

Applicant Organization: Maryland Department of Natural Resources (MD DNR)

Project Title: Maryland Oyster Habitat Restoration

Site Locations: Maryland waters of the Chesapeake Bay: St. Mary's River Sanctuary 38.194°, -76.439°, Manokin River Sanctuary 38.116°, -75.859°, Nanticoke River Sanctuary, Herring Bay Sanctuary 38.755°, -76.532°, Hooper Strait Sanctuary 38.229°, -76.079° and/or areas agreed to by partners.

Executive Summary/Project Description:

This proposal is for the hatchery production and planting of diploid *Crassostrea virginica* oyster spat-on-shell (SOS) and habitat enhancement in support of restoring oyster reefs. Oysters form reefs recognized as essential fish habitat for commercial and recreational species. The restored oyster reefs are expected to have important long-term outcomes including improved water quality, increased fish habitat, and nutrient sequestration. Habitat degradation, harvest pressure and disease have reduced the oyster population in the Chesapeake Bay to historically low levels. The Chesapeake Bay Program established and met a Bay-wide goal of restoring oysters in 10 tributaries by 2025. In 2025, a revised Chesapeake Bay Watershed Agreement was signed with a revised oyster goal. The revised oyster goal is to:

- Restore 1,100 acres of additional oyster reef habitat in restoration focus areas to provide ecosystem service benefits by 2040;
- Maintain a sustainable oyster abundance through oyster fisheries and aquaculture practices; and
- Maintain reefs that were established under the 2014 Chesapeake Bay Watershed Agreement to restoration success metrics.

This proposal will directly support the 2025 revised Chesapeake Bay Watershed Agreement Oyster Outcome. The goal of the restoration efforts focuses on restoration actions that are designed to reverse habitat degradation and loss, while performing an important ecological role.

These funds will provide the larvae necessary to complete the planned second seedings of the remaining two of the original five tributaries identified in Maryland, St. Mary's River Sanctuary and Manokin River Sanctuary, and the commitment to maintain reefs that were established under the 2014 Chesapeake Bay Watershed Agreement to restoration success metrics. Larvae will also be used to support other oyster restoration project priorities, including Eastern Bay Regional Sanctuary seeding and second seedings in the Nanticoke River Sanctuary.

The funds will also be used to produce spat-on-shell with the larvae produced and planted within the Herring Bay Sanctuary. Larvae will be set on shells and placed on restoration sites closed to oyster harvest.

These funds may also be used for habitat enhancement in Hooper Strait Sanctuary. Habitat enhancement will occur on an appropriate hard bottom by placing oyster shells for reef enhancement, in areas that have high natural recruitment.

These funds will be used to purchase shucked oyster shells that will be used towards spat-on-shell production and or habitat enhancement.

The amount of each of these tasks will vary yearly depending on monitoring results and the actual spat-on-shell needs for plantings.

Relevance and Applicability of Proposal to the Program Goals

There are both commercially and recreationally valuable species, or their prey, that are managed by the National Oceanic and Atmospheric Administration (NOAA) and are reliant on oyster reefs. The project supports an ecosystem based approach, by providing habitat and improving water quality, and will enhance Essential Fish Habitat (EFH) for nine species managed under the Magnuson-Stevens Act. NOAA EFH mapping tool identifies the project location as EFH for bluefish, summer flounder, Atlantic herring, red hake, clearnose skate, black sea bass, Atlantic butterfish, scup, and windowpane flounder. The project could improve water quality, which supports submerged aquatic vegetation (SAV) production. The project area is a SAV Habitat Area of Particular Concern (HAPC) for summer flounder.

Monitoring:

Oyster density and size distribution surveys will be conducted using the patent tong or diver gear. Multiple samples will be collected on each reef, oysters will be counted, and up to 50 oysters in each patent tong grab will be measured to determine size distribution.

Monitoring will occur on areas three and six years after initial restoration. Areas slated for second seedings, St. Mary's Sanctuary, Manokin Sanctuary and Nanticoke Sanctuary, will use year three monitoring results to determine the planned amount of second year class seedings required to meet the oyster restoration metrics for density and biomass. The oyster density and biomass metrics are of a minimum of 15 oysters per square meter and 15 grams per square meter with a target of 50 oysters per square meter and 50 grams per square meter at year six.

In areas that receive shell plantings for habitat enhancement, reefs will be monitored one year after planting to determine the level of natural recruitment to the reef.

Data Management:

Oyster habitat enhancement, spat planting and monitoring information will be maintained in a GIS geodatabase with an associated web map on DNR's ecological restoration websites.

Water quality parameters such as dissolved oxygen, salinity, water clarity, pH and temperature will be monitored through DNR's Eye's on the Bay program.

The reef performance will be documented in an oyster restoration report within one year of the data collection. The report and associated data will be posted and available to the public on DNR's ecological restoration websites.

Sustainability:

The project will occur in state designated oyster sanctuaries, which prohibit the harvest of oysters. It utilizes a restoration plan that is designed to be self-sustaining and accomplish an ecosystem-based approach to improving the habitat in the Chesapeake Bay. Historically, some of the sanctuaries under consideration for this project do not have a constant, high natural spat set, like Herring Bay and the Eastern Bay region sanctuaries. These reefs may need additional seedings in the future, however the additional broodstock added would be beneficial to the region. Sanctuaries such as Hooper Straits did historically have a constant, high, natural spatset, however, declining habitat over time resulted in a depressed oyster population.

The project is also designed to manage for several risk factors relevant to restoring oysters in the Chesapeake Bay such as sea level rise, seasonal low oxygen events and increased water temperatures. The USACE measured an accretion rate of six to 16 L/m²/yr on high relief reefs in a Chesapeake Bay tributary, a rate that would keep pace with documented rising sea levels. The project area was limited to a depth of 20 feet to limit the effects of hypoxia and anoxia. Limiting the placement of the reefs by staying out of deeper water to avoid poor environmental conditions will enhance the sustainability of the reefs. An increase in water temperature would provide a longer growing season for oysters in Chesapeake Bay while also increasing the risk of low dissolved oxygen events. The creation of these restored reefs will foster sustainability of oysters, restored oyster habitat, and habitat for many species that depend on viable oyster reefs.

The sanctuaries proposed for this project occur throughout the Maryland bay, across various salinity regimes and spat setting levels. All areas undertaken by this project will

be within sanctuaries and will restore oyster populations, therefore increasing the broodstock potential of a region. This increase in broodstock will serve as a larval source for the region, including public oyster fishery bottom and aquaculture leases.

Outreach and Education:

(a) Stakeholder Support.

The State of Maryland manages the oyster resource for the residents of Maryland, hence support for restoration projects is very important. For past and ongoing sanctuary restoration projects, DNR has been supported by various groups such as federal agencies, academic institutions, and non-profit environmental groups. It is likely that support from these groups would be applied to this project as well.

Landowner Support:

As the project will occur on Maryland Chesapeake Bay bottom, DNR is the landowner with the charge of managing the public resources and waters of the State. Maryland has committed to restoring oyster reefs in its waters of the Chesapeake Bay. It has completed initial restoration in Harris Creek sanctuary, Little Choptank sanctuary, Tred Avon River sanctuary, St. Mary's sanctuary, and Manokin River sanctuary totaling over 1300 acres. The State of Maryland continues to fund and support oyster restoration both in the five large scale areas but also in other sanctuaries. In addition, DNR actively engages citizens, local government, community groups and municipalities in areas with runoff draining into oyster restoration sites. Working through the Chesapeake Bay Program, efforts have been successful to target land-based best management practices to improve water quality in restoration tributaries.

(b) Inclusive Planning and Engagement.

The Oyster Advisory Commission is charged with advising the DNR on matters relating to oysters in Maryland's water of the Chesapeake Bay and was involved in the site selection for areas that receive restoration.

Commission meetings are open to the public and the Commission consists of representatives from the commercial public fishery, aquaculture industry, environmental organizations, NGOs, federal government partners, universities, local legislatures and the recreational fishery.

The Oyster Advisory Commission developed a consensus-based recommendation in 2021 to DNR to focus management actions in the Eastern Bay region of the Chesapeake Bay.

(c) Community Outreach and Education.

Public outreach includes maintaining and updating DNR's oyster restoration websites. This includes yearly implementation and monitoring efforts. Annual presentations are given to the Oyster Advisory Commission. These meetings are open to the public and all presentations are provided on DNR's website for access online.

The Chesapeake Bay Foundation, a nonprofit organization, hosts an annual recreational fishing tournament in the sanctuary areas that have received restoration. The event highlights the diversity of fish found around restored oyster reefs. Anglers collect, photograph, measure, release their catch, and collect GPS information of where the fish is caught. Participants are given access to a map that includes the type of restoration on reefs located where they catch fish.

Marylanders Grow Oysters (MGO) is a program managed by DNR in conjunction with Oyster Recovery Partnership and the University of Maryland Center for Environmental Science with the help of many local community organizations. The goals of the program are to engage the public, involving many partners while enhancing oyster sanctuaries. MGO is a citizen-based oyster 'gardening' program in which waterfront participants are given cages of oyster spat-on-shell to hang from their docks in the fall. Participants tend to the cages of spat, helping to protect the spat from siltation and predation during the vulnerable first months of life. In the spring, the oysters are collected and planted on reefs within oyster sanctuaries. The program is active in 31 tributaries, including ones targeted for large-scale restoration, with around 7,300 cages of oysters distributed and planted yearly. Marylanders Grow Oysters partners are active in over 21 Maryland schools educating over 2,000 students annually.

Permits and Approvals:

DNR already holds a permit to conduct spat-on-shell and shell restoration where 4 feet of water depth (clearance) will remain above the reef within Maryland's portion of the Chesapeake Bay.

Key Milestones:

Milestone 1: October 2027 production and planting of 500 million spat-on-shell, planting 10 acres of shell for habitat enhancement

Milestone 2: October 2028 production and planting of 500 million spat-on-shell, planting 10 acres of shell for habitat enhancement

Milestone 3: October 2029 production and planting of 500 million spat-on-shell, planting 10 acres of shell for habitat enhancement

Milestone 4: October 2030 production and planting of 500 million spat-on-shell, planting 10 acres of shell for habitat enhancement

Project Timeline:

October 2026 funding awarded

Spring/summer 2027 SOS production and SOS and shell planting

Spring/summer 2028 SOS production and SOS and shell planting

Spring/summer 2029 SOS production and SOS and shell planting

Spring/summer 2030 SOS production and SOS and shell planting

October 2030 grant complete

Budget:

Task	Task Description	FY2027	FY2028	FY2029	FY2030
Task 1	Program oversight (MD DNR)	\$50,000	\$50,000	\$50,000	\$50,000
	Grant Administrator	\$29,558.69	\$29,558.69	\$29,558.69	\$29,558.69
	Fringe (35%)	\$10,345.54	\$10,345.54	\$10,345.54	\$10,345.54
	Indirect (25.3%)	\$10,095.77	\$10,095.77	\$10,095.77	\$10,095.77
Task 2	Larvae Production (subcontractor)	\$370,000	\$770,750	\$771,519	\$772,307
	Subcontractor overhead	\$30,000	\$30,750	\$31,519	\$32,307
	Larvae production	\$340,000	\$740,000	\$740,000	\$740,000
Task 3	Spat-on-Shell or Shell Planting and Shell Purchase	\$580,000	\$679,250	\$678,481	\$677,693
	Total Cost	\$1,000,000	\$1,500,000	\$1,500,000	\$1,500,000