

MARYLAND'S 10-POINT OYSTER RESTORATION PLAN

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5. Rehabilitate oyster bar habitat
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7. Increase hatchery production
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9. Increase citizen involvement
10. Integrate inmate labor



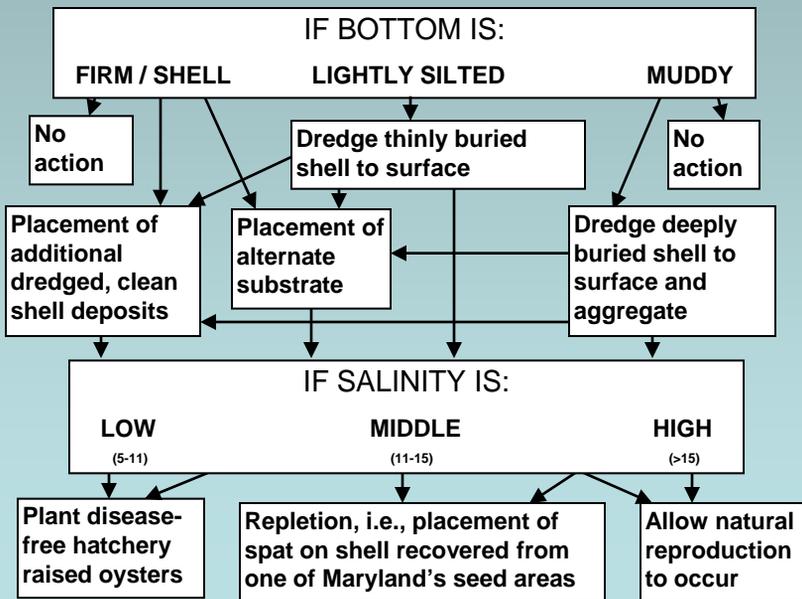
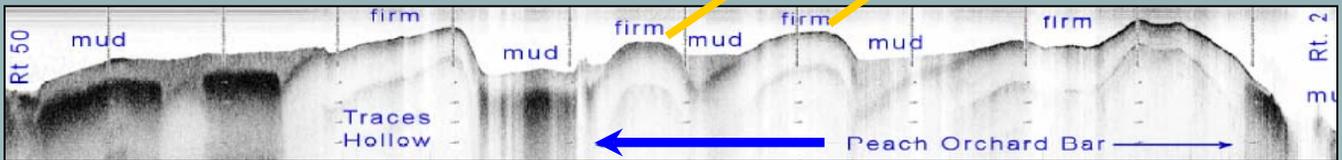
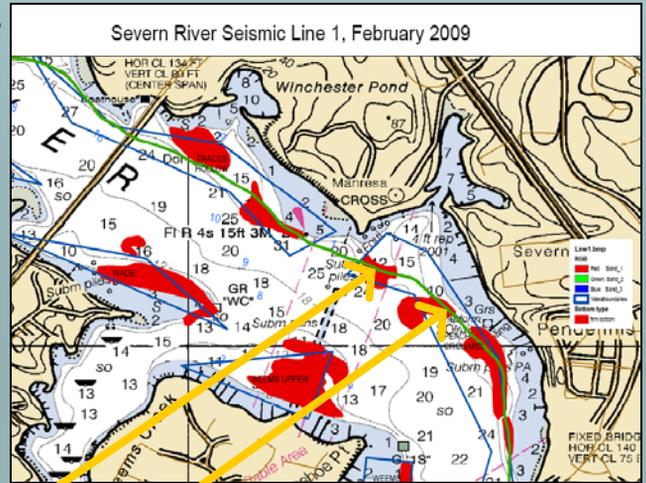
MARYLAND'S 10-POINT OYSTER RESTORATION PLAN

1. Focus on targeted restoration strategies

Maryland is implementing multiple strategies for native oyster restoration. We will set goals to maximize ecological benefits, facilitation population recovery and create positive outcomes for the commercial oyster fishery. We will target specific areas for each goal.

An Example from the Severn River

Side scan sonar technology was used to survey the bottom profile, of the river. The green line at right shows one of many tracks taken by the survey vessel. Data taken along that path is shown in cross-section below. The firm mounded areas with dark outlines correspond to the red shaded areas on the map to the right. These spots are indicative of current or historical oyster beds and shell present in the Severn.



We combine recent bottom survey data with historical oyster bar locations (blue polygons above) to help determine the best sites for rehabilitation (red shaded areas). Knowing the average salinity in a tributary allows us to select a restoration alternative that appropriately addresses disease and recruitment issues at each site. The flowchart at left is a simple, ecologically-based representation of the targeting process.

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2. Expand the sanctuary program

The Oyster Advisory Committee (OAC) recommended that DNR initiate a process to select and identify large sanctuaries in low, mid, and high salinity areas of the Chesapeake Bay.

Sanctuary vs. Reserve

Sanctuaries are areas permanently closed to shellfish harvest. They often contain oyster restoration projects to help enhance native oyster populations for their environmental benefits. Reserves are areas seeded with oysters, then later opened for harvest when certain criteria are met.

Other portions of Maryland's oyster harvesting waters may be periodically closed or prohibited due to contamination, or high potential for contamination, by fecal coliform bacteria.

Sanctuary Selection Strategy

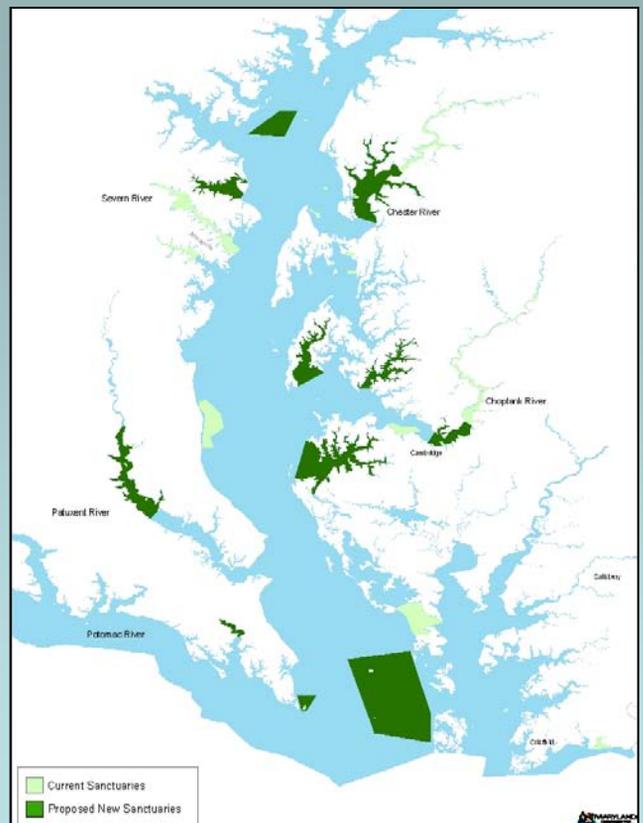
Maryland's oyster sanctuary areas, are targeted to:

- Increase disease resistance;
- Protect some of the Bay's most productive oyster grounds, as determined by an analysis of fall survey data compiled from 1996 to 2007;
- Increase the total area designated as oyster sanctuaries from 9% of habitat in 2009 to approximately 24% of remaining quality habitat in the Bay in 2010.

The proposed sanctuary expansion will still leave 167,720 acres of natural oyster bars for the wild oyster fishery.

Current Sanctuaries

In 2009, Maryland added three new oyster sanctuaries that more than doubled the area of protected bottom from 1475 to 2581 acres. These locations were the entire Severn River, Sandy Hill in the Choptank River, and Hooper Straight north of South Marsh Island. Yet the current sanctuary system is still comprised primarily of small, dispersed areas that protect only 9% of available oyster habitat.



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3. Support a more focused and scientifically managed wild oyster fishery

To achieve this goal, Maryland will strive to:

- Significantly reduce the amount of area open to commercial oyster fishery through the implementation of sanctuaries and harvest reserves.
- Establish a conservative, bay-wide fishing limit as we have done for other managed species like blue crabs and striped bass.
- Establish an annual quota based upon the bay-wide limit.
- Monitor and promptly close the fishery upon quota achievement.
- Revisit and revise the fishery management plan as needed to reach and maintain a more sustainable oyster population.



A close up view of oyster tongs.
Photo by S. Brown, NOAA

4. Shift commercial production to aquaculture

The DNR wishes to coordinate a strategy that will help Maryland's traditional wild oyster fishery transition to privatized aquaculture. In order for this to happen, the following actions have been taken:

- A 2009 Lease Law instituted the first reform of its kind in 103 years
- Aquaculture grants to provide incentives for new oyster farms have been secured
- MD DNR has partnered with the University of Maryland Center for Environmental Science (UMCES) and their Sea Grant program to assist with implementing new aquaculture initiatives.
- The first Aquaculture Enterprise Zone (AEZ) was established in October 2009 by regulation.
- Additional AEZ areas were identified in coordination with the Aquaculture Coordinating Council (ACC) and County Oyster Committees. Public scoping for these areas was completed with the Maryland Department of the Environment, Board of Public Works and U.S. Army Corps of Engineers.
- DNR representatives have met with 12 county oyster committees to explain the implications of the new lease law and to initiate the establishment of the public shellfish fishery areas.

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5. Rehabilitate oyster bar habitat



One key limiting factor for native oyster population recovery is the amount of suitable bottom habitat on which oyster larvae can settle. Approximately 90% of oyster habitat has been lost during the past 25 years, resulting in the need to rehabilitate at least 10,000 acres of habitat to facilitate large-scale recovery.

The True Cost of Rehabilitation

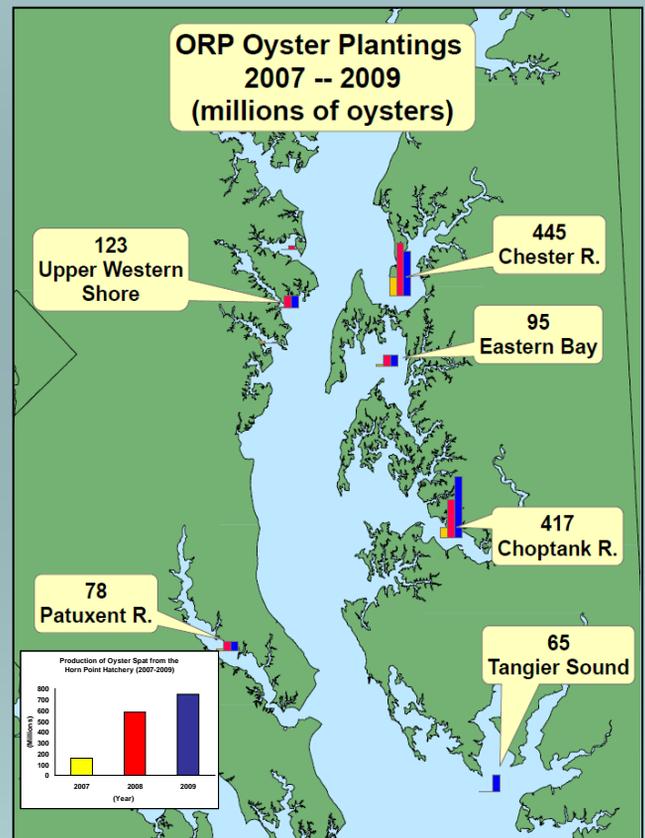
Depending on the method chosen, rehabilitation costs can range from \$2,000 to \$100,000 *per acre*. To date, the State of Maryland has spent \$2.3 million in capital funds to design, coordinate, and implement oyster bar rehabilitation. In the process, 600 watermen were provided with work opportunities. The total yield thus far is 250 acres of rehabilitated oyster reef.

Facing a Shell Shortage

Oyster shell, either new (shucked) or from buried deposits, is the predominant and preferred cultch for oyster habitat projects in the Bay. Since 1960, the dominant source of shells for restoration has been dredged shells from buried deposits in the upper Bay; however, improving degraded oyster habitat across large areas will require more shell than is available from traditional shell deposits.

To obtain sufficient cultch for upcoming restoration projects, Maryland has obtained a permit for a reclamation program that would provide up to 25 million bushels of shell. Also pending is a shell dredge permit application to obtain up to an additional 5 million bushels of shell from Man O' War shoal.

Recent Oyster Plantings in MD



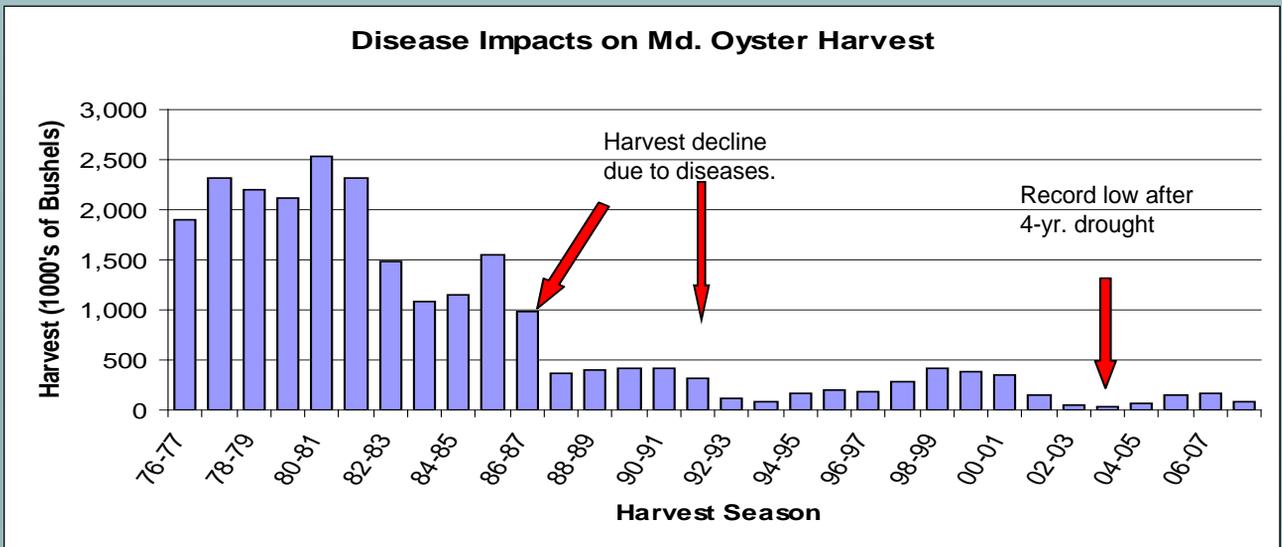
Alternative Substrates?

The most feasible function of alternative substrates is to provide a firm base for constructed oyster bars. Alternate materials that replace the need for natural shell and can be economically manufactured in large quantities have not yet been identified.

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6. Manage against oyster disease

Oyster diseases are responsible for significant levels of non-fishing mortalities among oysters inhabiting the Chesapeake Bay. To address disease challenges, Maryland will use a targeted restoration approach (different strategies) in high versus low salinity areas. (see point #1).

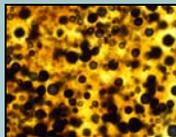


Each year during the Fall Oyster Survey, DNR Fisheries Staff collect 1,300 sample oysters specifically for pathogen and disease testing.



Thin wax sections of oyster tissues

Dermo



Dark-stained *Perkinsus marinus* cells (dermo disease pathogen)

MSX



Sampling oyster tissues for MSX disease diagnosis

Dermo disease is caused by the protozoan parasite *Perkinsus marinus*, is broadly distributed among Chesapeake Bay oysters, and occurred at high annual prevalences of 53-94% during recent decades. Dermo is found on most of the bars surveyed in MD.

MSX disease is strongly regulated by freshwater inflows to the Bay, Its protozoan parasite, *Haplosporidium nelsoni*, does not affect oysters in low-salinity waters (<10). MSX disease can infect up to 25% of oysters during drought years.

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7. Increase hatchery production

In order to meet the demands of an aggressive rehabilitation agenda, a rapidly growing Marylanders Grow Oysters program, and a new commercial aquaculture initiative, Maryland must have access to large quantities of disease-free oyster larvae (up to 2 billion per year) for restoration and distribution. To this end, the Maryland DNR has:

- Established a new Memorandum of Understanding with UMCES for future hatchery production
- Purchased all available oyster shells from shucking houses in the state and transported them to the UMCES Horn Point Hatchery for 2011-2012 production.
- Supported legislation that increased the price paid per bushel of oyster shell from \$.25 to \$.50
- Initiated oyster production at its own Piney Point Aquaculture Facility in St. Mary's County.
Approximately 50 million oysters were produced there in 2009.



Stanley Tomaszewski, manager of the Piney Point Aquaculture Center, surveys the large, concrete tanks that his staff is using to grow baby oysters for distribution in the Bay.



The UMCES Horn Point Oyster Hatchery (above) is currently under expansion. After construction is complete, annual production from this facility is expected to increase from 350-700 million to 1.5-2 billion spat.

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9. Increase citizen involvement

Initiated by Governor Martin O'Malley in September 2008, Marylanders Grow Oysters is managed by the Maryland Department of Natural Resources in conjunction with the Oyster Recovery Partnership, the University of Maryland Center for Environmental Science, and local organizations. Maryland Department of Public Safety and Corrections inmates produce the cages for the program.

The goal of this program is to encourage citizens to act to contribute to the ecological health of the river. The oysters they grow are planted in sanctuaries where an oyster reef community of fish, crabs and other organisms can develop.

In 2009, Marylanders Grow Oysters expanded into 11 new tributaries, that were selected through an online application process. Each tributary has a local sponsor who leads the program by organizing the growers and distributing cages and oysters. DNR works closely with the local sponsor, providing guidance, advice, cages and oysters.

Up to 5,000 cages were distributed with oyster spat to volunteer growers in the Magothy, Severn, South, lower Patuxent, St. Mary's, Wicomico, Corsica, lower Nanticoke, and Annessex Rivers, as well as San Domingo and La Trappe Creeks.



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10. Integrate inmate labor

The 2009 production season marked the first time in 4 years that the Piney Point aquaculture facility has produced oyster spat. The spat grow in large concrete tanks and when they reach the right size to be transplanted into the Bay, there is a big messy job to do.

The facility gets a large hand from local inmates who are part of the Southern Maryland Pre-Release Unit in Charlotte Hall, MD. The labor costs little and the inmates get a chance to do something unique and positive in the community - it is a win-win situation for both parties.

On a typical day, the inmates arrive at dawn to begin their work. They must start pulling spat out of the growth tanks and loading them onto boats early, before the daytime sun has a chance to overheat the baby oysters.

The inmates and watermen who assist with their boats can ship out as much as 3 million spat in a day, a feat not easily accomplished without their help.

Additionally, inmates at Eastern Correctional Institution in Westover, MD gain work skills, confidence, and a new respect for the resources of the Bay building oyster cages for the Marylanders Grow Oysters Program. The inmates are able to construct an average of 100 cages per day using an assembly line process, and the program saved the Department of Natural Resources thousands of dollars in labor costs.



Inmates from the Southern Maryland Pre-Release Center in Charlotte Hall load bags of shells seeded with oyster spat onto a boat for distribution in St. Catherine's Sound. Photo by J. Friess, Southern Maryland Newspapers.