

**REPORT AND
RECOMMENDATIONS
OF THE
BLUE RIBBON OYSTER PANEL**



MAY, 2007

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On June 14, 2006 Secretary of Natural Resources, L. Preston Bryant, Jr. and then-Commissioner of Marine Resources, William A. Pruitt, convened a study group known as the Blue Ribbon Oyster Panel. The Panel met on eight occasions, from June 2006, through May 2007, for the purpose of reviewing the strategies and expenditures of the Marine Resources Commission pertaining to native oyster restoration. The Panel was encouraged to identify new and innovative uses of the Commission's oyster restoration funds that might significantly advance efforts to ecologically restore the resource and also achieve economic stability of the industry. The Panel's recommendations are contained in this report.

The Blue Ribbon Panel consisted of the following members:

Honorable L. Preston Bryant, Jr., Secretary of Natural Resources
Honorable Steven G. Bowman, Commissioner of Marine Resources
Honorable Linwood Holton, former Governor of Virginia
Susan Bulbulkaya, Chesapeake Bay Commission
Eldridge N. Cook, Cook's Oyster Company
S. Lake Cowart, Jr., Cowart Seafood
Jeff Crockett, Tangier Watermen's Association
Thomas Hazelwood, Hazelwood Oyster Farms, Inc.
Paula Jasinski, NOAA Chesapeake Bay Office
Douglas F. Jenkins, Sr., Twin Rivers Watermen's Association
Robert Johnson, Johnson and Sons Seafood
Tommy Kellum, Kellum Seafood Company
Tommy Leggett, Chesapeake Bay Foundation
Michael L. Lipford, The Nature Conservancy
Dr. Mark Luckenbach, Virginia Institute of Marine Science
Dr. Roger Mann, Virginia Institute of Marine Science
Mark Mansfield, Army Corps of Engineers
Tommy Mason, Mason Seafood
Margaret Ransone, Bevans Oyster Company
Richard B. Robins, Jr., Associate Member, Marine Resources Commission

The format chosen for the Blue Ribbon Oyster Panel brought together individuals of varied interests and experience. Members were chosen for the range of their experiences and perspectives, as well as their ability to discuss complex issues in an open format. It was anticipated that members would come to the table with a broad range of suggestions and with an interest in problem solving. Meetings were conducted with a focus on consensus building, with members engaging in wide-ranging and frank discussions about solutions that would be beneficial to all concerned. Most of the recommendations of the Panel were supported unanimously.

The native oyster *Crassostrea virginica* is a keystone species in the Chesapeake Bay and the seaside lagoons of the Eastern Shore. It has sustained our economy, our culture, and the ecology of both ecosystems for centuries. Oysters have declined dramatically since the 1800s, and current estimates place the Chesapeake's native oyster population as low as one percent of its historic level. Largely lost are the critical filtering, fish habitat and fishery functions once provided by this resource.

The Blue Ribbon Panel has been tasked with advising the Marine Resources Commission on how it should spend the Commonwealth's financial resources to best counter this loss. Although the purpose of this panel was to focus explicitly on recommendations with regard to the native oyster, the introduction of a non-native oyster is currently being explored through a federally sponsored comprehensive oyster restoration Environmental Impact Statement (EIS). The Panel recognizes the importance of this EIS and the science that will form the basis of its assessments. Since many of the alternatives being considered in the EIS concern options for native oyster restoration, the Blue Ribbon panel recommends it reconvene after the EIS recommendations are made, to integrate those findings into its report and to implement "actionable" strategies to restore and sustain the oyster population in the Bay. Regardless of the outcome of the EIS, the Panel believes a significant opportunity exists to make progress with the native oyster, if a long-term commitment is made.

While the panel recognizes that harvesting has played a significant role in the decline of the public oyster resource, since the mid-1800's, it is the consensus of the Panel that oyster disease (MSX and Dermo) is currently the most significant limiting factor affecting ecological restoration of the resource and economic stability of the industry. Oyster diseases are now present within almost all areas of current and potential oyster habitat in Virginia. The diseases alter the age structure of the oyster populations, eliminate many of the older animals that would otherwise contribute to the spawning stock, and have forced industry to more intensive and expensive aquaculture methods and technologies. Likewise, the cownose rays are also a significant impediment to oyster restoration. Although not found in all oyster habitat, predation by the ray constitutes a major threat to both restoration efforts and industry investments. Finally, the Panel recognizes the need for a long-term, dedicated source of funding, for water quality improvements, for the Chesapeake Bay. While the Panel did not engage in extensive debate on water quality issues, it acknowledged that any degradation of water quality has the potential to undermine all oyster restoration efforts. A long-term commitment, therefore, must address funding for sewage treatment plant upgrades, storm water management, agricultural runoff, and atmospheric deposition.

The Panel believes our native oyster restoration will take significant time, resources and continuity of effort to achieve success in both ecological and economic terms. Given the realities of funding and time commitments to achieve large scale success, this report provides near-term recommendations that strive to maintain the continuity of effort while expanding scale wherever possible. These recommendations

address the immediate economic needs of the industry, as well as place greater emphasis on efforts to restore the critical ecological functions that the native oyster provides.

Four over-arching issues must be addressed to realize improvements in native oyster populations and move us toward meeting ecological and economic goals: 1) increased oyster production for both population growth and harvest, 2) improved and expanded oyster habitat and substrate, 3) establishment of a harvest policy that is based on sustainability of the fishery, and 4) improved water quality.

A summary of the proposed funding recommendations is attached at the end of this report.

Specific Recommendations

The following specific recommendations are intended to address the issues, above, that were the main focus of the Panel's discussions. The Panel's recommendations are based upon decades of scientific study, as well as generations of practical "in-the-field" experience. Since some of the suggested approaches are based on scientific theory and practical experience, the panel further recommends reconvening, for a review of the results of these recommendations, three years after their implementation. At that time, the Panel will consider the expansion of public investment in the successful methodologies.

- **Increase State Funding for VMRC's Oyster Restoration Effort to \$2.5 Million Per Year.** Native oyster restoration must be viewed as a long term endeavor achieved through incremental successes guided by a strong, scientifically sound, strategic plan. Whether for economic or ecological benefit, the existing state budget of approximately \$1.2 million is not sufficient to attain long-term, large scale restoration goals. Additional state general funding is needed for continued shell replenishment, new sanctuary reef construction, expanded native oyster aquaculture, including aquaculture training, expansion of a hatchery-based "put and take" fishery, and cownose ray investigations. The state should continue to seek federal funds for restoration, as a supplement to state general funds, not as a replacement for those funds. Virginia should also take full advantage of opportunities to leverage additional funds to further bolster state efforts.
- **Enhance VMRC's Efforts to Restore the Oyster Fishery.** The following actions are recommended to provide increased oyster production and habitat, for various sectors of the commercial fishery:
 - 1) Expand spat-on-shell production.

Hatchery seed oysters (spat-on-shell) raised from disease tolerant broodstock present a potential solution to oyster disease losses, cownose ray predation and can minimize grow-out time, when production is intended for commercial harvest. Spat-on-shell seed oysters are the only

viable alternative to wild seed transplants. The impacts from the loss of wild oyster seed transplants, based upon the recommendations contained in 5), found below, may be mitigated through the expansion of spat-on-shell oyster production. In 2007, the Commission used approximately \$700,000 in federal funds to plant 15,000 bushels of spat-on-shell, in both harvest and sanctuary areas. Unfortunately, these federal funds will not be available in 2008. Therefore, the Panel recommends an expenditure of \$600,000 of, state general funds, for spat-on-shell production. Such funding will procure approximately 24,000 bushels of seed oysters (6,000 spat per bushel).

2) Support expansion of private hatchery capacity in Virginia.

Greater hatchery capacity is critical to the expansion of oyster production, whether for fishery or ecological purposes. The VMRC, with NOAA funding, currently provides financial incentives to hatcheries, for the production of eyed-oyster larvae, that, in turn, are used for spat-on-shell production. Further expansion of this concept is needed to meet the spat-on-shell needs, for both the commercial harvest and ecological restoration programs. The Commission should continue to investigate and develop new mechanisms to encourage increased hatchery capacity to meet the needs of both restoration efforts and private oyster growers. The panel believes the proper levels of hatchery capacity can ultimately be achieved through the private sector.

When spat-on-shell are used to support public fisheries, the goal should be to produce an economic return from the harvested product that is greater than the cost to produce the spat-on-shell. Therefore, as many efficiencies as possible, in the production of spat-on-shell, should be encouraged.

3) Enhance the Role of Aquaculture to support economic goals.

Aquaculture will play an increasing role in revitalizing Virginia's oyster industry. Expanded hatchery capacity and aquaculture training programs should be critical components of this effort. The Commission's effort to train commercial fisherman in the methods of aquaculture have shown success and should be expanded. Engaging the traditional harvesters of oysters in aquaculture reduces their dependency on the wild stock and can provide them with a more consistent source of income. In 2007, the Commission trained 10 interested commercial fishermen in aquaculture techniques, at a total cost of \$50,000. The Panel recommends the training of at least 15 commercial fishermen, annually, for a projected cost of \$75,000.

The ongoing examination and development of disease tolerant strains of oysters should continue. Wild strains of the native oyster, currently exhibiting disease tolerance, should also be examined for use in

an expanded spat-or-shell program. The selection and maintenance of genetically superior oyster strains, for aquaculture, should be pursued at both public institutions (VIMS) and through the private sector. The work of the VIMS Aquaculture Genetics and Breeding Technology Center (ABC), has been particularly successful, in developing disease tolerant strains of oysters for aquaculture. Virginia should ensure this research center continues by providing a consistently sufficient level of funding its program. Approximately \$410,000 and 5.5 FTE are needed annually to sustain this important program.

As the role of aquaculture expands, within the Commonwealth, conflicts with waterfront property owners and other users of the water are inevitable. To alleviate the conflicts, the Commission should explore the establishment of “aquaculture zones”, for open, but controlled, access for intensive aquaculture.

To assist with the training, and “trouble-shooting” that will come with a developing and expanding aquaculture industry, the Panel recommends an “extension agent” position be funded. Such a position could be part of the Virginia Institute of Marine Science’s outreach program or the Virginia Tech extension centers. VIMS Marine Advisory Program routinely conducts various educational/training events, including the annual Shellfish Culture Forum, special topics seminars, and short courses. A 3-day intensive course is currently available for non-commercial oyster gardeners. A similar program could easily be developed at VIMS for commercial oyster culture training. Likewise, the Virginia Tech Food and Science Department has a long and successful history of providing valuable assistance to the oyster industry, concerning food safety and post-harvest treatment processes, as well as consumer education. Its network of extension centers is ideal for improved outreach, for aquaculture training and education. The Panel recommends funding of up to \$75,000 annually, for the extension agent position.

- 4) Continue shell planting to increase habitat and maintain public oyster grounds.

The maintenance of natural reefs with available oyster packing house shell must continue. The Panel recommends continued efforts in this activity, as well as further testing of the use of alternative substrates, such as concrete or granite, as proposed by the Corps of Engineers. However, broad scale and indiscriminant application of shells over large areas should be avoided. Because of the impacts of disease, sedimentation, and natural shell degradation, shell plantings should be focused on the best oyster grounds and target areas known to receive more consistent spatsets. Production from these shelled areas should be monitored and not replanted, barring catastrophic loss from weather events, if the return on investment is less than a 1:1 ratio. The Panel

proposes a continuing expenditure of \$800,000 for this effort, one-half of which should be used for the maintenance of rotational harvest areas, described later in this report, and one-half for the construction of permanent oyster sanctuaries. Due to the anticipated loss of federal funds, the status quo expenditure of \$800,000 actually requires an increase of \$100,000 in state funds. The location of these new sanctuaries should be optimized with regard to critical factors, such as larval transport, lack of subsidence, and high water quality, to ensure the greatest chance of restoration success. This level of funding will provide for the maintenance of 250 - 400 acres of harvest areas (plantings of 1,000 – 2,000 bushels per acre) and restoration of 50 – 100 acres of sanctuary (plantings of 5,000 – 10,000 bushels/acre).

5) Reduce or eliminate the transplantation of diseased seed.

The movement of wild, native oyster seed is extremely risky because of disease and cownose ray predation. Based upon the advice of oyster pathologists from the Virginia Institute of Marine Science, the Panel concurs that James River seed is the most susceptible to oyster disease and ray predation and, should not be moved to other locations. Further, any oyster seed that is infected with disease should not be moved into areas of lower disease incidence.

Like shell planting, the cost/benefit of each seed transplant should be monitored to ensure adherence to a 1:1 return on investment ratio. The Panel recommends reducing wild seed transplanting expenditures from \$250,000 to \$150,000 in 2008. These funds would procure about 12 - 15,000 bushels of seed oysters from sources other than the James River.

- **Development and Implementation of a New Management Strategy for Oyster Harvest and Restoration Activities.** The Commission, VIMS, and stakeholders should develop management plans, for each major river system, Bay region, and seaside coastal embayment, that describe objectives related to traditional harvests, put-and-take fishery harvests, sanctuary designation, and other ecological objectives. Using the best available science, management “triggers” should be established to determine when and how harvest occurs. Hydrodynamic modeling, when possible, should be used for siting harvest and sanctuary areas, to maximize natural recruitment opportunities.

The Panel strongly endorses the above concept and its immediate application to the Rappahannock River, as recommended by the Oyster Heritage Program and more specifically as described below:

- 1) Implement a strategy to rotate harvest areas, consistent with the localized survival of oysters, in order to maximize harvest yield. In high salinity, disease-prone areas, rotation should occur on a 2 - 4 year

time-frame, to maximize harvest prior to loss by disease and maintain the sequence of growth from spat to market size. Annual stock assessments should guide replenishment activities, within each rotational area, to target those areas consistently meeting the 1:1 return on investment ratio or to supplement areas experiencing natural recruitment failure. In addition to the obvious biological benefits, rotation of harvest areas also allows for the advance notice to industry of the potential harvest quantities.

- 2) Using the best available models for larval dispersal, designate large sanctuaries within each rotational harvest area. Long term sanctuaries allow for natural selection and serve as the nuclei for spawning and spat set for the adjacent harvest areas. Sanctuaries should be further defined, by regulation, as areas preserved in perpetuity, where no commercial or recreational harvest can ever occur. The establishment of any sanctuary should be biologically defensible, as to its location, size, larval dispersal potential, historical recruitment success and other appropriate criteria.

Sanctuaries, particularly three-dimensional reefs, contribute to oyster population growth and fisheries production, through the provision of habitat and food. Living reefs simultaneously provide protection from predators, enhance water quality and other essential ecological functions. Sanctuaries should be adequately large to provide broodstock and sufficient recruits, to enhance peripheral non-sanctuary harvest areas. Reefs may be constructed of alternative materials such as concrete structures. Concrete structures offer additional habitat for oyster settlement but also deter illegal harvests within valuable sanctuaries. The Panel further recommends the use of up to \$400,000 for the placement of concrete structures, within specified sanctuaries, for these purposes. The Commission should make use of donated “materials of opportunity”, such as discarded concrete pipe, to reduce the cost of this recommendation. Any funds saved from such an effort should be used on higher priorities.

- 3) Implement a maximum size limit on oysters within the rotational areas. Require the collection of these largest oysters during the harvesting process and require their placement within designated sanctuaries.

VIMS research has shown that some older oysters are surviving and may be developing disease tolerances, through natural selection, that may be passed on to subsequent generations. Restoration of the native oyster, in some areas, may occur over the long term through this process of natural selection. But, natural selection will only occur, if the largest oysters exhibiting disease resistance, are protected from

harvest and are further concentrated on closed sanctuaries, to improve the probabilities of spawning success. Continued monitoring to identify the location of these disease-tolerant animals and to provide for their protection is also recommended.

- 4) Simultaneously, open all harvest seasons in the Commonwealth to avoid overcrowding and excessive effort within the relatively small, local rotational harvest areas. If necessary, consider the establishment of a control date and limited entry to reduce excessive effort in the fishery and to protect those watermen who are historically invested in the fishery. The control date establishes the deadline for eligible fishery participants and excludes, or limits, those entering the fishery after that date.
- 5) Establish harvest season dates, once per year, avoiding season extensions and expansion of the fishery into additional areas.
- 6) Low salinity areas, like the upper Rappahannock River, should be designated for a put-and-take fishery and may be rotated, based on the growth rate of the oysters within the area. Rotation schedules may be of a longer time period than those set for higher salinity areas, to account for slower growth rates. The areas may be supplemented with wild seed or spat-on-shell. Harvests within the put-and-take areas should be targeted and controlled. Harvest times may differ from “normal” seasons in order to maximize returns on investment.

As soon as practicable, and based upon the best available science, the new strategy of rotational harvest areas and sanctuaries should be applied to systems beyond the Rappahannock River. The Potomac River tributaries, Tangier and Pocomoke Sounds, and the lower James River should also receive priority consideration for implementation of this management concept. Monitoring and research, necessary for the design of the harvest and sanctuary areas, should begin in these areas, as soon as possible, to avoid delays in implementation.

- **Enforcement of Virginia’s Oyster Restoration Plan.** Strong enforcement of fishery regulations and substantial patrolling of Virginia’s sanctuaries and harvest areas are critical elements necessary for successful oyster restoration. Average fines levied for violations of most harvest rules provide little deterrent to those intent on violating the rules. Further deterrence, in the form of license revocation, is necessary. Accordingly, the Panel recommends the Commission make liberal use of its authority to revoke fishing licenses for up to two years (Section 28.2-232, Code of Virginia).

The Panel further proposes that the Commission revoke the license of any person convicted of any one of the following violations:

1. Harvest of oysters from closed areas or sanctuaries.
2. Harvest of oysters from public grounds out of season.
3. Harvest of broodstock oysters, exceeding a maximum size limit.
4. Tampering with aquaculture or experimental equipment.
5. Larceny from aquaculture equipment or private shellfish grounds.
6. Violation of consumer health protection regulations.

The length of the license revocation should increase significantly with multiple violations.

While the manpower and equipment necessary for the proper enforcement of conservation and human health protection regulations are believed to be adequate at this time, the Panel expresses its concern that these resources be expanded, as necessary, to ensure an optimum level of enforcement. Implementation of the rotational harvest areas, previously described, will undoubtedly place additional burden on law enforcement resources.

- **Improve Understanding of Management Options for the Cownose Ray.** Cownose rays are an increasing problem for both ecological and economic restoration of the native oyster. The Panel supports the establishment of a responsible and sustainable fishery on the cownose ray as a means of limiting its impacts on the oyster resource. It encourages monetary incentives, totaling at least \$300,000 (2007 funding was \$200,000), to industry participants willing to invest in the infrastructure necessary for fishery and market development. It supports funding for those additional efforts of the Marine Products Board (\$75,000), to develop domestic and export markets for cownose ray products. And, it recommends investment in the collection of biological information and monitoring that should be used to determine the most appropriate management actions for this species. Additionally, the Panel supports research efforts that might provide methods that would reduce the ray's ability to feed on oysters or deter the rays from harvest or restoration areas. Funding of at least \$100,000, annually, is needed to support all of these biological investigations.
- **Focus Ecological Restoration.** With limited funding and the need to address restoration at an appropriately large scale, to be successful state-wide, it is likely that we can only be effective in a few waterways over the next five to 10 years. The Panel recommends that the following areas of current focus remain as the targets for continued near-term investment in oyster restoration because of the recent local progress made: Eastern Shore seaside coastal bays; the Lynnhaven River; the Great Wicomico River; and, the Piankatank River. The Panel recommends the Commission establish ecologically-relevant, measurable goals, for each of these systems, for the upcoming three years, and develop implementation plans accordingly.

- **Finance Water Quality Improvements.** As the commercial oyster industry and restoration efforts rely more heavily on hatchery based production, the need for good water quality will become even more important to the success of both. Hatcheries in MD and VA's Chesapeake Bay have experienced production problems as a result of poor water quality, suspected to stem from algal blooms resulting from excess nitrogen pollution. The panel strongly endorses the need for a long term dedicated funding source for water quality improvements in the Chesapeake Bay. A long term commitment must address sources of nitrogen pollution from sewage treatment plants, storm water and agricultural runoff, and atmospheric deposition.

OYSTER RESTORATION FUNDING

<u>ACTIVITY</u>	<u>2007</u>	<u>BROP RECOMMENDATION</u>
Total	0.8 M NOAA 1.2 M General Funds (GF)	2.5 M General Funds (GF)
Oyster Production		
Wild Seed	250 K GF	150 K GF
Spat on Shell	700 K NOAA	600 K GF
Aquaculture Training	50 K GF	150 K GF
Cow Nosed Ray	200 K GF	400 K GF
Oyster Habitat And substrate	200 K GF	400 K GF
Harvest Area (i.e., implement rotation harvest Areas)		
Sanctuary Area Expanded	100 K NOAA 500 K GF	400 K GF
Add structure to Inhibit harvest		400 K GF