

The Recovery of Oysters
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Maryland established its Oyster Advisory Commission (OAC) in the latter half of 2007 in order to engage a wide range of interested people to consider strategies which could lead to the restoration of robust populations of native oysters in the Chesapeake Bay. The Commission was established at a time when hope for native oysters had virtually vanished and many in the region were advocating for the introduction of Asian oysters, in the expectation that they would provide a minimum base for continued oyster harvesting businesses. Many conservationists were calling for a moratorium on oystering, noting that such action had been central to restoration of rockfish several decades earlier.

The OAC was only the latest in a long series of commissions and other studies going back nearly one hundred years that examined the plight of native oysters in Chesapeake Bay. This staggering nature of the decline was buttressed by the fact that harvests in the late eighteen hundreds were reputed to have been well in excess of ten million bushels and by the latter part of the twentieth century had fallen to around 50,000 bushels annually---a steep and prolonged decline. But, the recommendations of most of these reviews were either ignored or proved inadequate to reverse the loss of oysters.

Thus, in 2007 at the direction of the General Assembly John Griffin, Secretary of the Maryland Department of Natural Resources, with the support of Governor Martin O'Malley appointed yet another special body to further consider actions to save and restore the native oyster. The OAC began its work in September, 2007. Initially it had twenty members including watermen, other representative of the oyster industry, academia, elected and other government officials, and the conservation community. It was chaired for its first four years by the author. At the time I was a Vice President of the World Wildlife Fund; during the nineteen eighties I had been a senior environmental official responsible for Maryland's environmental protection programs and had played a major role in the state's first efforts to grapple comprehensively with restoration of Chesapeake Bay.

In its first report, issued early in 2008, The Commission set forth the basic strands of the strategy for oysters in Maryland's Chesapeake Bay which it would develop in greater detail over the next two years culminating in its major recommendations made in early 2011. The strategy had three elements:

- Reestablish of a healthy wild populations of native oysters through the creation of extensive permanent sanctuaries;
- Energize the development of a robust and large oyster aquaculture industry through streamlining relevant laws and providing technical and other assistance;
- Establish procedures for the wild fishery so that it would be biologically and economically self-sufficient.

It is important to note that there was great relief in many quarters that the OAC had not recommended a moratorium on all oyster harvesting.

Now, in 2017 the second and third of these three elements are not the subject of significant controversy. However, the first, building strong populations of native oysters through sanctuaries, has proven difficult to keep in place in the face of continued opposition from many watermen.

In order to provide more specificity to the general sanctuary objective, the OAC made detailed recommendations in subsequent Reports. It said that 25 % of the most productive oyster habitat should be set aside by DNR in sanctuaries that would be permanently closed to harvesting. It also said that these sanctuaries should be large and spread across the full range of potentially productive oyster bottom in the entire Bay. This OAC recommendation was accepted for implementation by the DNR and also was the basis for an oyster management plan for the whole Bay that was adopted through the Chesapeake Bay Program. In Maryland, initial areas identified for protection as sanctuaries included Harris Creek and Tred Avon River, tributaries to the Choptank River, and the Little Choptank River. Work was completed in 2015 in Harris Creek and resulted in 350 acres of newly improved bottom structure for the establishment of oyster communities. Work has slowed in the Tred Avon and Little Choptank as the Hogan Administration has weakened its support for sanctuaries.

If the current interest in abandoning large scale sanctuaries is to be overcome it is important to understand the rationale that the OAC unanimously agreed to in supporting a strong sanctuary effort in Maryland. And, to understand the rationale behind sanctuaries it is instructive to review the reasons for the extraordinary decline in oyster populations in Chesapeake Bay. Precision on this latter point is impossible because there is essentially no clear and simple agreement in the scientific community as to the cause or causes of the precipitous decline in Bay oyster populations over the last century. Remarkably, this lack of consensus exists even though the oyster is one of the most studied marine organisms in the world, including by pre-eminent scientists at the nation's first marine biologic laboratory established at Solomon's Island in 1927. So rather than review yet again the scientific data (most recently done in an Army Corps of Engineers EIS on the introduction of non-Native oysters to Chesapeake Bay completed during the first several years of the OAC) ,let's review some history and think logically about this animal, as the OAC did. It is out of this logical review that the idea of large sanctuaries evolved.

It is indisputable that the oyster has been the victim of a wide range of abuses. The first has to do with its preferred habitat structure. When Captain John Smith and his immediate successors first visited the Bay one of the remarkable features they observed were the many and large oyster reefs throughout the Bay. These were remarkable structures created by generations of oysters over thousands of years, often reaching above water level at low tide. Given their permanence and complexity they provided habitat to many other Bay species much as coral reefs do in tropical waters. Among the most notable of these is the rockfish, so called because of its close association with oyster "rocks." In the interest of safeguarding navigation and harvesting oysters, these reef structures have been completely destroyed and the unique master habitat builder of the bay has been forced to live a lowly life in the bottom sediments of the Bay, far removed from the enriching flows of current and nutrients of all the Bay's waters.

Having been forced to live solely in the alien environment of the Bay's bottom, the oyster was then subjected to unrelenting efforts by watermen to capture as many as possible for the market. They were

enabled in this pursuit by poor government management. The result was that by the latter part of the eighteenth century oyster harvests in Maryland's portion of the Bay were estimated to be on the order of fifteen million bushels a year. Oysters could not withstand this onslaught and by early in the Twentieth Century harvests had declined to a level of three or four million bushels a year. Meanwhile, the first of many studies had concluded: "We have wasted our inheritance by improvidence and mismanagement and blind confidence..." (W. K. Brooks, *The Oyster*, 1891).

As a result at the start of the twenty-first century, oysters were relegated to living in an inhospitable environment in the Bay's bottom and were subject to severe harvesting pressures meaning that virtually all oysters were taken once they reached market size. Consequently the genetic pool of oysters in the Bay was becoming smaller and smaller and more homogeneous. The biologic diversity within the species across the Bay was impoverished.

At the same time, another assault was about to be launched against the now highly enfeebled species and that was contamination of the Chesapeake Bay waters with a wide range of pollutants. Industrialization without effluent clean-up, modern agriculture without controls for fertilizers and pesticides, and suburban development without controls of runoff and widespread use of household chemicals all combined to further degrade the quality of the water that flowed through the organism.

It is hard to imagine a strategy more perfectly designed to exterminate a species. First, destroy its natural habitat. Then kill virtually all members of the population as, or shortly after, they reach sexual maturity. Finally, introduce a range of new chemical and toxic materials into the very water that is "breathed" by every individual. The result could only be a population able to survive in limited quantities barely sufficient to support a dying oyster fishery. By the nineteen-seventies even that survival came more and more to depend upon government support in the form of artificial breeding programs (hatcheries) and human maintenance of oyster beds.

But, further blows were to come in the form of foreign diseases. Probably through the discharge of ballast water by ships from Asia, two new organisms were introduced to the Bay which proved to be highly efficient at causing the deaths of oysters. While species of Asian oysters had over many generations presumably developed resistance to these diseases, the weakened Bay oyster had no opportunity to do so and rapidly succumbed in ever larger numbers to their ravages. By the first decade of the twenty-first century oyster harvest in Maryland had plunged to less than 30,000 bushels a year. Disease was the final blow resulting in fears that the native oyster might disappear, certainly commercially if not biologically, and even that, if a few survived, they would no longer be important components of the Bays' ecology.

As noted at the start of this piece, this decline gave rise to a number of thoughtful efforts to develop strategies to rescue the native oyster, but, none yielded successful results at any significant scale. The industry was ready to give up on the native oyster and shift to building a new fishery on Asian species which could, presumably, withstand the impacts of disease.

The creation of the OAC was a last ditch effort to save the native oyster and large scale sanctuaries became the key ingredient for achieving that objective. At the inception of the OAC there was much talk

of a total harvest moratorium, as had been very successfully done for Rockfish in the nineteen-eighties. It was not clear to me that the parallels between the causes of decline in the two fisheries were sufficiently strong to justify a moratorium. The proximate cause of Rockfish decline was clearly due to overharvesting of fish of reproductive age, thereby reducing the recruitment of young fish into the population. Oysters were subject to a more complex and longer period of destructive impacts but the proximate problem was disease. To save oysters one needed to enable them to develop a natural capacity to resist the disease.

An animal is likely to have the maximum capability to develop genetically-based resistance to disease if certain conditions are met. First, it must be able to live in the most hospitable environment possible so that individuals in the population thrive physically. For the oyster this means providing opportunities for re-establishment of the historic reef structures . This can only be done in the absence of harvesting and requires a long time frame for protection.

Second, the animals must be allowed to live out their full life expectancy, especially when faced with the predation of disease. Those animals that live long lives in the face of disease are likely to do so as a function of genetic and other factors disposing them to resistance. Those positive characteristics must be allowed to be reproduced as extensively as possible from generation to generation in order to begin to build a population of oysters in the Bay capable of resisting disease. Harvesting young healthy animals cuts off the flow of future healthy generations of oysters.

Sanctuaries need to be distributed throughout the Bay. This distribution will assure that as weather and other environmental conditions change from time to time and impose transient stress on particular sanctuaries, others not subject to the stress can help carry the whole system through such periods of local stress, especially as regards the reproductive processes. Also, the distribution of sanctuaries across the Bay means that larval dispersal from successful reproduction at sanctuaries will benefit adjacent non-sanctuary oyster habitat. The sanctuaries can become a natural seed source beyond their boundaries.

Finally, sanctuaries need to be large. Unfortunately, the history in Chesapeake Bay regarding small sanctuaries is that they will be illegally harvested. This has proven true time and again. Only large areas encompassing an entire water body such as Harris Creek or the Little Choptank are at a scale that allows relatively efficient law enforcement. An illegal harvester can easily and quickly skip across the line of a ten acre sanctuary. It is impossible to do that if an entire creek is made a sanctuary. Large size is also essential if the full range of potential benefits that sanctuaries are likely to offer is to be maximized and therefore justify the significant investment that is required to re-establish naturally thriving oyster populations.

The Maryland Oyster Sanctuary Plan envisages only covering 25 % of good oyster habitat. That leaves 75 % for traditional oyster practices. The sanctuaries are the only logical way to assure native oysters are eventually able to resist disease and again play an important role in the ecological life of the Bay. They will also significantly improve the probable success of thriving oyster populations outside of sanctuaries. To abandon this vision for the contribution of sanctuaries in Maryland is to abandon the native oyster.

