DECISION DOCUMENT

CHESAPEAKE BAY OYSTER RECOVERY PROJECT
MARYLAND

May 2002

Baltimore District
U.S. Army Corps of Engineers

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TABLES

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I. AUTHORITY

The Chesapeake Bay Oyster Recovery Program provides for Corps participation with a non-Federal sponsor in design and construction assistance for water-related resource protection and development projects affecting the Chesapeake Bay estuary. The program was authorized under Section 704(b) of the Water Resources Development Act (WRDA) of 1986. The project authority was later amended by Section 505 of WRDA 1996 and Section 342 of WRDA 2000. Section 505 of WRDA 1996 increased the authorization limit from $5 million to $7 million, and expanded the potential project area from only Maryland, to Maryland and Virginia. Section 342 of WRDA 2000 further increased the project authorization limit to $20 million, as well as provided guidance on allowable project activities. Section 113 of P.L. 107-66 (2001) further modified the authorization to permit the non-Federal interest to provide its share, including the provision of suitable shell stock, as in-kind services, and permits the Corps to consider such services provided on or after October 1, 2000. The authorization for the program is codified at 33 U.S.C. § 2263, entitled "Study of Corps Capability to Conserve Fish and Wildlife."

II. PURPOSE AND SCOPE

The purpose of this document, prepared by the Baltimore District, U.S. Army Corps of Engineers, is to provide the basis for a recommendation to amend the project cooperation agreement (PCA) for the Chesapeake Bay Oyster Recovery Project, which was executed in February 1997. Phase I construction activities for this project were undertaken in Fiscal Year (FY) 1995 – 2000, at a total cost of $3.3 million.

This decision document supports amending the existing PCA to provide for Phase II project construction activities, including project construction beyond FY 2000 and an increase in the project cost from $3.3 million to $6.7 million. The Maryland Department of Natural Resources (MdDNR) is the local sponsor (see letter of intent in Correspondence Section of Appendix).

This decision document serves as an addendum to the *Chesapeake Bay Oyster Recovery Project, Maryland,* report prepared by the Baltimore District in May 1996. This decision document does not recommend or address the need for future studies involving the Commonwealth of Virginia, and does not recommend activities beyond those included in the original Baltimore District project, as identified in the May 1996 *Chesapeake Bay Oyster Recovery Project Report.*

A long-term master plan, to be written jointly between the Norfolk and Baltimore Districts, will be prepared concurrently with the implementation of the Phase II project activities. The long-term master plan will address the eventual scope of the Chesapeake

Bay Oyster Recovery Program for the 10-year follow-on effort. The proposed Baltimore District and Norfolk District 2002 and 2003 Phase II projects will complement the Corps' long-term activities.

III. PROJECT BACKGROUND

Oyster bars are the Chesapeake Bay's equivalent to coral reefs and provide substrate for attachment of organisms such as barnacles, sponges, and tube-building worms. In addition, oyster bars provide shelter for motile invertebrates and finfish. Many important species such as striped bass (rockfish) and blue crab utilize oyster bars for foraging. In addition, recent public, scientific and governmental attention has been focused on the water quality improvement capabilities of oysters, which remove nutrients from the water column while they feed.

Oyster populations in Maryland have declined dramatically since the turn of the century, largely due to overharvesting, parasitic diseases, and loss of habitat due to oyster harvesting practices and declines in water quality (Figure 1 in Appendix). Since 1890, oyster populations in the Maryland portion of the Chesapeake Bay have decreased from 15,000,000 bushels to less than 500,000 bushels at present. The Chesapeake Bay Oyster Recovery Project will benefit oyster populations in the bay through various activities performed as part of this project. The planting of oyster shell (cultch) will provide much needed clean substrate for the setting and growth of hatchery–produced and wild-produced spat (young oysters). The spat that grows on the cultch will create living oyster bars. The mature oysters will contribute not only to the oyster bar upon which the spat sets, but will contribute larvae to adjacent areas through distribution by currents.

As noted previously, the original Phase I project was described in the *Chesapeake Bay Oyster Recovery Project, Maryland,* report prepared by the Baltimore District in May 1996. The 1996 report and environmental assessment covered construction activities and potential environmental impacts for the four-year period of 1997 through 2000. The report addressed alternatives, risk management, and included an environmental assessment (EA) and finding of no significant impact (FONSI) that were fully coordinated with the public and resource agencies. Tables 1 through 4 in the Appendix, which present Tables 6-1 through 6-4 from the 1996 report, describe the proposed Phase I project activities, including shell planting, spat planting, design of the oyster bars, and areas for environmental restoration.

Through the evaluation and coordination process for Phase I (implemented) of the oyster restoration project, the Baltimore District and Maryland Department of Natural Resources (MdDNR) developed and evaluated a range of alternatives. Elevation, site conditions, surfaces for oyster spat attachment, in addition to other environmental factors were considered during the development of the oyster bar design criteria. This resulted in a successful Phase I four-year restoration project that has provided valuable habitat and increased oyster populations as documented in a Maryland Sea Grant video and monitoring reports.

The purpose of the proposed Phase II actions is to further develop and implement the best technically feasible and economically justifiable solution to restore degraded oyster habitat in the Maryland portion of the Chesapeake Bay. Based on past experience with the Phase I actions, the same design criteria and coordination among resource agencies will be applied to the design of the proposed Phase II actions.

The proposed Phase II work will be a continuation of the first phase of the project and will require an amendment to the existing PCA, which was executed in February 1997 by the Assistant Secretary of the Army (Civil Works) and MdDNR, the non-Federal sponsor. The proposed amendment will extend the duration of the project's Phase I construction activities for 2 years and increase the total project cost from $3.3 million to $6.7 million.

The implementation of the Phase II project, as documented in the PCA amendment, will be identical to Phase I of the project. Actions undertaken as part of Phase II will be similar to those undertaken under Phase I and will occur in the same general locations. The project areas and activities proposed for the first year are within the scope and recommendations included in the original project report. Six rivers in Maryland were considered suitable for oyster restoration, as identified on Figure 2 in the Appendix, and the associated environmental documentation for these rivers was completed.

Within these six Maryland rivers, the Chesapeake Bay Oyster Recovery Project uses only areas that have known oyster bars and suitable substrate. No construction has taken place, or will take place, outside of charted oyster bar areas. Through FY 2000, five of the six rivers have actually been sites for oyster restoration as part of the Chesapeake Bay Oyster Recover Project. The Nanticoke River was not used because of prevailing environmental conditions. The Chester, Choptank, and Patuxent Rivers (see Figure 2, Appendix) are currently identified for potential Phase II restoration activities, based on their current suitable substrate and environmental conditions. These rivers were previously used as restoration sites for the Phase I project activities.

IV. Plan Formulation

The Maryland Oyster Roundtable Action Plan was used as the foundation for plan formulation. The Baltimore District identified elements of the Roundtable Action Plan that could be implemented by the Corps of Engineers. During plan formulation, the District coordinated extensively with the Oyster Roundtable Steering Committee and with a Steering Committee workgroup. The District contacted oyster experts at the University of North Carolina, the Corps Waterways Experiment Station, and Rutgers University for information on project design and monitoring.

A. Evaluation Process

Through the evaluation and coordination process, the partnership of the district and the sponsor have developed a range of alternatives to produce outputs that address the restoration goals. The outputs are measured as the net difference between the future with, and the future without, the various alternatives.

Ecosystem restoration activities examine the condition of existing ecosystems, or portions thereof, and determine the feasibility of restoring degraded ecosystem structure, function, and dynamic processes to a less degraded, natural condition. Corps activities in the ecosystem concentrate on engineering solutions to water and related land resources problems consistent with policy and guidance as presented in ER 1165-2-501, Civil Works Ecosystem Restoration Policy, and ER 1105-2-100, Planning Guidance Notebook.

B. Evaluation Criteria

Significance

"Significant" is defined in the Principles and Guidelines (P & G) (3.2.1) as "...likely to have a material bearing on the decision making process." Paragraph 3.4.3 further elaborates that significance of EQ resources is based on institutional, public, or technical, recognition and likely to be affected by one or more of the alternative plans. Institutional recognition means that the importance of an EQ resource is acknowledged in laws, adopted plans such as national or international agreements, or other policy statements of public agencies or private groups. Public recognition means that some segment of the general public recognizes the importance of an EQ resource or attribute. Technical recognition is based on scientific or technical knowledge or judgement of critical resource characteristics.

Scarcity

Scarcity of the resource contributes to the value of the restored habitat. The scarcity of a resource is usually described in terms of the amount of the similar type habitat that is known to have existed in the past. ER 1105-2-100, paragraph 7-34.d.(1)c states:

> "Criteria for determining significance shall include, but not be limited to, the scarcity or uniqueness of the resource from a national, regional, State, and local perspective. Non-monetary values associated with fish and wildlife resources are subjective, and depend on the value society places on them. Different publics may express differing values and concerns for the non-monetary and monetary values associated with similar fish and wildlife resources. Such differences shall be documented, including the rationale used to select values chosen to determine resource significance."

View of the Non-Federal Sponsor

Evaluation of the project outputs must also consider the input of the non-Federal sponsor for the project. ER 1105-2-100, paragraph 4-41.a. states that," the willingness of the non-Federal sponsor to share study and project costs and the general concurrence of the State and Federal resource agencies and environmental community are strong indicators of the reasonableness and worthiness of the recommended action."

Additional Criteria

Paragraph 4.46 of ER 1105-2-100 identifies and defines additional criteria to be used to nominate a proposed project for funding as:

- Acceptability - acceptable to State and Federal resource agencies; broad public support; acceptable to non-Federal cost sharing partner.
- Completeness - account for all investments and realization of outputs.
- Efficiency - cost effective.
- Partnership Context - priority given to project where another Federal agency uses their funding.
- Reasonableness of Costs - even after tests of cost effectiveness and incremental analysis, the decisionmaker must ascertain that the benefits are really worth the costs.

C. Maryland Oyster Roundtable Action Plan

In 1993, the State of Maryland convened a broad interagency taskforce called the Maryland Oyster Roundtable. The 40 members of the Oyster Roundtable include Federal and state agencies, research institutions, representatives of the environmental community, regulatory agencies, industry, aquaculture, and watermen. The goals of the Oyster Roundtable were to develop sound, broadly supported recommendations to restore oyster populations through an action plan to: (1) maximize and enhance the ecological benefits of oysters, (2) maximize and enhance the economic benefits derived from harvesting in the oyster fishery, and (3) maximize the ability of government to respond effectively to the magnitude of the problem. A Steering Committee was formed to implement the plan.

Recommendations of the plan are divided into two sections. The first section describes actions which should occur throughout the Bay. The second section describes the designation of Bay tributaries or segments of tributaries as Oyster Recovery Areas (ORAs) that will be managed in innovative ways to (1) limit transplantation activities that would perpetuate MSX and Dermo and (2) evaluate different methods to rehabilitate, rebuild, plant, and otherwise restore oyster populations in these areas.

Each ORA is comprised of one to three zones. Zone A is generally the lowest salinity area of the ORA. In Zone A, shellfish harvesting is suspended, and only oyster seed certified as "disease free" can be planted. Zone B is located immediately downstream of Zone A, or it is the lowest salinity zone in rivers without a Zone A. Shellfish harvesting is allowed in Zone B, but only disease-free seed can be planted. Zone C is generally a large zone located downstream of Zone B. Shellfish harvesting is allowed in this zone, and diseased or disease-free natural seed can be planted.

ORAs have been established in the Chester, Choptank, Magothy, Nanticoke, Patuxent, and Severn Rivers. Zones A, B, and C have been designated in the Chester and Choptank Rivers. Zones B and C have been designated in the Nanticoke, Magothy, and Patuxent Rivers. Zones A and B have been designated in the Severn; however, in this river, Zone A is located downstream of Zone B.

D. Chesapeake Bay Program Oyster Fishery Management Plan

The 1994 Chesapeake Bay Oyster Fishery Management Plan is a revision of the plan developed in 1989 to implement the Living Resources Commitments of the 1987 Chesapeake Bay Agreement. The 1994 plan was developed through recommendations from the Maryland Oyster Roundtable and the Virginia Holton Plan and was drafted by MDDNR, the Virginia Marine Resources Commission, and the Potomac River Fisheries Commission. A workgroup consisting of members from government agencies, the academic community, the fishing industry, and public interest groups reviewed and commented on the revised plan.

The goal of the 1994 Oyster Fishery Management Plan is to "enhance the production of oysters in the Chesapeake Bay ecosystem by restoring habitat, controlling fishing mortality, promoting aquaculture and continuing the repletion programs." Efforts under this plan include planting shell, planting oyster seed, investigating alternative reef materials, researching diseases, and conducting stock assessment surveys. The proposed project, through the restoration of oyster habitat, is consistent with the objectives of this plan.

E. Habitat Improvement Objectives

The ecological role of the oyster in the Chesapeake Bay ecosystem has increasingly been recognized. As filter feeders, oysters remove plankton from the water column, consume large quantities of suspended organic particles, recycle nutrients, and transfer energy throughout the food web. In addition, oysters at different life stages are an important food source for commercially and recreationally valuable finfish and crab species. The three-dimensional elevated structure of an oyster bar provides hard substrate, habitat complexity, and vertical relief which supports oysters and many other species of invertebrates and fish.

The planting of oyster seed will increase oyster populations at project locations and provide progeny to downstream and adjacent areas. The planting of oyster seed certified as disease-free will aid the production of disease-free oysters.

Monitoring will be an integral part of the project in order to determine the success of project activities and aid management decisions for subsequent project activities and locations. In addition to factors related to oyster productivity, overall habitat parameters will also be monitored. Monitoring will allow adaptive management, which is a process of adjusting management actions and directions, as appropriate, based on new information on environmental conditions and progress towards accomplishing project objectives.

Consideration of environmental conditions, including disease prevalence, salinity, and bottom composition, and the use of GIS mapping will assist the selection of specific locations for project activities to foster oyster productivity and habitat development.

F. Alternatives Considered

Alternatives considered during plan formulation are described below.

Alternative 1 New Bar Construction
Differences in current speed are believed to affect oyster productivity through differences in the amount of water-borne larvae, food material, and sediment deposited on the oyster bar. The size (height of the bar from the bottom) and shape of an oyster bar may influence water currents. Current speeds are expected to be greater across bars with greater height, resulting in increased oyster productivity. Water depth may also affect oyster productivity, due to associated variations in salinity, food availability, sediment deposition, and dissolved oxygen concentrations. Through the construction of new bars in flat and mounded morphologies, the effects of bar morphology on oyster productivity can be investigated.

Alternative 2 Modification of Existing Bars
Many areas of former oyster habitat have been lost due to siltation. Existing bars can be rehabilitated in a variety of ways to provide a suitable substrate for spat attachment and to raise the bar profile. To raise the profile of existing bars, clean shell can be placed on existing bars. Oyster shell buried by sediment can be recovered by bagless dredging, which redeposits the clean shell in the same area. Through the use of a clam dredge, shell can be recovered, moved, and placed to increase the height of existing adjacent bars and thereby decrease the likelihood of future sedimentation. Prevalence of disease may be reduced by removing diseased oysters and shell and then planting clean shell and disease-free spat. This can be done by removing the top layer of shell from an existing bar with a clam dredge. The shell would be transported to land and allowed to dry, and the clean shell would be replaced on the bar. A vacuuming technique, involving the removal of surface shell, spat, and oysters, has been successfully used in the Long Island Sound of Connecticut. Clean shell and disease-free spat are placed on the vacuumed bar.

Alternative 3 No Action
This alternative would involve not conducting the project.

Sanctuary and Reserve Designations

In the project authorization language in the Water Resources Development Act of 2000, Congress recognized the need for designation of permanent sanctuaries for oyster projects. At the present time, the authorization states that the Corps may participate in projects that may include:

> *... the construction of reefs and related clean shell substrate for fish habitat, including manmade 3-dimensional oyster reefs, in the Chesapeake Bay and its tributaries in Maryland and Virginia if the reefs are preserved as permanent sanctuaries by the non-Federal interests, consistent with the recommendations*

of the scientific consensus document on Chesapeake Bay oyster restoration dated June 1999. (33 U.S.C §2263 (b)(1)(D))

The June 1999 consensus document (*Chesapeake Bay Oyster Restoration – Consensus of a Meeting of Scientific Experts*, Chesapeake Research Consortium, June 1999) speaks of two types of structures (reefs and shellplants), as well as to two purposes (permanent sanctuaries and harvestable areas). The consensus document defines a reef as "a three-dimensionally-complex biogenic structure that rises substantially from the seafloor," and recommends that its height be equal to at least one-half the water column depth. In addition to the reefs, the consensus document addresses "shellplants," low-relief oyster bars where shell would be placed for future harvest or moved to other areas for sanctuary development or future harvest. The goals laid out in the June 1999 consensus document specifically acknowledge the need for a balanced approach, combining the use of permanent reef sanctuaries and shallower harvestable oyster bars.

The dichotomy of this approach is reflected in the language of the statute. The statute clearly provides that "reefs" must be "preserved as permanent sanctuaries by the non-Federal interests." However, under the adopted reading of the statute, the sanctuary restriction does not apply to "related clean shell substrate." Analysis of the legislative history and consultation with the Congressional interests who sponsored the legislation reveals a legislative intent that the phrase "related clean shell substrate" equates to the low-relief shellplants and not a component of the "reefs" themselves. Therefore, the statute requires that "reefs" be sanctuaries but shellplants need not be.

The WRDA 2000 legislation for this project recognizes that the design and construction of reef structures require a significantly greater financial investment, and therefore, these structures need to be permanently preserved as sanctuaries. Consequently, any oyster restoration structure of substantial height for the Phase II project will be designated as a permanent sanctuary by the non-Federal sponsor. However, as currently designed, none of the planned oyster bars for the Phase II work in Maryland would qualify as "reefs" and warrant permanent sanctuary designation. For a number of reasons, the historic oyster structures in Maryland differed from those that were present in Virginia portions of the Bay. Using historical oyster bar dimensions as a guide, unlike Virginia oyster structures that were quite tall in some cases, the Maryland oyster bars are proposed to be a maximum of 1 to 2 feet high, and placed at depths of 5 to 10 feet (placement at shallower depths would hinder recreational and commercial navigation). Thus, these Maryland bars are considered "clean shell substrate" in terms of the legislation.

Although the requirement for sanctuary designation does not apply for the proposed oyster bars in Maryland, both the Corps and the non-Federal sponsor recognize the critical importance of setting aside areas for sanctuaries and for managing the oyster harvest. Therefore, the Phase II project will include some designated areas for permanent sanctuaries; these areas will be planted at a higher density of spat to promote increased oyster productivity. Although the 1999 consensus document presents the recommendation that 10 percent of the oyster bar acreage in the Bay be set aside and restored as permanent sanctuaries, permanent sanctuary designation will be targeted to 25

percent of the project's restored area, to maximize the consensus document's recommendations. The remaining project area will classified as "reserves" and will be closed to harvest until the oysters have sufficient time to develop to reproductive size for at least a full year. These reserve areas are expected to remain closed for an estimated four years. At the end of the reserve period, the non-Federal sponsor could then open the area for managed harvest.

V Evaluation of Alternatives

The evaluation and selection of alternatives was conducted in conjunction with MDDNR and the Roundtable Steering Committee. The alternatives included in the plan are within the Maryland Oyster Roundtable Action Plan. The Steering Committee views the project as a fortuitous opportunity to implement parts of the Action Plan, and supports the selected plan.

Alternative 1 New Bar Construction

New bars could be constructed to create oyster habitat within all ORA zones. New bars would be constructed in flat and mounded morphologies. Depending upon location and availability of seed, new bars would be planted with hatchery-produced seed, with natural seed, or will remain unseeded to receive a natural set.

Alternative 2 Modification of Existing Bars

This involves various techniques to restore oyster habitat that has been covered with sediment. Harvesting the shell and drying it on land to kill disease was rejected due to adverse impacts to the benthic community. Using a vacuum to remove a layer of shell and place it on land was also rejected due to environmental impacts. Subsequently, this alternative was rejected at this time.

Alternative 3 No Action

This alternative would not fulfill the project objectives and is therefore not considered acceptable. It would not contribute to achieving the 10-fold goal of oyster restoration and would not contribute to the restoration of the Chesapeake Bay ecosystem.

Benefit Evaluation Method

There are a number of techniques that can be used to determine the habitat benefits of an environmental restoration project. Generally, habitat evaluation procedures compare existing conditions at a site with habitat criteria for one or more animals. Projected habitat values are developed for the existing conditions and for the period after a project alternative or management measure is in place. For the purposes of this project, benefits of oyster habitat restoration will be addressed both qualitatively and quantitatively.

Six rivers in Maryland were considered suitable for oyster restoration. Within these six Maryland rivers, the Chesapeake Bay Oyster Recovery Project uses only areas that have known oyster bars and suitable substrate. No construction has taken place, or will take place, outside of charted oyster bar areas. Through FY 2000, five of the six rivers have been sites for oyster restoration as part of the Chesapeake Bay Oyster Recover Project. The Nanticoke River was not used because of prevailing environmental conditions. The

Chester, Choptank, and Patuxent Rivers are currently identified for potential Phase II restoration activities, based on their current suitable substrate and environmental conditions. These rivers were previously used as restoration sites for the Phase I project activities.

The decline in oyster harvests in Chesapeake Bay has prompted great interest in restoring the oyster resource by increasing natural oyster reef communities. Oyster reefs have a unique ecological role in the estuarine environment. Oysters are keystone organisms in the ecology of Chesapeake Bay both for the habitat they create and for their water filtering capacity. In addition, their numbers have supported a substantial commercial fishery. Bay-wide, harvests of oysters peaked in the late 1800's at 20 million bushels per year.

Years of overharvesting, habitat destruction, pollution, and disease-induced mortalities have severely impacted oyster populations throughout the Chesapeake Bay and its tributaries. Oyster bars provide excellent habitat for many Chesapeake Bay species of shellfish, finfish, and crabs. Additionally, the oysters themselves directly contribute to improved water quality as they and others are filter feeders that consume quantities of suspended organic particles and plankton through biofiltration and they remove suspended solids from the water. Nutrients are consumed and recycled, transferring energy throughout the food web.

Project benefits are based upon environmental value. With increased spatset rates, more larvae will survive to adulthood. The sanctuary areas will be planted at the rate of 2 million spat per acre, and the reserve oyster bars will be planted at the rate of 1 million spat per acre. An adult oyster is reported as capable of filtering at least 10.6 gallons of water per day, and possibly as many as 60 gallons of water per day. Typical oyster density of 2 adults per square meter on a one-acre site would filter approximately 86,000 gallons of water in one day. A four percent survival rate on the sanctuary and an eight percent survival rate on the reserve would net a one order of magnitude increase. Populations on a one-acre site would increase to roughly 20 adults per square meter, which would be capable of filtering 860,000 gallons of water in one day. Survival rates are expected to be greater, and these figures are expected to be extremely conservative.

For the purpose of plan evaluation, benefits are defined as meeting the environmental goals of the project in terms of increased oyster spatset, and, eventually, adult broodstocks, over naturally occurring levels. Indirect benefits will include improved water filtration capacity and hence water quality as well as an increase in food sources for finfish and shellfish. Alternatives 1 and 2 would provide the benefits in Table 1.

Based on an evaluation of environmental benefits, benefits of oyster habitat restoration are significant in terms of oyster population growth, ecosystem integrity and water quality. Alternatives 1 and 2 will equally meet the goal of the project in terms of increasing oyster spatset rates, hence improving water quality and trophic integrity.

TABLE 1. PROJECT BENEFITS

RESOURCE	QUALITATIVE BENEFIT	QUANTITAVE BENEFIT
Oysters	Restoration of historical conditions. Sanctuary will provide opportunity for older, larger, disease resistant oysters to spawn. Harvest areas will provide many acres suitable substrate for larval attachment (spatset) that have previously been suboptimal.	Estimate spatset of 115 million for the entire project acreage. This estimate represents an increase of over 110 million spat compared to no action. *
Finfish/Shellfish	Increase spatset will provide increased food source for finfish and shellfish. Species richness increases at oyster restoration sites (Harding and Mann, 1999).	Biomass of food organisms doubled.
Water Quality	Enhanced water quality will provide improved habitat for submerged aquatic vegetation.	Estimate project will provide oysters capable of filtering approximately 78.5 million gallons per day. This is an increase of 74.5 million gallons filtered per day under current conditions in this area. **

* Estimated total from 22.5 acres of shellplant sanctuaries (22.5ac x 2,000,000 spat/acre) and 70 acres 2-D reserve (70 acres x 1,000,000 spat/acre). Natural spatset was set at 45,000 spat/acre (4,162,500 total).

** Oyster population increases by an order of magnitude on 2-D reserves, and 2-D sanctuaries will have a substantially larger population due to their lack of harvest on them. Conservative estimate 1 oyster per square meter pre-project would increase to 10 oysters per square meter on 2-D reserve areas (estimate 70 acres) and 50 oysters per square meter on 2-D sanctuary areas (estimate 22.5 acres). Based on filtration rate of 10.6 gallons per day per adult oyster.

Tables 2, 3, and 4 summarize the evaluation of sites and the selection rationale.

TABLE 2. PHASE II SITES AND GROUP ASSIGNMENTS

Location	Total Shellplant (acres)	Shellplant for Reserve (acres)	Shellplant for Sanctuary (acres)	Larval retention regime (1-5)*	Group assignment
Choptank	50	40	10	5	A
Chester	27.5	25	2.5	5	
Patuxent	15	10	5	5	
Choptank	50	50	0	4	B
Chester	27.5	27.5	0	4	
Patuxent	15	15	0	4	

TABLE 3. SUMMARY OF GROUP RANKING CALCULATIONS

Group	**SHELLPLANT ACREAGE**	Benefits Calculated *	Benefit/Acre Ratio	Cost**	Cost/Unit Benefit	Ranking
A	92.5	51.9	0.56	$810,000	$15,600	1
B	92.5	37	0.4	$810,000	$21,900	2

* (2-D Area in Sanctuary X Benefit Factor) + (2-D Area X Benefit Factor) = Total Benefit

Group A = Each acre of shellplant within the sanctuary has environmental benefit factor assigned as 0.75, and outside the sanctuary area, 0.5. 22.5(.75) +70 (0.5)= 51.9.

Group B = Each acre of shellplant has an environmental benefit factor assigned as 0.4 (reduction due to proximity and larval retention factors). 92.5(0.4)= 37.0

**Cost is based on estimate of $100,000 per acre reef and $10,000 per acre shellplant.

TABLE 4. BENEFITS FACTORS EXPLANATION

Factor	A	B	Explanation
2-D Sanctuary	0.75	N/A	Group B has no sanctuary 2-D shell plant areas.
2-D	0.5	0.4	Group A has a higher benefit factor because of site location and because it is closer to sanctuary giving it better spat set.

VI. Project Description

A. Phase I (1997-2000)

Project restoration activities conducted in 1997-2000 included the following: creation of new oyster bars and rehabilitation of existing non-productive bars; construction of seed bars, collection of seed oysters (spat), planting of hatchery-produced and seed bar spat on new and rehabilitated bars; and monitoring of the implemented projects. Rehabilitation of non-productive bars included raising bar profiles and cleaning sediment from existing bars using oyster dredges and/or hydraulic clam dredges. Areas identified in the 1996 EA were six oyster recovery areas (ORA's) designated by the State of Maryland in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers, along with Kedges Strait and the James Island area at the mouth of the Little Choptank River. Project activities were consistent with strategies identified in the Maryland Oyster Roundtable Action Plan developed by MdDNR, universities, environmental organizations such as the Chesapeake Bay Foundation, and watermen. A copy of the Roundtable Action Plan is included in Appendix A of the 1996 report.

In 1999, the Baltimore District evaluated the use of the Eastern Bay on Maryland's Eastern Shore as a seed bar area for the project. Subsequently, the District prepared a supplemental EA including this site in the project area, and the District Engineer signed a FONSI in July 1999. Public and agency response to the implemented Phase I project, the project report, and environmental assessments has been very favorable and encouraging; by all accounts the Chesapeake Bay Oyster Recovery Project by the Corps and MdDNR has been a success. Again, a summary of the Phase I project proposed activities is presented in Tables 1 through 4 in the Appendix (using Tables 6-1 through 6-4 from the 1996 report.) A copy of the Maryland Sea Grant video documenting the success of the created oyster bars is available from the Baltimore District.

B. Proposed Phase II Activities

The proposed Phase II actions are broken into first year and second year activities. The specific activities will be evaluated each year in coordination with pertinent resource agencies, scientists, and community representatives, consistent with the approach undertaken for Phase I activities. Due to the dynamics of the Bay's environment, it is

important that this evaluation be undertaken in the spring just prior to construction placement.

First Year, Phase II Activities

The first year (2002) of proposed Phase II actions was designed in coordination with Maryland resource agencies, the Chesapeake Bay Foundation, the Environmental Protection Agency's Chesapeake Bay Program, National Marine Fisheries Service, the Oyster Recovery Partnership, the University of Maryland, and the Maryland Oyster Roundtable Technical Committee. As in the 1996 report, the latest information on environmental conditions and oyster restoration techniques was incorporated into the project design and monitoring plan. Factors that were considered include salinity, disease prevalence, planting substrate availability, and the availability of hatchery and natural seed. The Phase II (and past Phase I) actions were designed to complement the activities of other agencies and interests involved in Chesapeake Bay restoration activities. All first year Phase II activities and locations were included in the 1996 Oyster Recovery Project Report and EA.

One of the unique technical aspects of this project is that the Corps fine-tunes the actions each year through discussions with resource managers, researchers, and watermen based upon the latest reports on environmental conditions and need. This is part of Baltimore District's adaptive management approach used for the Phase I activities, and will be continued in Phase II activities. Without this flexibility the Phase I actions would not have been successful and would not have met the recommendations of the non-Federal sponsor and the environmental community. Additionally, this flexibility has demonstrated to the oyster restoration community that the Corps has the ability to be a major participant in the Chesapeake Bay oyster restoration effort. The Baltimore District's adaptive management approach, in conjunction with the local sponsor and the scientific community, allows for changing the sites and actions to account for variability in natural conditions such as flow, oyster disease, and fecundity.

Some of this adaptive management information is not available until shortly before the start of construction. In all cases, alternate sites and activities that may be selected as a result of adaptive management must be covered by an existing NEPA document, be fully coordinated with interested parties, be covered by a water quality certificate from the State of Maryland, and be supported by an M-CACES estimate. Baltimore District will coordinate these changes with the North Atlantic District via electronic mail. Based on current conditions, all anticipated Phase II locations or activities are already covered by existing National Environmental Policy Act (NEPA) documentation and the extended water quality certificate from the State of Maryland. Should new actions or areas be proposed, which are not covered by the above documentation, the necessary coordination and documentation will be completed prior to construction.

The activities planned for the first year of Phase II are described below, with project locations shown in Figures 3, 4, and 5 in the Appendix.

(1) In the Choptank River (see Figure 3), 50 acres of bottom are proposed to be planted with 22,500 cubic yards of shell. Of this amount, 10 acres will be a sanctuary and 40 acres will be a reserve.

(2) In the Chester River (see Figure 4), 27.5 acres of bottom are proposed to be planted with 4,500 cubic yards of shell. Of this amount, 2.5 acres will be a sanctuary and 25 acres will be a reserve.

(3) In the Patuxent River (see Figure 5), 15 acres of bottom are proposed to be planted with 6,750 cubic yards of shell. Of this amount, 10 acres will be a sanctuary and 5 acres will be a reserve.

(4) The sanctuary areas will be planted at the rate of 2 million spat per acre, and the reserve oyster bars will be planted at the rate of 1 million spat per acre.

At all locations, the shell will be placed to create a 3-inch layer at varying project depths. The Phase II first year (2002) planting is estimated to require about 33,750 cubic yards of shell and 72 million spat, for a total of 22.5 acres of sanctuary and 70 acres of reserve. The estimated cost for the Phase II first year (2002) construction activity is $810,000. Construction is expected in the late spring or early summer of 2002. A summary of project costs is provided in the Appendix at Table 5, with the detailed M-CACES estimate provided at Table 6.

Second Year, Phase II Activities

The second year Phase II activities are expected to be similar in size and cost to the first year activities. Since oysters are vulnerable to many pressures, including disease, the second year Phase II locations and actions will not be determined until the spring of 2003. This will allow the latest information to be used to facilitate successful restoration. As described for the first year of Phase II, project design will be developed in cooperation with the scientific community, watermen, and resource agencies. This will be accomplished by the Corps and MdDNR meeting with leading researchers, watermen, environmental groups, and the Oyster Roundtable Technical Committee. As stated in the 1996 Oyster Recovery Project Report, restoration is designed to allow for adaptive management response to changing environmental conditions and technological innovations.

The proposed Phase II actions are consistent with the recent research and guidance from the scientific community such as the Maryland 1994 Oyster Roundtable Report prepared by the State of Maryland and also the Chesapeake Research Consortium 1999 report, *Chesapeake Bay Oyster Restoration – Consensus of a Meeting of Scientific Experts*. The Phase I and Phase II project actions are an important part of an initiative by the Mayor of the District of Columbia, the Federal agencies that signed the Chesapeake 2001 agreement, and the Governors of Virginia, Maryland, and Pennsylvania. This included a commitment to increase oyster populations ten-fold by 2010. The Phase II solutions are consistent with the oyster restoration master plan being prepared by U.S Environmental Protection Agency's (EPA) Chesapeake Bay Program.

VII. Environmental Compliance

The recommended plan for Phase II includes only activities and areas covered by the extension of the previous water quality certificate and previous NEPA environmental assessments (EA's) and two findings no significant impact (FONSI's). Therefore, the Baltimore District's Office of Counsel has determined that Phase II activities are covered under existing NEPA documentation. A copy of this legal determination is provided in the Correspondence Section of the Appendix.

No changes are recommended that would alter the project design and construction, or produce environmental impacts not included in previous National Environmental Policy Act (NEPA) documentation for the project. The only required legal certification is a water quality certificate (WQC) from the State of Maryland. In a letter dated December 29, 2000, which is included in the Correspondence Section in the Appendix, the state has extended the Phase I WQC until January 1, 2003, to cover the first year of Phase II activities. A further extension will be requested for second year activities.

District coordination fully documents that the Phase II activities have the support of all the resource agencies, environmental groups and watermen.

VIII. Cost-Sharing and Views of the Non-Federal Sponsor

The non-Federal sponsor for the Phase I oyster restoration effort was MdDNR. MdDNR will also serve as the non-Federal sponsor for the Phase II effort, and is willing and financially capable of fulfilling its cost-sharing responsibilities as documented by letter dated June 27, 2001 (see Correspondence Section in Appendix). Recent restoration efforts by MdDNR have shown much promise, but the scale of the State's efforts is limited by available funding and is not enough to reverse historical population decline. The Governor of Maryland has recently allocated $25 million over a 10-year period to rebuild the oyster populations in the Maryland part of the Bay. These funds will be used by MdDNR to participate in the Phase II project, as well as fund additional State efforts. The non-Federal sponsor has, over the last four years, been a cooperative and willing partner in the Phase I project.

A. Project Costs and Financing

The implementation mechanism and sponsorship will remain the same from Phase I to Phase II. Under Section 704(b), as amended, the non-Federal sponsor will provide 25 percent of the project costs in cash, in-kind services, or a combination of both. The current M-CACES estimate (see Table 6 in Appendix) indicates a total project cost of $6.7 million, including $3.4 million for the Federal and non-Federal Phase II activities. As with Phase I, MdDNR will provide the non-Federal share of project costs through in-kind services (see letter of intent, Correspondence Section in Appendix). The proposed amendment to the February 1997 PCA will continue this arrangement, following approval of this decision document.

The design of the Phase II activities for the long-term project, which will be accomplished prior to the execution of the PCA amendment, will be initially 100 percent Federally funded, with sponsor reimbursement to the Federal government of 25 percent of those costs following execution of the PCA amendment. Similar to the Phase I project cost sharing, the non-Federal sponsor's share of project costs is anticipated to include substantial (up to 100 percent of their share) in-kind credits for the project construction. A summary of the cost-sharing breakout for the Phase II activities is provided in Table 5, below.

TABLE 5. COST SHARING REQUIREMENTS FOR THE CHESAPEAKE BAY OYSTER RECOVERY PROGRAM, MARYLAND

Share	Phase I [1]	Phase II [2]	Total
Federal	$2,500,000	$2,500,000	$5,000,000
Non-Federal	$834,000	$833,000	$1,667,000
Cash	$0	0	$0
In-Kind Services	$834,000	$833,000	$1,667,000
Total	$3,334,000	$3,333,000	$6,667,000

The proposed PCA amendment will also reference the HQUSACE (CECC-G/CECC-C and CECW-PC/CECW-ZA) guidance dated 19 July 2001, relating to construction or relocations performed by the non-Federal interest and compliance with the Davis-Bacon Act (40 U.S.C. § 276a et. seq), the Contract Work Hours and Safety Standards Act (40 U.S.C. § 327 et. seq), and the Copeland Anti-Kickback Act (40 U.S.C. § 276c) in order to be eligible to receive credit for work-in-kind.

B. Non-Federal Cooperation Requirements

The local cooperation requirements for implementation of the proposed project have been discussed with the non-Federal sponsor. The sponsor understands that they will be required to provide assurances that they have the legal authority to enter into the

[1] For Phase I (FY 1995-2000), a total of $2,500,000 total was appropriated.
[2] In Fiscal Year 2001, $3,000,000 was appropriated. For Fiscal Year 2002, the Appropriations Act included $3,000,000 for the project. These FY-01-02 funds are to be shared between the Baltimore and Norfolk Districts, for work on their respective short-term projects, as well as for preparation of the joint long-term master plan.

amendment of the project-cooperation agreement, and are able to execute these responsibilities.

The non-Federal requirements for implementation include:

- Contribute 25 percent of total project costs:
- Provide all lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Government determines the Non-Federal Sponsor must provide for the implementation, operation, and maintenance of the Project, and shall perform or ensure performance of all relocations that the Government determines to be necessary for the implementation, operation, and maintenance of the Project.
- Provide, during construction, any additional costs as necessary to make its total contribution equal to 25 percent of the project costs.
- For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government.
- Give the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.
- Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.
- Hold and save the Government free from all damages arising for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors.
- Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.
- Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.
- Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or

rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project.

- To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.
- Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public law 91-646, as amended by title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.
- Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

IX. Operation and Maintenance

Operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) is expected to be limited to the monitoring and policing of the sanctuary and reserve areas. The local sponsor will incorporate the Corps-MdDNR project into its long-term monitoring program.

Areas designated as permanent sanctuaries will be planted at a higher density of spat to promote increased oyster productivity. The remaining project area will classified as "reserves" and will be closed to harvest until the oysters have sufficient time to develop to reproductive size for at least a full year. These reserve areas are expected to remain closed for an estimated four years. At the end of the reserve period, the non-Federal sponsor could then open the area for managed harvest. The non-Federal sponsor will develop a plan for monitoring and policing the sanctuary and reserve areas.

X. Real Estate Requirements

As was the case for Phase I, Phase II activities will take place on the Chesapeake Bay bottom, below the mean high water mark. The bay bottom is owned by the State of Maryland, but is under the navigational servitude of the Federal Government. At the time that the Phase I Chesapeake Bay Oyster Recovery Project, Maryland decision document was approved, it was determined that the Federal Government could proceed on this project under navigational servitude with no further permissions from the State, nor would the State receive credit for the value of their real estate under navigational servitude. This is fully explained in Appendix F, Real Estate Plan of the Phase I main report.

XI. Recommendations

The proposed Phase II activities have been developed as part of a major goal of the EPA Chesapeake Bay Program's Chesapeake 2000 Agreement, of which the Corps is a partner, to increase oyster populations ten-fold by 2010. The Corps project was developed in conjunction with, and is supported by environmental interests such as the Chesapeake Bay Foundation, and the Oyster Recovery Partnership, and is a key part of EPA's oyster restoration goal. The project has been designed to complement activities undertaken by private citizens, environmental groups, and local, state and Federal agencies. Baltimore District has worked closely with these interests to efficiently allocate resources based upon the particular expertise and missions of the respective parties.

MdDNR, who has demonstrated expertise in the field of oyster habitat restoration, has proven to be a willing and able sponsor. Moreover, the inclusion of this cost-shared project will contribute in part to a much larger Virginia-Maryland Chesapeake Bay-wide effort to increase oyster populations ten-fold by 2010. The Phase II oyster recovery activities will demonstrate the Baltimore District's continued ability and dedication to preserve aquatic ecosystems and its commitment to the health of the Chesapeake Bay.

Therefore, I recommend that the oyster project be extended by two construction years with an associated cost increase of $3.4 million.

Date: 29 May 02

CHARLES J. FIALA, JR.
COL, Corps of Engineers
District Engineer