of the TMDL (i.e., in lieu of reductions from permitted sources) or to offset loads from new development.

The use of oysters in lieu of land-based controls should be limited to within the same impaired segment.
As noted above, one of the main technical hurdles of using oysters is that they are only indirectly removing nutrients from the aquatic system. Hence, it will be challenging to ensure that any ensuing ecological effects (algae blooms, dead zones) will be adequately mitigated by oysters, particularly if they are not in the same geographic location.

The explicit demonstration that the use of oysters in lieu of land-based controls will not contribute to a violation of water quality standards. Oysters remove nitrogen and phosphorus, but only after these pollutants have entered surface waters *and* been incorporated into phytoplankton. Thus, it will be challenging to ensure that any ensuing ecological effects (algae blooms, dead zones) will be adequately mitigated by oysters, particularly if they are not in the same geographic location.

Pollution reduction projects associated with aquaculture oysters must demonstrate they are "additional to" projects that are already in existence. For example, aquaculture projects that are currently in existence would not be eligible to be counted toward achieving the load allocation because there is no additional pollution reduction benefit associated with the practice. However, if that existing operation expanded, that would be acceptable.

For more information or questions, contact Chris Moore, Virginia Senior Scientist at 757/622-1964 or Beth L. McGee, Ph.D., Senior Regional Water Quality Scientist at 410/268-8816.

---

[1] Newell, R.I.E., T.R. Fisher, R.R. Holyoke, and J.C. Cornwell. 2005. Influence of eastern oysters on nitrogen and phosphorus regeneration in Chesapeake Bay, USA. p. 93–120. *In* R. Dame and S. Olenin (ed.) The comparative roles of suspension feeders in ecosystems. Vol. 47, NATO Science Series IV: Earth and Environmental Sciences. Springer, The Netherlands.
[2] Newell, R.I.E. 2004. Ecosystem influences of natural and cultivated populations of suspension-feeding bivalve molluscs: A review. J. Shellfish Res. 23:51–61.
[3] Kellogg, M.L., J.C. Cornwell, M.S. Owens, and K.T. Paynter, K.T. 2013. Denitrification and nutrient assimilation on a restored oyster reef. Marine Ecology Progress Series 480:1-19.
[4] Mark Luckenbach, Virginia Institute of Marine Science, Personal Communication, July 24, 2013 email to B. Goldsborough.