US Army Corps
of Engineers
Baltimore District

ENVIRONMENTAL ASSESSMENT

CHESAPEAKE BAY OYSTER RECOVERY PROJECT

MARYLAND

Prepared By:
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FINDING OF NO SIGNIFICANT IMPACT

CHESAPEAKE BAY OYSTER RECOVERY PROJECT

MARYLAND

The Baltimore District, U.S. Army Corps of Engineers, in cooperation with the Maryland Department of Natural Resources, is conducting the planning, engineering, and design of the Chesapeake Bay Oyster Recovery Project in Maryland. Project construction will be initiated in 1996 with upgrades to the Piney Point hatchery. Construction activities will occur over a five-year period and include the following: creation of new oyster bars and rehabilitation of existing non-productive bars; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters or "spat"; and planting of spat produced at hatcheries and harvested from seed bars on new and rehabilitated bars. Monitoring of implemented projects will continue for three years after project implementation. Project activities will occur within Oyster Recovery Areas (ORAs) established by the Maryland Oyster Roundtable Action Plan in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers, and potentially in other Maryland waters of the Chesapeake Bay.

The purpose of the project is to restore oyster habitat and to increase oyster populations in the Maryland portion of the Chesapeake Bay. Oyster populations have declined dramatically since the turn of the century, largely due to parasitic diseases, overharvesting, and a loss of habitat. Oysters, which are filter feeders, improve water quality in the Chesapeake Bay, and oyster bars provide valuable habitat for fish, blue crabs, and other species.

An Environmental Assessment (EA) has been prepared which evaluates the potential environmental impacts associated with the proposed project. The EA was prepared in accordance with the provisions of the National Environmental Policy Act of 1969, as amended. Potential impacts were assessed with regard to the physical, chemical, and biological characteristics of the aquatic and terrestrial ecosystem, endangered and threatened species, hazardous and toxic materials, aesthetics and recreation, cultural resources, and the general needs and welfare of the public. In accordance with Section 404 of the Clean Water Act, a Section 404(b)(1) analysis was conducted for the proposed actions. The analysis determined that the project would result in beneficial impacts to the aquatic environment.

Upon reviewing the EA, I find that potential negative environmental impacts to benthic and open water habitat associated with implementation of the project will occur over a relatively small area and will be primarily short-term in nature. The project will produce a net beneficial impact to the environment through the creation of habitat for oysters and other species associated with oyster communities. Based upon this finding, preparation of an Environmental Impact Statement is not required.

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Colonel, Corps of Engineers
District Engineer

January 29, 1996

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MARYLAND

This Environmental Assessment (EA) identifies and assesses the potential environmental impacts associated with the Chesapeake Bay Oyster Recovery Project in Maryland. The project is to be conducted by the Baltimore District, U.S. Army Corps of Engineers, in cooperation with the Maryland Department of Natural Resources (MDDNR). This project is proposed under Section 704(b) of the Water Resources Development Act of 1986, which provides authority for the Corps to conduct projects of alternative or beneficially modified habitats for fish and wildlife, including but not limited to man-made reefs for fish.

This EA was prepared in accordance with the provisions of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations 40 CFR 1500-1508, U.S. Army Corps of Engineers Regulation 200-2-2 "Procedures for Implementing NEPA," and 33 CFR 230.

1.0 PURPOSE AND NEED OF THE PROPOSED ACTION

1.1 Purpose. The purposes of the project are to restore oyster habitat and to increase populations of the eastern or American oyster (*Crassostrea virginica*) in the Maryland portion of the Chesapeake Bay. In addition to having economic value as a commercial fishery, oysters provide significant environmental benefits. Oysters, which are filter feeders, improve water quality in the Bay by removing plankton and nutrients from the water column. Oyster bars or reefs provide valuable habitat for many organisms, including crabs, clams, barnacles, mussels, and other invertebrates which are important food items for higher order prey. Oyster bars are frequented by blue crabs, striped bass (rockfish), white perch, weakfish, flounder, and many other species.

Oyster restoration is a significant component of current efforts to restore the Chesapeake Bay ecosystem. The proposed project supports objectives of the Chesapeake Bay Program and the Maryland Oyster Roundtable. The project is also consistent with the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay* of 1994.

1.2 Need. Oyster populations in Maryland and Virginia have declined dramatically since the turn of the century, largely due to parasitic diseases, overharvesting, and the loss of habitat. Oyster harvests in Maryland have declined from 3.2 million bushels in 1973 to 79,617 bushels in 1994. The 1994 harvest represents a 35 percent decline from the 1993 harvest and a 95 percent decline from the 1986 harvest (MDDNR 1995). Increased mortalities of oysters in the Bay have followed the increased prevalence of two parasites: Dermo (*Perkinsus marinus*) and MSX (*Haplosporidium nelsoni*). These parasites are single-celled organisms that infect oysters and cause significant mortalities within the first two years of life.

Harvesting has contributed to the reduction of oyster habitat by the removal of shell, thereby

flattening and fragmenting oyster bars. It is estimated that oyster habitat is 50 percent or less of what it was a century ago (Rothschild 1994). Flattening of bars places oysters lower in the water column with a reduction in water current, food availability, and oxygen. Increased sediment loads in the Chesapeake Bay from agricultural and urban runoff and construction activities impact water quality and have adversely affected oyster habitat. Free-swimming oyster larvae attach to oyster shells or other hard substrate in a process known as "setting." Siltation of oyster bars reduces the amount of suitable habitat for larval setting and impairs the health of adult oysters.

In 1993, the State of Maryland convened the Oyster Roundtable to address the restoration of oyster populations in the Maryland portion of the Chesapeake Bay. The 40 members of the Roundtable included Federal and state agencies, research institutions, representatives of the environmental community, regulatory agencies, industry, aquaculture and public interests. The Roundtable developed the Maryland Oyster Roundtable Action Plan as a framework for oyster restoration efforts. The Action Plan recommends establishing Oyster Recovery Areas (ORAs) in tributaries or segments of tributaries to the Bay that are to be managed in innovative ways to support restoration of oyster populations. These ORAs will be managed to (1) control the spread of disease and abate disease occurrence in stocks within low salinity zones; (2) improve opportunities for private aquaculture; and (3) create oyster sanctuaries that limit harvest and control disease introduction and allow recovery of oyster populations. Specific management strategies for each ORA are currently being developed (Jordan 1994).

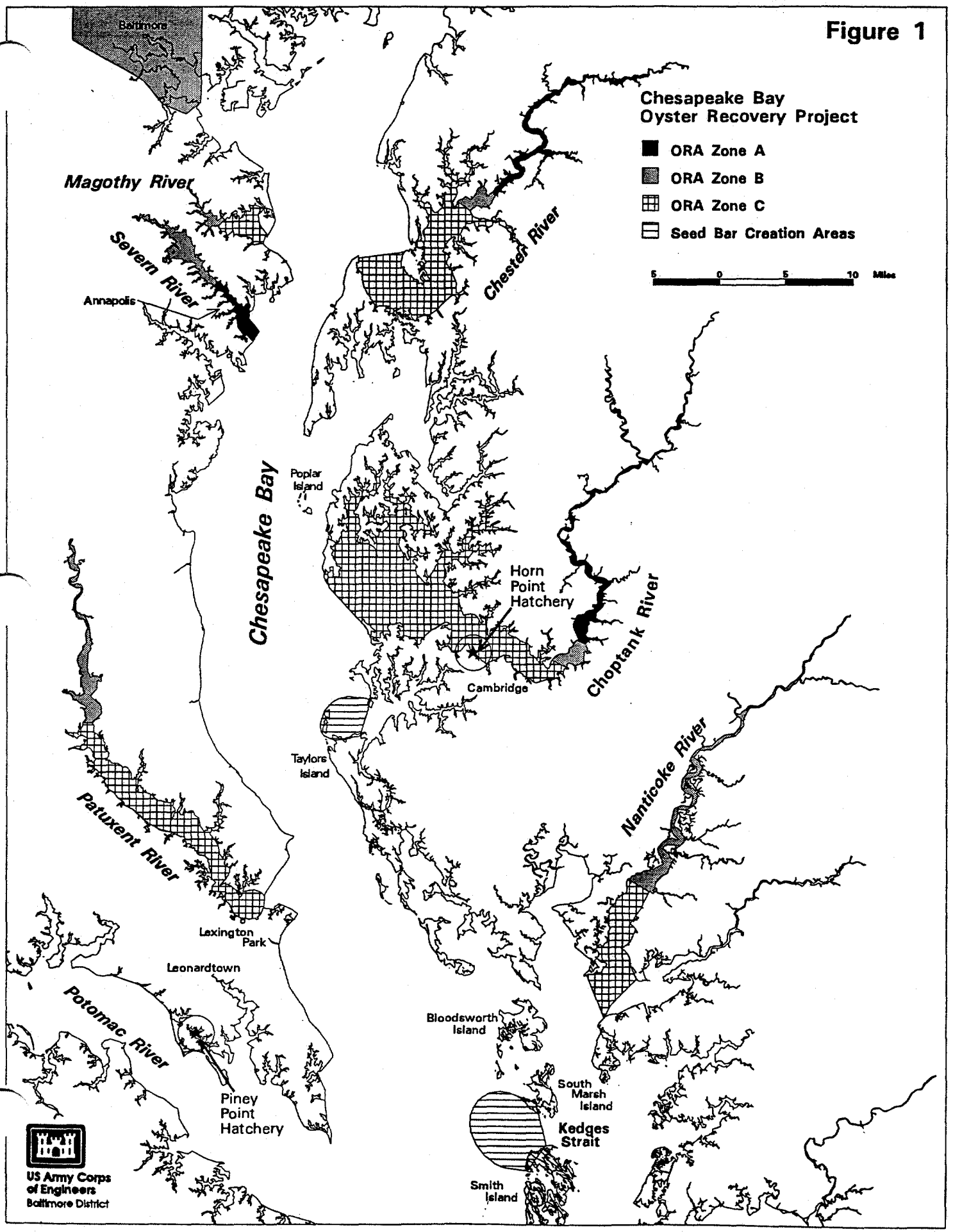
2.0 DESCRIPTION OF THE PROPOSED ACTION

Due to changing environmental conditions and prevalence of disease and in order to utilize new knowledge and technology, this project has been designed to be flexible in its actions and locations. Activities which are planned at this time are described. Project activities will occur within Oyster Recovery Areas (ORAs) in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers (Figure 1). The Oyster Roundtable Action Plan includes designation of zones within ORAs. Zone A is generally the zone of lowest salinity levels in each ORA. In Zone A, shellfish harvesting will be temporarily suspended, and only oyster seed certified as disease free will be planted. Zone B is generally located downstream of Zone A, or it is the lowest salinity zone in rivers without a Zone A. In Zone B, shellfish harvesting is allowed, but only disease-free seed can be planted. Zone C lies downstream of Zone B and comprises the highest salinity area within each ORA. Shellfish harvesting is allowed in Zone C, and natural oyster seed (i.e. not certified as disease free) can be planted. 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.

2.1 Hatchery Upgrades

2.1.2 Horn Point Hatchery

A greenhouse will be constructed for the production of algae to feed oyster larvae. The greenhouse will be approximately 36 feet by 42 feet and will be constructed between the existing



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Source: Maryland Department of Natural Resources Shellfish Program

hatchery building and concrete tank pad. The greenhouse will include an evaporative cooling system, a heating system, and an aeration system. Three oyster larval tanks and eight mass algal tanks will be installed inside the greenhouse. New oyster larval tanks will include tempered filtered, ambient filtered, and ambient raw seawater lines connected to existing lines. The new mass algal tanks will be provided with ambient, tempered ambient, and filtered seawater lines connected to existing lines. The new mass algal tanks will be connected to the existing algal distribution system. The new greenhouse algal distribution system will be connected to existing oyster setting tanks located adjacent to the greenhouse. Remote setting equipment, including two fiberglass tanks, heaters, a rotary blower, and a discharge pump, will also be provided.

2.1.3 Piney Point Hatchery

Three new water intake lines will be installed to replace the existing intake line from St. George's Creek to the pumphouse. These intake lines will connect to two new pumps and one existing pump in the pumphouse. A new drain line will be installed at the grow-out building (Plant #4).

At the main hatchery building (Plant #1), a new drain line and a new water supply line will be installed. Six new 2,900 gallon fiberglass tanks will be installed in the hatchery area, and six new 2,900 gallon tanks will be installed adjacent to the hatchery area for oyster larvae culturing. New rapid sand filters and a pipeline will be installed to deliver filtered saltwater to individual tanks. A regenerative blower and a pipeline will be installed to deliver high volume, low pressure air to individual tanks. Pipelines will be suspended overhead. Electrical work will be conducted at both buildings.

2.2 Aquatic Activities

Aquatic activities are currently planned to occur within the limits of legal bars, also known as natural oyster bars (N.O.B.'s) within ORAs shown in Figure 1. If additional ORAs are designated or environmental conditions change, project activities may occur in other locations. Specific locations for bar creation and rehabilitation will be determined based surveys of bottom composition and benthic communities, salinity, water depth, water currents, dissolved oxygen levels, and disease prevalence. The GIS being developed at the MDDNR Cooperative Oxford Laboratory will also be utilized.

Aquatic activities will involve the placement of oyster shell obtained by dredging fossil oyster shell or other means. Oyster shell and seed oysters will be transported to project sites by barge and placed overboard by front-end loaders and/or high-pressure water "cannons".

2.2.1 Seed Bars

An initial seed bar will be constructed at Kedges Straits, north of Smith Island (Figure 1). The area will have a solid bottom so the shell will not subside into the sediment and will be in an area noted for high oyster spat production. The bar will be 10 acres and may be expanded in subsequent years. Seed bars will be constructed between June and July, prior to the mid-summer oyster spawn. Shell will be placed at a quantity of 12,500 bushels per acre. Surveys during the fall will assess the level of spat set and the density of seed on the bar.

The seed bar, which is normally harvested and moved in the spring, could be harvested that same fall. The fall harvesting, which has been performed experimentally by MDDNR, is an attempt to relocate spat prior to disease infection. However, the size of the oyster at this time may result in higher mortalities due to physical abrasion. Spat is usually moved in the spring when the oysters have grown to a larger size and loss due to transportation is lower.

Seed bars will be harvested by dredging the entire site and evaluating the amount of spat on the shell. The normal amount of yield using this method is 25 percent of the shell planted (i.e. 100,000 bushels of cultch produces 25,000 bushels of spat). The spat harvested will be used to "seed" (plant) new or rehabilitated oyster bars created under this project. Spat harvested from seed bars will be planted in Zone C unless it can be "certified" as disease free. If it can be certified, the spat can be planted in Zones A or B. Seed bars will only be harvested the initial fall and/or spring following creation.

Seed bars will be monitored in part for disease, growth, and abundance. Siting of subsequent seed bars will be based on the harvest success of the initial bar. An alternate location for seed bar creation is the mouth of the Little Choptank River near James Island.

2.2.2 New Bars

New bars will be created within existing legal oyster bars on substrate which is firm but has a lack of shell to support oysters. Depending on location, new bars will be placed in water depths between 8 and 25 feet. New bars may either be harvested or protected (i.e. designated as non-harvestable areas).

It has been speculated the morphology of oyster bars may contribute to health and productivity. Bars of various sizes (height of the bar from the bottom) and different shapes may influence the speed at which water currents flow across the oysters. 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 oysters. Current speeds are expected to be greater across bars with greater height. Other factors which could affect oyster productivity, including salinity, food availability, sediment, and dissolved oxygen concentrations, tend to vary with water depth.

New bars can be constructed in Zones A, B, or C. This project will include construction of new bars using 5,000 bushels per acre and 10,000 bushels per acre to investigate differences in productivity. Shell will be placed in June and July to create new bars. Bars will differ in size and shape to investigate variation which may increase productivity and growth. Two different morphologies will be constructed and compared. The first form is a "flat" bar. This type of construction represents an even distribution of shell over the entire bar. The end result will not be entirely flat but an area undulating with small hills and valleys. The second form considered is a "mound". The shell for this configuration will be concentrated in one or more areas thereby providing relief higher than the flat areas. The more mounds within a given site, the lower they will be, since all sites will receive 10,000 bushels of shell per acre.

New bars placed in Zones A and B will be planted with hatchery-produced spat or natural seed (harvested from seed bars) which has been certified as disease free. However, since Zone B, in

certain dry years of higher salinities, may receive a natural set, shell could be placed in this zone without seeding.

New bars created in Zone C can be planted with hatchery or natural seed or not be planted to receive a natural set. Seed placed in Zone C does not have to be certified as disease free.

2.2.3 Rehabilitation of Existing Bars

Some productive oyster bars have experienced increased sedimentation or have settled into the substrate to an extent that larvae cannot set. Rehabilitation of non-productive or low-productivity bars will occur within the boundaries of existing legal oyster bars mostly in Zones B and/or C of ORAs. Rehabilitation of existing bars will occur using three different methods: raising, reclamation, and cleaning .

Raising an existing bar will be accomplished by creating mounds with dredged shell at 5,000 bushels of shell per acre. The mounds will vary as to overall size and height depending on the depth of the existing bar but should create a series of mounds over the area. This hill and valley concept may produce a healthier oyster due to increased flows across the bar. The reef mound will provide more surface area as compared to a relatively flat area, and therefore increase habitat diversity. To assess the success of the mounds some will be created in sanctuaries or non-harvest areas. The mounds may be allowed to have a natural set or could be planted with either hatchery seed or natural seed.

Reclamation will be performed by the use of a hydraulic clam dredge. The dredge will excavate the shell from the sediment, transport the shell by conveyor belt and store the shell on a barge or some other vessel. The shell will be transported to a central area in the bar for placement. The reclaimed bars may be allowed to set naturally or could be planted with natural or hatchery seed. The effort involved with reclamation will be evaluated to determine economic feasibility.

Cleaning will be conducted by using a "bagless" oyster dredge. The oyster dredge will penetrate the substrate a couple of inches, pick up shell and redeposit it on the surface of the bar. The shell should then be clean and allow for possible revitalization of the site and larval attachment. Bars which have been cleaned may have hatchery or natural seed planted at the same rate as new bars, or allowed to set naturally.

2.2.4 Disease-Resistant Strains of Eastern Oyster

Seed of disease-resistant strains of *C. virginica* will be produced at State hatcheries and used initially on new bars in the Chester and Choptank Rivers. The new strains will be planted on bars having mound and flat configurations. Spat of these new strains will be planted at the same rate as in the new bars. New strains will be placed in Zones A and C to determine their resistance to disease pressure.

2.2.5 Monitoring

The project relies on observations of created or rehabilitated bars to allow management decisions for subsequent activities. Monitoring will investigate the performance of the project with respect to oyster habitat creation, increased populations, and disease resistance. Issues which should be addressed include but are not limited to the following:

When does natural spat become infected by disease, particularly Dermo?

Can natural spat be successfully harvested for planting before infection, i.e., in the fall?

Will 5,000 bushels of shell per acre support oyster habitat as well as 10,000 bushels per acre?

Is there a difference between mounded and flat bar morphologies regarding growth, disease resistance, setting capacity, etc.?

Are different strains of *C. virginica* more disease resistant or productive compared to the native strain?

What is the cost effectiveness of different rehabilitation methods?

Are there differences between natural and hatchery seed with regard to growth and productivity?

Results of initial monitoring will help determine locations for bar creation, effects of rehabilitation, timing of transplanting, bar morphology, and comparison of natural and hatchery seed.

Seed Bars will be monitored for spat attachment, size, growth, mortality, density, and disease acquisition. Frequent monitoring will be conducted to determine disease acquisition. This could allow for movement of the spat prior to disease acquisition. The entire bar habitat may be sampled and analyzed for species diversity.

New Bars will be monitored for growth, mortality, presence of disease, and density of the community. The bars will be created to investigate the success of different bar morphologies, new strains, and natural seed and hatchery seed. In addition the composition of the benthic community and associated organisms will be investigated.

Rehabilitated bars will be observed for growth, spat density, mortality, and prevalence of disease. Other parameters which could be noted are the composition of the benthic community and associated organisms inhabiting the bar. An economic evaluation will be made as to the success of rehabilitation and compared to creation of new bars.

A complete and more detailed monitoring plan will be developed by the Corps and MDDNR in conjunction with the Oyster Roundtable Steering Committee. Details such as frequency, methodology, procedures, and duration of monitoring will be established prior to any construction.

3.0 ALTERNATIVES CONSIDERED

3.1 The "No-Action" Alternative. CEQ regulations on implementing NEPA require a no-action alternative as a benchmark against which proposed actions are evaluated. The no-action alternative would consist of not implementing the proposed project. This alternative does not support the project goals of restoring oyster habitat and increasing oyster populations in the Maryland portion of the Chesapeake Bay. If no action is taken, oyster habitat would not be created through the construction of new bars nor restored by the rehabilitation of non-productive bars. In addition, hatcheries would not be upgraded and seed bars would not be created to increase the production of oyster seed for use in oyster restoration activities. Environmental benefits associated with increased oyster populations would not be realized. In addition, the no-action alternative does not support the goals and objectives of the Maryland Oyster Roundtable and the Chesapeake Bay Program.

3.2 Alternative Project Activities

See Table 3-1 for a summary of activities which were considered during formulation of the project.

Alternative 1 Hatchery Upgrades - Upgrades to the hatcheries at Horn Point and Piney Point will increase the production of oyster seed for restoration activities. Hatcheries are currently the only source of oyster seed which can be certified as disease free. Remote setting is utilized by the Horn Point hatchery. Remote setting involves transporting hatchery-produced "eyed" larvae (larvae which are ready to set) to the river system where they will be planted for placement in mobile tanks for a period of 5 to 7 days prior to planting.

Alternative 2 Seed Bar Construction - Seed bars will be constructed in high salinity areas with a high rate of spat set. Seed oysters will be harvested from these bars for planting in low salinity areas with low rates of spat set and a lower incidence of disease.

Alternative 3 Seed Bar Harvest and Planting - Seed bars will be harvested the fall and/or spring following creation. It is thought that the harvest of seed bars over multiple seasons may increase the likelihood of infection with disease due to the presence of older year classes. Therefore, seed bars will only be harvested the initial season following creation.

Alternative 4-a New Bar Construction - New bars will be constructed to create oyster habitat in all ORA zones. Through the construction of new bars in flat and mounded morphologies, the effects of bar morphology on oyster productivity can be investigated.

Alternative 4-b Alternative Materials for Bar Construction - Due to the limited availability of oyster shell for oyster restoration efforts, alternative materials have been used to provide substrate for the placement of shell or oyster seed. Clean dredged material from Baltimore District

Table 3-1: Assessment of Alternatives
Oyster Recovery Project

Alternative Considered	Environmental Acceptability	Technical Feasibility	Cost Effectiveness	Meets Project Objectives	Consistent With Maryland Oyster Roundtable Action Plan
1. Hatchery Upgrades	High	High	High	High	High
2. Seed Bar Construction	High	High	High	High	High
3. Harvest & Plant Natural Seed*					
a. spring harvest					
b. fall harvest	Medium	High	High	High	High
4. New Bar Construction					
a. flat/mounded morphologies	High	High	High	High	High
b. alternative materials	High	High	High	High	High
5. Existing Bar Rehabilitation					
a. raising (add shell)	High	High	High	High	High
b. cleaning (bagless dredging)	High	High	High	High	High
c. reclamation (clam dredging)	Medium	Medium	Medium	High	High
d. clean & dry shell	Medium	Medium	Low	Medium	High
e. vacuum (Connecticut method)	Low	Low	Low	Medium	High
6. Plant Hatchery Seed					
a. native *C. virginica*	High	High	Medium	High	High
a. strains of *C. virginica*	High	High	Low	High	High
b. non-native species (i.e. *C. gigas*)	Low	Low	Unknown	Low	Low**
7. Aquaculture Projects	Medium	Low	Unknown	Low	High
8. No Action	Low	N/A	N/A	Low	Low

*Ratings for this activity assume only seed certified as disease-free will be planted in low salinity zones.
**Preparation of EIS would be required for introduction of exotic species.

maintenance dredging could be placed in geotextile tubes and covered with a layer of oyster shell for bar creation. Dredging projects typically occur within a short timeframe, and funding availability is often uncertain. Therefore, this alternative was not included as part of the project.

Alternative 5 Existing Bar Rehabilitation - Various methods to rehabilitate existing non-productive oyster bars were considered. To provide a suitable substrate, clean shell could be placed on the existing bar and then planted with oyster seed (Alternative 5-a). The project will include placement of shell on existing bars.

Oyster shell buried by sediment can be recovered by bagless dredging, which deposits the clean shell in the same area (Alternative 5-b). 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 (Alternative 5-c). The project will include bagless dredging and use of a clam dredge for bar rehabilitation.

The prevalence of disease may be reduced by the removal of diseased oysters and shell and placing 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 (Alternative 5-d). 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 then placed on the vacuumed bar (Alternative 5-e). These alternatives were rejected due to potential environmental impacts and expense.

Alternative 6-a Planting of Hatchery-Produced Seed - Oyster seed produced at the Piney Point and Horn Point hatcheries will be planted on new and rehabilitated bars. It has been speculated that the prevalence of disease can be reduced through the planting of disease-free oysters in currently infected areas. Hatchery seed which has been certified as disease-free can be planted in Zones A and B of ORAs.

Alternative 6-b Planting of Disease-Resistant Strains - Current research is focused on developing disease-resistant strains of the eastern oyster (*Crassostrea virginica*). Researchers at Rutgers University have employed genetic breeding techniques to develop strains of *C. virginica* that are resistant to MSX. Although Dermo did not impact oyster populations in the Chesapeake until the late 1980's, it has been an inhabitant of the Gulf of Mexico and other southern waters since the 1950's. Oysters from Texas, Louisiana, Florida, and the Carolinas are being studied to identify populations that are less susceptible to Dermo and disease progression. Disease-resistant strains will be planted to determine their viability in the natural environment and response to disease pressure.

Alternative 6-c Planting of Non-Native Oyster Species - Research indicates that the Japanese oyster (*Crassostrea gigas*) is resistant to MSX and Dermo. The Maryland Oyster Roundtable Action Plan recommends the preparation of an environmental impact assessment prior to the introduction of a non-native species of oyster to the Chesapeake Bay. Due to the potential for adverse impacts to native species and ecosystem functions, many environmental groups and agencies are strongly opposed to the introduction of exotic species. Therefore, this alternative was

not included as part of the proposed project.

Alternative 7 Aquaculture Projects - The Roundtable Action Plan recommends the implementation of aquaculture demonstration projects, such as floating raft culture. Aquaculture, as part of private industry, is not within the environmental restoration mission of this project. Therefore, this alternative was not included as part of this project.

3.3 Alternative Project Locations. Project activities are currently planned to occur within ORAs and seed bar creation areas shown in Figure 1. The MD Oyster Roundtable Action Plan established ORAs as a focus for oyster restoration activities within the Maryland portion of the Chesapeake Bay. Additional ORAs may be designated in the future. The seed bar areas are currently used by MDDNR and are known to be areas of high spat set and oyster productivity.

4.0 AFFECTED ENVIRONMENT

4.1 Project Area Description

4.1.1 Land Use. The Chester, Choptank, and Nanticoke Rivers are located on the eastern shore of Maryland. The headwaters of the Chester River extend into New Castle County, Delaware. The headwaters and upstream portions of the Chester River drain predominantly agricultural areas. The headwaters of the Choptank River extend into Kent County, Delaware. The upper portions and headwaters of the Choptank also drain an extensive area of predominantly agricultural land. Most of the upper portions and headwaters of the Nanticoke River lie within Sussex County, Delaware. The Nanticoke River watershed is sparsely developed, and is comprised mostly of agricultural lands and wetlands.

The Magothy, Severn, and Patuxent Rivers are located on the western shore of Maryland. The Magothy River is located between the Patapsco and Severn Rivers. The Magothy is approximately seven miles long, and its watershed has been heavily impacted by urban and suburban development. The Severn River is located between the South and Magothy Rivers, and drains mostly urban and suburban areas of Anne Arundel County. The Patuxent River drains about a tenth of the total land area of Maryland. The watershed of the Patuxent River has been undergoing rapid urbanization over the past three decades and has suffered significant losses of agriculture, forest, and wetland areas.

The Piney Point hatchery is located along St. George's Creek in St. Mary's County, Maryland. The Horn Point Environmental Laboratory is located along the Choptank River in Dorchester County, Maryland. Land use in the vicinity of the hatcheries is predominantly agricultural.

4.1.2 Geology. The Chesapeake Bay lies within the Atlantic Coastal Plain Physiographic Province. The Coastal Plain is underlain by young, poorly consolidated sediments, covered in areas by unconsolidated terrace and alluvial deposits.

4.1.3 Soils. A large database of bottom sediment characteristics in the mainstem of the

Chesapeake Bay was collected during the early 1980's for the U.S. Environmental Protection Agency (EPA). In general, areas with water depths greater than 25 feet contain soft substrate.

The Piney Point hatchery facility is located on Othello silt loam (Ot) soils, with a small area of Mattapex loams (MuA, MtA). Dominant soil at the Horn Point hatchery is Mattapex silt loam (MsA), with some eroded Mattapex soils (MsB2) and Tidal Marshes (TM). Othello soils are poorly drained, sandy soils, while Mattapex soils are moderately well-drained loamy soils.

4.1.4 Topography and Drainage. Coastal Plain topography is characterized by rolling hills and broad open valleys with streams that have flat slopes and shallow channels. The Chester River is a drowned river valley and is characterized by a relatively deep channel extending from the Chesapeake Bay to Chestertown, with broad shallow flanks in the downstream estuarine reaches. The Choptank River is also a drowned river valley characterized by a relatively deep channel extending from the Bay to Denton, with broad shallow flanks in the downstream estuarine reaches.

The Magothy and Severn Rivers are relatively small coastal plain rivers, with well-developed estuaries in their lower reaches. The Magothy and Severn have narrow valleys lined with steep, eroding bluffs. Both the Severn and Magothy have deep central channels, and generally lack large areas of shallow water.

The Nanticoke River flows from the central portion of Delaware through the lower eastern shore of Maryland into the northern end of Tangier Sound. The Patuxent River drains piedmont and coastal plain areas encompassing approximately one-tenth of the land area in Maryland. The estuarine reaches of the Patuxent are narrow, and some reaches are enclosed by high banks. The Patuxent is the deepest Maryland tributary to the Chesapeake, with depths over 130 feet, but it has sufficient shallow areas to support a large amount of oyster habitat.

4.1.5 Climate. The climate of the Chesapeake Bay area is temperate and humid. Temperatures vary moderately in four well-defined seasons. Winters are mild with the coldest months being January and February with temperatures averaging about 30 degrees Fahrenheit (F). The warmest month is July with temperatures averaging in the upper 80's.

Climate and subsequent changes in salinity affect the distribution and intensity of MSX and Dermo. Due to the inflow of freshwater to the Bay and decreased salinity, disease is generally less virulent in years of high rainfall.

4.2 Air Quality. The project area is located within the Northeast Ozone Transport Region attainment area as defined by guidance published pursuant to the Clean Air Act Amendments. The Baltimore region, including Baltimore City, Baltimore County, Harford County, Anne Arundel County, Carroll County and Howard County, is classified as a serious non-attainment area for ozone. The Washington metropolitan area, including Washington, D.C., Montgomery County, Prince George's County, and Charles County, is classified as a severe non-attainment area for ozone. Queen Anne's County and Kent County, located on the eastern shore of Maryland, are classified as marginally non-attainment for ozone.

4.3 Water Quality

The Maryland Department of the Environment (MDE) monitors salinity and other water quality parameters in the ORA tributaries. Salinity near the mouth of the Chester River rarely exceeds 10 parts per thousand (ppt). The Chester has experienced some problems with dissolved oxygen, bacterial contamination, and toxic contamination.

The Choptank has a fairly wide salinity range. Salinity near the mouth of the Choptank averages about 14 ppt, and has reached 18-20 ppt in some years. The Choptank has experienced few problems with low levels of dissolved oxygen and toxic contamination. Bacterial contamination near Cambridge has caused localized problems.

Salinities in the estuarine reaches of the Magothy and Severn Rivers are typically 5-10 ppt. The Severn and Magothy have experienced chronic problems with low dissolved oxygen in summer. Bacterial contamination associated with urban point and non-point source discharges has also degraded the water quality of these rivers.

Although the Nanticoke River is one of the least developed watersheds in coastal Maryland, there have been recent concerns about possible water quality problems in the Nanticoke due to municipal, industrial, and agricultural discharges.

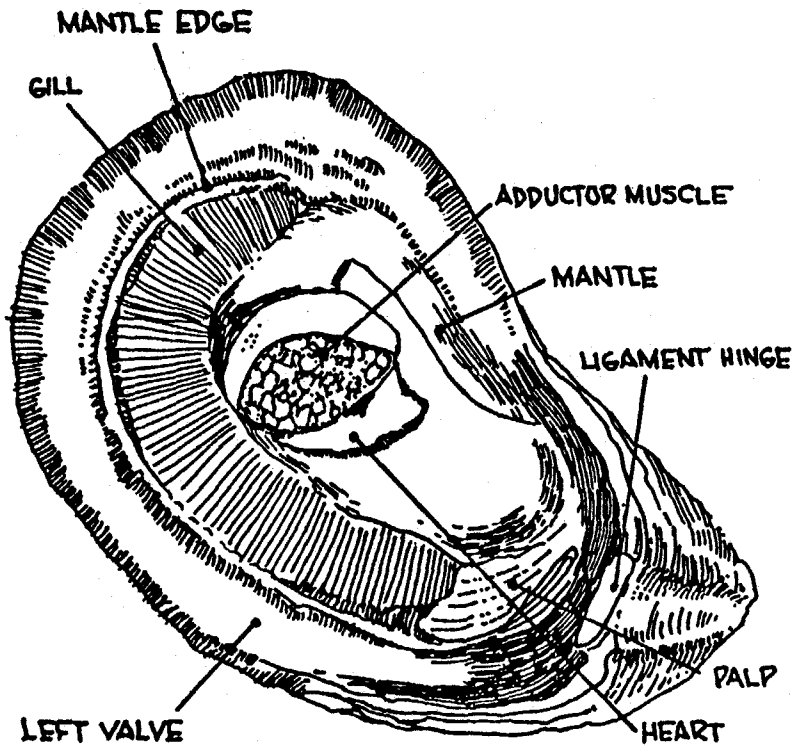
The tidal Patuxent has a wide range of salinity, from fresh water to salinities of 20 ppt or more at the mouth. Rapid development in the Patuxent watershed has resulted in increased loads of nutrients, sediments, organic matter, and other contaminants. Heavy metals are also a concern, since they can accumulate in oyster tissue.

4.4 Aquatic Resources

Eastern Oyster - The eastern oyster lives subtidally in the Chesapeake Bay, at water depths ranging from 6 to 30 feet from mean low water (MLW). In Maryland, oysters spawn from June through September depending upon water temperature (Figure 2). Larvae are free-swimming and experience heavy mortality due to predation, low salinity and low levels of dissolved oxygen. Larvae prefer a hard substrate for attachment, and the newly attached oysters are called spat. Spatfall varies widely in the Bay, with the highest rates occurring in more saline areas. Spat mortality is also high. Oysters tolerate a wide range of salinities from 5 to 30 ppt. However, salinities must remain at or above 9 ppt for successful reproduction. In Maryland, oysters reach the legal harvest size of three inches in approximately three years.

The Chester River is the northernmost river of the Chesapeake Bay that is suitable as oyster habitat. Due to low salinities, the Chester River is not an important natural oyster producing area. However, the Chester has become increasingly important as a seed transplant and grow-out area due to its low salinity character which decreases the prevalence and intensity of low salinity intolerant diseases (i.e. MSX and Dermo). The Choptank and Patuxent Rivers have historically supported significant oyster fisheries. The Nanticoke River has supported inconsistent oyster production in the past decade. The Magothy River does not have extensive oyster resources, and

Anatomy



Early Life Stages

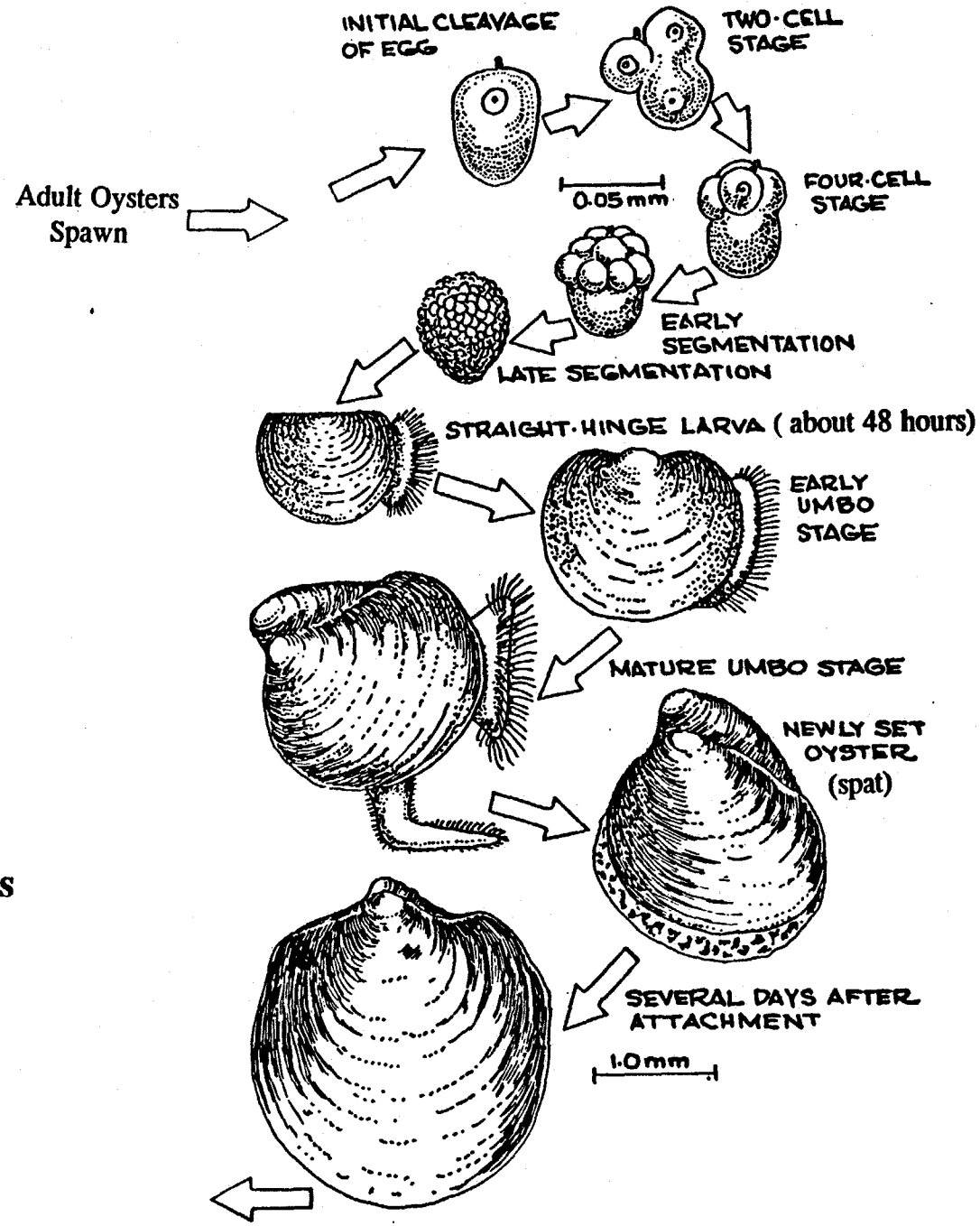


Figure 2 Anatomy and Early Life Stages of the Eastern Oyster

Source: The Maryland Oyster (Fred W. Sieling, MDDNR)

B. Species noted during the 1993 aerial survey include widgeon grass (*Ruppia maritima*), coontail (*Ceratophyllum demersum*), Eurasian watermilfoil (*Myriophyllum spicatum*), red-head grass (*Potamogeton perfoliatus*), horned pondweed (*Zannichellia palustris*), elodea (*Elodea canadensis*), and various naiads (*Najas* spp.). All SAV species in the Chester occur in water depths at or less than 6 feet (MLW). SAV within the Choptank River watershed occurs primarily in the lower tidal tributaries of ORA Zone C, and is comprised of two salinity-tolerant species: widgeon grass and horned pondweed. Both species grow in water depths generally not exceeding 3 feet (MLW). No SAV has been documented in the Nanticoke River in aerial surveys conducted from 1984 through 1994. SAV abundance in the Magothy River has rebounded in recent years. Species observed in the Magothy in 1993 and 1994 were horned pondweed, widgeon grass, and red-head grass. No SAV was observed in the Severn River during VIMS aerial surveys in 1992 and 1993. However, citizen surveys identified small beds of widgeon grass along the main river shoreline. The VIMS aerial survey in 1993 documented two SAV beds in the Patuxent River. The northernmost bed consists of eleven species, including coontail, elodea, and other freshwater species. The southern bed consists of widgeon grass and horned pondweed. In the region of Kedges Straits, higher salinity-tolerant species dominate SAV beds, including eelgrass and widgeon grass, which generally grow at water depths above 6 feet (MLW).

Terrestrial Vegetation - A forested area is located on the eastern portion of the Piney Point hatchery facility. Forests on the southern Coastal Plain typically include various pine and oak species, black gum, sweet gum, and red cedar. The proposed site for the greenhouse addition at the Horn Point hatchery has been previously disturbed and is vegetated by various grasses.

Wetlands - Several wetland areas fringe the forested area at Piney Point, including estuarine scrub-shrub and emergent wetlands. Wetland species include southern bayberry (*Myrica cerifera*), marsh elder (*Iva frutescens*), and greenbrier (*Smilax* species). Emergent wetlands are predominantly smooth cordgrass (*Spartina alterniflora*).

4.6 Wildlife Resources. Terrestrial wildlife species expected to occur at the hatchery facilities include raccoons (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), Virginia oppossum (*Didelphis virginiana*), small mammals, and various bird species.

4.7 Threatened and Endangered Species. The National Marine Fisheries Service (NMFS) has determined that Federally listed species of marine turtles may occur within project areas. Several species of turtles, including the threatened loggerhead turtle (*Caretta caretta*), the endangered Kemp's ridley turtle (*Lepidochelys kempii*), and the endangered leatherback turtle (*Dermochelys coriacea*), occasionally move into the central and upper Chesapeake Bay during warm weather months. The Atlantic sturgeon (*Acipenser oxyrhynchus*) is currently being considered for listing by NMFS. The U.S. Fish and Wildlife Service (USFWS) has proposed re-introducing Atlantic sturgeon to the Nanticoke River through the release of hatchery-raised individuals.

According to the USFWS, nests of the bald eagle (*Haliaeetus leucocephalus*), which is federally listed as threatened, occur in tidal rivers within the project area. One nest is located on the Severn River, and numerous nests occur along the Patuxent, Chester, Choptank, and Nanticoke Rivers.

4.8 Prime and Unique Farmlands. No prime and unique farmlands are located within the project area.

4.9 Wild and Scenic Rivers. No national wild and scenic rivers or river segments are located within the project area. The Severn and Patuxent Rivers have been designated as wild and scenic rivers by the State of Maryland.

4.10 Cultural Resources. The project, as a Federal undertaking, falls within the review requirements of the National Historic Preservation Act of 1966, as amended, and its implementing regulations 36 CFR, Part 800. These regulations require the agency to identify, evaluate and mitigate impacts to National Register eligible or listed cultural resources prior to project initiation, in consultation with the appropriate State Historic Preservation Officer (SHPO), and at times, the Advisory Council on Historic Preservation (ACHP).

Hatchery Upgrades - An initial Phase IA study was conducted in September 1995 at the Horn Point and Piney Point hatcheries. At the Horn Point facility, construction of a greenhouse adjacent to the existing hatchery is proposed. Field investigations determined that the greenhouse site is located in an area extensively disturbed by previous construction. At the Piney Point facility, field investigations located a lithic scatter near the present maintenance building, and documented informant knowledge of a projectile point collection area to the south of the facility.

Aquatic Activities - Coordination with the SHPO identified known submerged cultural resources within project areas in the Magothy, Choptank, Severn and Patuxent Rivers (see Appendix I). Project areas at Kedges Straits, in the upper part of the Patuxent River, and in the Nanticoke River have not been surveyed for cultural resources.

4.11 Hazardous, Toxic, and Radioactive Substances. In order to plan specific sites for project activities, a listing of Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) and Resource Conservation Recovery Information System (RCRIS) sites within the project area has been generated by the Baltimore District. The project will avoid known CERCLIS and RCRIS sites.

4.12 Infrastructure. Transportation routes in the project area include primary and secondary roads located on lands adjacent to the ORA rivers and navigation routes within the rivers.

4.13 Socioeconomic Conditions

4.13.1 Demographics. According to U.S. Department of Commerce census data, the 1990 population of the state of Maryland was 4,781,468. The population estimates for the Maryland counties bordering the Chesapeake Bay are as follows: Anne Arundel County, 427,239; Baltimore City, 736,014; Baltimore County, 692,134; Calvert County, 51,372; Caroline County, 27,035; Cecil County, 71,347; Charles County, 101,154; Dorchester County, 30,236; Harford County, 182,132; Kent County,17,842; Prince George's County, 729,268; Queen Anne's County, 33,953; Saint Mary's County 75,974; Somerset County, 23,440; Talbot County, 30,549; Wicomico County, 74,339; and Worchester County, 35,028.

There are approximately 15 million people living in the Chesapeake Bay watershed (Chesapeake Bay Program 1995). Between 1950 and 1990, population in the watershed increased from 8.4 million to 14.7 million and, by 2020, there will be an estimated 17.4 million people living in the watershed (Chesapeake Bay Program 1995). Most of this growth is expected to take place in Maryland and Virginia.

The number of oystermen in Maryland can be estimated by the number of oyster surcharges paid by tidal fish licensees. In 1992 the number of oyster surcharges paid totalled 1,578. This figure dropped to 874 in 1993. In 1994 the number of surcharges decreased again to 545, nearly 34% of the total surcharges paid in 1992. In 1995, oyster licenses demonstrated a modest increase to 875.

4.13.2 Economics. According to the Maryland Department of Economic and Employment Development (MDDEED), incomes generated from commercial fishing; activities for the ports; ship and boat building; ship repair; and tourism totalled an estimated $678 billion in 1987. This figure combines the present values of the annual incomes generated by the major annual economic activities which could not take place without the Bay as well as the land value premiums which people are willing to pay for waterfront, waterview, or water access residence.

An estimated 500 million pounds of seafood is harvested from the Chesapeake Bay annually (Smithsonian Environmental Research Center). The harvest includes menhaden, striped bass, bluefish, flounder, shad, white perch, blue crabs, hard and soft clam meats, and oysters. The dockside value of the annual oyster harvest has declined dramatically, affecting the economies of many small, water-oriented communities around the Bay. Whereas the dockside value for 1986 was $16.6 million, in 1994 the dockside value was only $1.3 million, 92 percent less. Preliminary data estimates the dockside value for 1995 to be approximately $3 million.

From 1987 to 1995, oyster harvests in the ORA rivers are as follows: 403,565 bushels in the Chester River; 749,316 bushels in the Choptank River; 44,804 bushels in the Nanticoke River; 9,370 bushels in the Magothy River; and 120,456 bushels in the Patuxent River. Table 4-4 summarizes the bushels and dockside value in the Maryland oyster industry since 1986.

Table 4-4 Oyster Harvests in Maryland

SEASON	*BUSHELS*	*DOCKSIDE VALUE*
1986	1,557,091	$16,653,862
1987	976,025	$16,516,182
1988	363,259	$7,341,501
1989	398,508	$7,443,487

1990	413,592	$9,910,448
1991	418,393	$9,451,855
1992	323,189	$6,449,539
1993	123,618	$2,686,777
1994	79,617	$1,375,465
1995	164,317	$2,382,838
1996*	98,000	-----

*1996 DATA PRELIMINARY

4.13.3 Recreation. The Chesapeake Bay region is heavily utilized for recreational activities. Hunting, camping, swimming, boating and other water-related activities are major attractions. Sportfishing is a major recreational activity. In 1987, the total economic impact associated with these activities in Maryland and Virginia was approximately $8 million (MDDEED 1989).

4.13.4 Public Health and Safety. Contamination of oysters and other shellfish with bacteria and viruses has been associated with sewage discharges, septic leaching, and stormwater runoff. Oyster harvest is restricted in various areas by MDE for public health reasons, including areas with excessive coliform bacteria counts, and setbacks from marinas and municipal discharges. Consumption of oysters infected with MSX or Dermo does not affect humans.

4.13.5 Noise. The major sources of anthropogenic noise in the project area are power boats and vehicular traffic along adjacent roads.

4.13.6 Visual and Aesthetic Values. The Chesapeake Bay region is noted for its abundance of natural resources and scenic areas.

4.14 Environmental Justice. Due to the large geographic area encompassed by the proposed project, low income and/or minority communities may exist in the project area.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 Project Area Description

5.1.1 Land Use. Specific sites for creation of new bars and rehabilitation of existing bars will be determined based on appropriate substrate (shell or firm bottom) within legal oyster bars. Historically, oyster reef communities covered large portions of the bottom of the Bay mainstem and its tributaries. Proposed activities will restore a small portion of their historic range. Proposed hatchery upgrades are consistent with current land use. Therefore, no impacts to land use are expected.

5.1.2 Geology. Installation of the greenhouse addition at the Horn Point hatchery will involve minor excavation of a previously disturbed site. The installation of water intake and discharge lines at the Piney Point hatchery will also involve minor excavation of soils. Shell recovery activities will move existing shell and minor amounts of sediment from river bottoms. Therefore, the proposed project will not impact existing geology.

5.1.3 Soils. To minimize the potential for siltation and burial of shell, shell will be placed on firm bottoms of sand, shell, gravel, etc. Hatchery upgrades will not significantly impact existing soils. The proposed sites for the drainage lines at Piney Point and the greenhouse addition at Horn Point have been previously disturbed. Disturbed areas will be restored to pre-project conditions. Terrestrial construction activities will utilize best management practices and will be accomplished using sediment and erosion control measures as required by applicable local, state, and federal regulations.

5.1.4 Topography and Drainage. Bar creation, rehabilitation and seed planting activities will increase the elevation of the existing substrate, but will not impact existing drainage patterns. Due to the limited size and extent of underwater activities, they are not expected to have any hydraulic impacts. Proposed activities at the hatcheries will not affect existing topography or drainage.

5.2 Air Quality. The project was evaluated to determine if the Clean Air Act Conformity Requirements apply (58 Fed. Reg. 63214, November 30, 1994). This project is exempt from this regulation as stated in 40 C.F.R. Section 93.153(c)(1). Impacts to air quality will be temporary. A temporary increase in emissions of volatile organic compounds, nitrogen oxides, sulfur dioxide, and carbon monoxide from construction vehicles (mobile sources) will occur. Emissions produced during construction are not expected to exceed ambient air quality standards. Temporary construction activities are generally accounted for in the Maryland State Implementation Plan.

5.3 Water Quality. Shell placement is not expected to impact water quality. However, shell recovery activities involving dredging and redepositing shell may cause temporary turbidity. The selection of sites for shell recovery will include an evaluation of bottom composition, and appropriate measures to minimize turbidity will be implemented. Long-term impacts to water quality as a result of the creation and restoration of oyster habitat are expected to be positive. Oysters filter nutrients and plankton from the water column, thereby improving water quality.

Hatchery upgrades are not expected to impact water quality in adjacent surface waters. Appropriate erosion and sediment control techniques will be implemented during construction activities at Piney Point and Horn Point.

5.4 Aquatic Resources. The proposed project is expected to result in beneficial impacts to aquatic resources. Through the creation of new oyster bars and the rehabilitation of existing non-productive bars, a portion of historic oyster habitat will be restored. Placement of shell and seeding activities will form an elevated reef structure with greatly increased surface area for the attachment of sessile organisms (e.g. algae, barnacles, sponges, bryozoans, and tube-building worms). In addition, this reef structure will provide shelter and cover for mobile invertebrates and finfish. The three-dimensional habitat of an oyster bar results in a higher level of primary and secondary production than is produced in most other benthic substrates. Planting of hatchery-produced oyster seed and spat harvested from seed bars is expected to increase oyster populations. Shell recovery activities may cause resuspension of sediments and generate turbidity which could potentially impact fish eggs, larvae, and juvenile stages. However, this impact would be temporary, minor and confined to a limited area. Most project activities will occur in June and July, which is after the spawning season for most anadromous fish. In addition, most spawning occurs in shallow, low salinity areas, which are not expected to be used as a part of this project.

5.5 Vegetation.

Submerged Aquatic Vegetation (SAV) - Since oysters are generally restricted to water depths between 6 and 30 feet (MLW), shell placement and seeding activities will occur within this range. Therefore, these activities are not expected to impact SAV. Increased turbidity due to shell recovery activities could result in sediment deposition and reduced productivity in adjacent SAV beds. To minimize this potential impact, NMFS has indicated that time-of-year restrictions may be necessary to protect SAV from elevated turbidity within 500 yards of the activity.

Terrestrial Vegetation and Wetlands - The greenhouse addition at the Horn Point facility will be placed in a previously disturbed area that is currently vegetated by various grasses. At Piney Point, placement of a water supply line from the pumphouse to the main hatchery building (Plant #1) may be placed on an above-ground structure and will not require significant disturbance of vegetation. The water intake lines from St. George's Creek to the pumphouse will be placed to minimize impacts to wetland areas and existing vegetation. The proposed water discharge lines will be installed along existing outlet lines. Therefore, no significant impacts to vegetation will occur as a result of proposed hatchery upgrades.

5.6 Wildlife Resources. Proposed activities are not expected to significantly impact terrestrial wildlife species. Proposed upgrades at the hatcheries may temporarily displace some wildlife species. However, this impact will be temporary, and no significant changes to wildlife habitat will occur.

5.7 Threatened and Endangered Species. Based upon a review of the proposed project by NMFS, the central and upper Bay and its tributaries are not essential habitat for threatened and endangered marine turtles which may occur in project areas, and it is not anticipated that any of

the proposed activities will adversely impact these species.

The re-introduction of Atlantic sturgeon proposed by the USFWS in the Nanticoke River will likely occur within tidal freshwater reaches of ORA Zone A. Shell recovery activities, which may generate some turbidity, is not planned for this zone. Shell placement and seeding activities are not expected to impact re-introduction efforts.

Determination of specific locations for project activities will include additional consultation with the USFWS to prevent potential impacts to bald eagle nest sites and sturgeon spawning and rearing areas (see Appendix I).

5.8 Prime and Unique Farmlands. Since no prime and unique farmlands are located within the project area, there will be no impacts to this resource.

5.9 Wild and Scenic Rivers. The project is expected to to benefit the aquatic environment, and will not result in adverse impacts to state-designated wild and scenic rivers.

5.10 Cultural Resources.

Hatchery Upgrades - At Horn Point, the proposed site for construction of a greenhouse is in an area extensively disturbed by previous construction. Therefore, the proposed project will not impact cultural resources at this location. At Piney Point, the proposed water supply line from the pumphouse to the main hatchery building (Plant #1) is to be placed above-ground, and, therefore, will not impact cultural resources. The Maryland SHPO concurred that the proposed hatchery modifications would not affect cultural resources (see Appendix I). However, should subterranean construction of the water intake line become necessary at Piney Point, additional cultural resource investigations may be appropriate.

Aquatic Activities - Based upon coordination with the SHPO, site selection will be sensitive to the nature of submerged resources. Project sites will be selected to avoid submerged resources in areas that have been previously surveyed or will be in locations with a low potential for containing significant cultural resources. However, the District and the SHPO agreed that additional investigations could become necessary if sensitive areas were selected for oyster recovery actions with the potential to affect significant cultural resources.

5.11 Hazardous, Toxic, and Radioactive Substances. The proposed project is not expected to result in the use or production of hazardous materials. Determination of specific project locations for shell placement, seeding, and shell recovery activities will include consideration of CERCLIS and RCRIS listed sites, which will be avoided.

5.12 Infrastructure. The proposed project will require the use of transport vehicles and excavation equipment. Shell placement and seeding activities will involve the use of barges, tugboats, and heavy equipment, such as front-end loaders. Project activities will be short-term and are not expected to significantly impact existing transportation routes.

5.13 Socioeconomic Conditions

5.13.1 Demographics. The proposed project will not impact demographics.

5.13.2 Economics. The proposed project is expected to result in increased oyster populations, which, as filter feeders, may improve water quality in the Bay, and the restoration of oyster habitat. This may result in economic benefits through a minor increase in commercial and sportfishing opportunities. No significant adverse impacts to other fisheries are expected to occur as a result of this project.

5.13.3 Recreation. It is expected that oyster habitat restored as a result of the proposed project will support blue crabs and various species of finfish. This will have a minor positive impact to blue crab and finfish populations, and therefore to recreational fisheries.

5.13.4 Public Health and Safety. The proposed project is not expected to impact public health or safety. Determination of project locations will include avoidance of pollution sources and areas where shellfish harvest is restricted, as determined by MDE.

5.13.5 Noise. The proposed project will generate noise through the use of barges and tugboats to transport shell to project sites and the use of dredges for shell recovery activities. Proposed upgrades to the hatcheries will also generate noise through the use of heavy equipment and vehicles. However, these impacts will be short-term and are not expected to be significant. In addition, no residences are expected to be located in close proximity to project sites.

5.13.6 Visual and Aesthetic Values. Transport vehicles, boats and heavy equipment associated with the proposed project will be a temporary negative impact. Project activities, with the exception of hatchery upgrades, will occur under water, and therefore will not impact visual and aesthetic values. Proposed activities at the hatcheries primarily involve upgrades to existing systems and structures, and will not significantly impact visual and aesthetic values.

5.14 Environmental Justice. The project is expected to comply with Executive Order 12989, dated February 11, 1994 (*Environmental Justice in Minority Populations and Low-Income Populations*). The project is not expected to adversely impact any minority or low-income communities.

5.15 Cumulative Impacts. The proposed project will provide valuable information on optimal locations for bar creation, effects of different methods of rehabilitation of existing bars, effects of different bar morphologies, comparison of success of natural and hatchery-produced seed, and overall habitat development for future restoration activities. Potential negative impacts associated with the project, including increased turbidity, are not expected to be significant and will not contribute to adverse impacts to the Chesapeake Bay ecosystem. Restoration of oyster habitat associated with the proposed project, in conjunction with other restoration efforts, is expected to result in increased oyster populations and habitat area in the Chesapeake Bay and a long-term positive impact to the estuarine ecosystem. Oyster restoration activities are currently being conducted by MDDNR, the Oyster Recovery Partnership, the Chesapeake Bay Foundation, and

local conservation groups. Increased oyster populations would result in improved water quality in the Bay, and restoration of oyster bars would increase available habitat for communities associated with oyster bars, including benthic organisms, blue crabs, and finfish. In addition, oyster restoration is of economic importance to the commercial oyster fishery.

5.16 Environmental Permits and Regulatory Compliance. Project activities which occur within navigable waters are subject to authorization pursuant to Section 10 of the River and Harbors Act of 1899. The determination of specific locations for restoration activities will avoid potential impacts to navigation. Dredging of oyster shell, redeposition of sediment from dredging activities, and the deposition of shell within the Chesapeake Bay and its tributaries is subject to authorization pursuant to Section 404 of the Clean Water Act. In accordance with Section 404 of the Clean Water Act, an evaluation of the impacts of proposed project to waters of the United States was conducted (Appendix V). Water quality certification for the proposed project has been received from the State of Maryland. This project will be consistent with the Coastal Zone Management Act. A summary of compliance of the project with applicable environmental statutes is given in Appendix VI.

6.0 COORDINATION

The proposed project has been coordinated with the USFWS, NMFS, EPA, the U.S. Natural Resources Conservation Service, MDDNR, MDE, and Maryland Historical Trust. Copies of environmental coordination correspondence are included in Appendix I.

Public notices concerning the proposed project were distributed to interested persons and organizations. Two public information meetings were held on the Western Shore of the Chesapeake Bay in Leonardtown, Maryland, on September 7, 1995, and on the Eastern Shore in Cambridge, Maryland, on September 12, 1995. The two meetings were advertised in nine Maryland newspapers, including the Watermen's Gazette, which is circulated to approximately 5,000 watermen and other individuals, commercial organizations, interest groups and agencies directly involved with the Chesapeake Bay.

7.0 CONCLUSIONS

This Environmental Assessment has evaluated the proposed Chesapeake Bay Oyster Recovery Project in the Maryland portion of the Chesapeake Bay. No significant adverse environmental impacts are expected as a result of the proposed project. The findings herein have been prepared in accordance with the National Environmental Policy Act of 1969, as amended.

APPENDIX I

ENVIRONMENTAL COORDINATION

Coordination Responses

Organization	Date(s)	Comment	Response
MD Dept of Environment	9/26/95	Concern about placement of project activities near pollution sources.	Determination of specific project locations will consider water quality.
MD Dept of Environment	11/17/95	Water quality certification of project received.	
MD Dept. of Nat'l Resources	11/6/95	Concerned about of accuracy of boundaries of legal oyster bars shown on maps and terminology for bars charted during 1906-12 survey.	
MD Historical Trust	10/26/95	Concerned about effects of harvesting of project bars on submerged cultural resources.	
MD Historical Trust	11/1/95	Requested maps and plans of project activities at hatcheries.	Field report and plans sent 10/6/95.
MD Historical Trust	11/6/95	Based on field report and plans for hatcheries, project is unlikely to affect terrestrial resources.	
MD Historical Trust	12/2/95	-In the Magothy, Choptank, Severn, and Zone C of the Patuxent, submerged cultural resources should be avoided. -A Phase I survey is recommended prior to project activities at Kedges Straits, in Zone B of the Patuxent, and in the Nanticoke	-Known cultural sites will be avoided in these areas. -Surveys will be performed for project locations in undocumented areas.
National Marine Fisheries Service	9/11/95	Provided baseline information for project area in Planning Aid Report.	
	10/6/95	-Potential for sediment re-suspension during shell recovery activities. -Potential conflicts with soft-shell clam fishery. -Concerned about success of project activities in low salinity zones.	-Locations for shell recovery will evaluate bottom composition to minimize sedimentation. -Project activities will occur within legal bars to minimize impacts to clam fishery. -Project activities in low salinity areas will be planted with oyster seed.
U.S. Environmental Protection Agency	11/8/95	No comments received.	
U.S. Fish and Wildlife Service	11/7/95	Use of clam dredges for shell recovery should be monitored closely.	Reclamation activities will be included in project monitoring plan.
U.S Fish and Wildlife Service	11/30/95	-Federally listed species in project area: Atlantic Ridley turtle, loggerhead turtle, and bald eagle. Additional consultation with USFWS recommended during project implementation. -Adaptive management approach recommended for project monitoring. -Time-of-year restrictions may be necessary to protect SAV from elevated turbidity within 500 yds of project activities.	-Determination of locations for project activities will include consultation with USFWS concerning bald eagle nest sites and potential sturgeon spawning and rearing areas. -Project will utilize adaptive management. -Siting of project activities within 500 yds of SAV will be avoided.

file

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

December 13, 1995

Mr. Mark Mendelsohn
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Mendelsohn:

The Maryland Department of the Environment has reviewed the Chesapeake Bay Oyster Recovery Project for consistency with the State's Coastal Zone Management Program (CZMP), as required by Section 307 of the federal Coastal Zone Management Act of 1972, as amended. Based on recommendations of the Maryland Oyster Roundtable Action Plan, the purpose of the project is to restore oyster habitat and to increase oyster populations in the Maryland portion of the Bay. Specific activities proposed over a five-year period include the creation of new oyster bars and rehabilitation of non-productive bars; upgrading State-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters; planting spat on new and rehabilitated bars; and monitoring activities.

Based on the information provided in the Public Notice dated August 24, 1995 and the Environmental Assessment dated October, 1995, the proposed activities are consistent with the State's CZMP. Accordingly, the State concurs with the Corps' determination that the project complies with, and will be conducted in a manner consistent with the Maryland Coastal Zone Management Program.

If you have any questions, please contact me at (410) 974-2156.

Sincerely,

Elder A. Ghigiarelli, Jr.

Elder A. Ghigiarelli, Jr.
Chief, Coastal Zone Consistency
Wetlands and Waterways Program

EAGJr:cma

MARYLAND HISTORICAL TRUST

Archaeology Office

Parris N. Glend
Gov.

Patricia J. Payne
Secretary, DHCD

December 2, 1995.

Dr. James F. Johnson, Chief
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dr. Johnson:

This office has compared the maps, provided by your office, of natural and legal oyster bars extant in a number of Maryland rivers with our records of submerged cultural resources and NOAA charts for these same areas. Remains which may be potentially impacted by the proposed oyster seeding and subsequent dredging are highlighted in green. Discussion of these follows with additional commentary on areas where survey is recommended.

Figure 4a: Chester River - activities do not appear to impact known cultural resources.
Figure 7a: Magothy River - only one site may be impacted; however, because of the scale and schematic nature of the maps provided it is difficult to determine the exact placement of the site. Activities in this area may proceed with caution.
Figure 5a: Choptank River - five sites, all in Section C, fall within or lie extremely close to proposed activity areas; these areas may be avoided or plans for further investigation for assessment and evaluation made through a Phase I survey.
Figure 6a: Severn River - eight sites, all in Section A, fall within or lie extremely close to proposed activity areas; these areas may be avoided or plans for further investigation for assessment and evaluation made through a Phase I survey.
Figures 8a: Kedges Straits and 3a: Nanticoke River - on both maps the legend obscures areas where oyster bars exist. Few sites are documented for these areas because they have not yet been surveyed and the only information at hand is from NOAA charts. Because of the historic significance of the former and the absence of records for the latter, Phase I survey is recommended for areas where activities are planned for both of these regions.
Figure 2a: Patuxent River - fifteen sites fall within or lie in close proximity to proposed activity areas. However, for the most part these sites tend to cluster and this should facilitate avoidance; some also appear to lie within Navy restricted areas. It is presumed that areas farther up this river are not being considered for activity. Because of the presence of the remains of the entire Chesapeake Flotilla which served, under the command of Commodore Joshua Barney, during the War of 1812 activities outside of

Section C are not recommended without Phase I survey. Plans for a remote sensing survey in this region are currently being formulated by the Maryland Historical Trust in cooperation with the U.S. Navy and Maryland National Capital Park and Planning. It is also presumed that no activities are planned at this time for the areas of the Potomac (eg. Breton Bay) which appears at the bottom of this figure.

Phase I underwater survey should be carried out by a qualified professional archaeologist and performed in accordance with the "Standards and Guidelines for Archaeological Investigations in Maryland" (Shaffer and Cole 1994) and with Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (1983). Based upon the results of the survey, we will be able to determine whether or not the project will affect any submerged archaeological resources and make appropriate recommendations. Further consultation with our office will be necessary to fulfill compliance with Section 106 of the National Historic preservation Act of 1966; and we will discuss field methods and techniques with the archaeologist selected to perform the requested survey.

We appreciate your cooperation and assistance. If you have any questions or require further information, please contact me at (410) 514-7662.

Sincerely,

Susan B.M. Langley, Ph.D
State Underwater Archaeologist

/sl
9502235
cc: Mr. William Matuszeski
Ms. Elizabeth Gillelan
Mr. Timothy E. Goodger
Dr. Jeri L. Berc
Ms. Elizabeth J. Cole
Honorable Jane T. Nishida
Mr. Daniel J. O'Leary
Mr. W. Peter Jensen
Honorable John R. Griffin
Mr. William C. Baker
Mr. John P. Wolfin
Mr. Roy E. Denmark, Jr.
Mr. W. Michael McCabe
Mr. Mark Mendelsohn
Dr. Gary Shaffer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

November 30, 1995

Colonel Randall R. Inouye
District Engineer
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Attn: Mark Mendelsohn

Re: Chesapeake Bay Oyster Recovery Project, Maryland

Dear Colonel Inouye:

This constitutes the report of the U.S. Fish and Wildlife Service on the proposed oyster habitat restoration project in the Maryland portion of the Chesapeake Bay and tributaries. It is submitted in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). This report sets forth the Service's official position on the Corps' recommended plan as described in the Environmental Assessment dated October 1995.

PROJECT DESCRIPTION

The proposed plan to increase oyster habitat and increase populations of the American oyster (*Crassostrea virginica*) includes the following: creation of new oyster bars and rehabilitation of existing non-productive bars; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters (i.e., spat); and planting of hatchery-produced and seed bar spat on new and rehabilitated bars. The project would also include monitoring during implementation and for three years afterwards. Project activities are planned to occur within Oyster Recovery areas established by the Maryland Oyster Roundtable Action Plan in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers, and potentially in other waters of the Chesapeake Bay.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

All life history stages of the American oyster live subtidally in the Chesapeake Bay, at water depths ranging from 6 to 30 feet. Free swimming larvae prefer a hard substrate for attachment, at which time they become known as spat. Oysters tolerate a wide range of salinities, but successful reproduction requires salinities of at least 9 ppt. Salinities in the estuarine reaches of the six project rivers range from 5 ppt to more than 20 ppt. Rivers with low salinities, such as the Chester, have not been important natural oyster producing areas. The Chester River, however, has become an important grow-out area due to its unattractiveness to low salinity intolerant diseases.

The Choptank and Patuxent Rivers have historically supported significant oyster fisheries. The Nanticoke River has supported inconsistent oyster production in the past decade. The Magothy River contains no legal oyster bars, and the Severn River has historically supported a modest oyster fishery.

The project area rivers provide habitat for soft-shell clam (*Mya arenaria*) and the blue crab (*Callinectes sapidus*), as well as a variety of finfish (including freshwater resident, anadromous/catadromous, and ocean-spawning and/or estuarine species). The soft-shell clam is harvested in subtidal areas ranging in depth from 6 to 20 feet (MLW). Clam dredging is restricted within 150 feet of legal oyster bars. Spawning anadromous fish activity has been observed in low salinity zones of the project area and upstream into nontidal reaches. The project rivers are also used for nursery areas by anadromous fish.

Several species of submerged aquatic vegetation (SAV) occur in the project rivers, except the Nanticoke River, where no SAV has been documented. Most, if not all, of these SAV species occur in water depths at or less than 6 feet (MLW).

Terrestrial vegetation in the vicinity of the Piney Point and Horn Point hatcheries include a typical southern Coastal Plain forest composed of various pine(*Pinus* spp.) and oak (*Quercus* spp.)species, black gum (*Nyssa sylvatica*), sweet gum (*Liquidambar styraciflua*), and red cedar(*Juniperus virginiana*), and estuarine scrub-shrub and emergent wetlands. Wetland species include southern bayberry (*Myrica cerifera*), marsh elder (*Iva frutescens*), greenbrier (*Smilax* spp.) and saltmarsh cordgrass (*Spartina alterniflora*). Upland vegetation at the Horn Point hatchery has been previously disturbed and is vegetated by various grasses.

Threatened and Endangered Species

Three listed species occur in the project area: the Atlantic ridley turtle (*Lepidochelys kempii*), loggerhead turtle (*Caretta caretta*) and bald eagle (*Haliaeetus leucocephalus*). The National Marine Fisheries Service has the lead for the two sea turtles. Bald eagle nests occur in tidal rivers being considered for the proposed oyster recovery project. One nest is located on the Severn River and numerous nests occur along the Patuxent, Chester, Choptank, and Nanticoke Rivers. Except for occasional transient individuals, no other Federally listed or proposed endangered or threatened species are known to exist in the project impact area.

The Atlantic sturgeon (*Acipenser oxyrhynchus*) is currently a species of concern. The Service has proposed re-introducing Atlantic sturgeon to the Nanticoke River through the release of hatchery-raised individuals.

BIOLOGICAL EFFECTS OF THE PROJECT

To minimize the potential for siltation and burial of shell, shell placement will be on firm bottoms of sand, shell, and gravel. Shell recovery and placement activities involve dredging. Redepositing shell may cause temporary turbidity. Project plans call for appropriate measures to minimize turbidity, including evaluations of bottom composition to maximize shell placement on firm bottoms. Water quality is expected to improve over the long-term as a result of increased oyster production and their water filtering capabilities.

The creation of new oyster bars and the rehabilitation of existing non-productive bars is expected to result in beneficial impacts to aquatic resources. The reef structures created by the project will increase the surface area of hard substrate for the attachment of sessile organisms. The three-dimensional structure will also provide shelter for mobile invertebrates and finfish. Atlantic sturgeon are not expected to be adversely affected by the project (Skjeveland, personal communication 1995). In fact, they may benefit from the additional prey attracted to the restored oyster habitat. Planting of hatchery-produced oyster seed and spat harvested from seed bars is expected to increase oyster populations.

Potentially negative effects include impacts to the eggs, larvae, and juvenile stages of fish from the resuspension of sediments and resultant turbidity. These effects are expected to be temporary, minor and confined to a limited area.

Direct impacts to shallow submerged aquatic vegetation is not expected because of the greater depths involved in the oyster restoration project. Increased turbidity due to shell recovery activities could result in sediment deposition and reduced productivity in adjacent SAV beds.

Construction at the Horn Point hatchery will take place in a previously disturbed area vegetated by various grasses. Construction at the Piney Point hatchery involves the placement of a water intake line from St. George's Creek to the hatchery over wetland vegetation. Best management practices are proposed for this area to minimize impacts. If necessary, the water intake line will be placed on an above-ground structure.

RECOMMENDATIONS

The project is not expected to result in significant adverse impacts to fish and wildlife resources. However, the Service recommends an adaptive approach to reducing the uncertainties associated with the effects of human perturbations on natural resource recovery by viewing project activities as vehicles for learning. Rather than simply monitoring growth rates and other factors as described in the Corps' Environmental Assessment, an

xperimental approach to project implementation, with controls and replicates, is recommended. Similar, but expanded recommendations were emphasized in the Maryland Oyster Roundtable's Action Plan (December 1993).

The Service concurs with the NMFS recommendation that time-of-year restrictions may be necessary to protect submerged aquatic vegetation from elevated turbidity within 500 yards of shell recovery and placement efforts. Finally, the Service requests additional consultations with project implementors. Depending on the nature of the construction/rehabilitation activities, time-of-year restrictions may be needed for actions within one quarter mile of active eagle nest sites and during sturgeon occupation of spawning and rearing areas.

To the extent that this project restores oyster habitat and increases oyster populations in the Maryland portion of the Chesapeake Bay, it will likely enhance the ecological and economic benefits of oysters. The Service, therefore supports the Chesapeake Oyster Restoration Project. If you have any questions regarding this response, you may contact Laura Hamilton of my staff at (410) 573-4545.

Sincerely,

John P. Wolflin
Supervisor
Chesapeake Bay Field Office

BIBLIOGRAPHY

Maryland Oyster Roundtable. 1993. Action Plan.

Skjeveland, Jorgen. 1995. Project Leader, United States Fish and Wildlife Service. Personal Communication.

U.S. Army Corps of Engineers. 1995. Environmental Assessment: Chesapeake Bay Oyster Recovery Project. Baltimore District.

U.S. Fish and Wildlife Service. 1995. Letter to M. Mendelsohn concerning presence of endangered and threatened species. Chesapeake Bay Field Office.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

November 21, 1995

Mr. Mark Mendelsohn
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715
Attn: CENAB-PL-EC

Re: Chesapeake Bay Oyster Recovery Project in Maryland

Dear Mr. Mendelsohn:

This responds to your September 29, 1995, request for information on the presence of species which are Federally listed or proposed for listing as endangered or threatened in the project area. We have reviewed the information you enclosed and are providing comments in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The following Federally listed species occur in the project area:

Atlantic Ridley turtle	*Lepidochelys kempii*	*E*
Loggerhead turtle	*Caretta caretta*	*T*
Bald eagle	*Haliaeetus leucocephalus*	*T*

Because the National Marine Fisheries Service has the lead for the two sea turtles, Doug Beach of their Gloucester office should be contacted at (508) 281-9300 concerning Section 7 requirements for these species. Bald eagle nests occur in tidal rivers being considered for the proposed oyster recovery project. One nest is located on the Severn River and numerous nests occur along the Patuxent, Chester, Choptank, and Nanticoke rivers.

When site-specific plans have been developed by the Corps, they should be checked against actual nest site locations by contacting this office or Glenn Therres of the Maryland Nongame and Endangered Species Program (410-827-8612). Depending on the nature of the construction/rehabilitation activities time-of-year restrictions may be needed for actions within one quarter mile of active eagle nest sites.

Except for occasional transient individuals, no other Federally listed or proposed endangered or threatened species are known to exist in the project impact area. Should project plans change, or if additional information on

the distribution of listed or proposed species becomes available, this determination may be reconsidered. This response relates only to endangered species under our jurisdiction. For information on other rare species, you should contact Ms. Lynn Davidson of the Maryland Natural Heritage Program at (410) 974-2870.

Thank you for your interest in fish and wildlife issues. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

for John P. Wolflin
Supervisor
Chesapeake Bay Field Office

cc: John Gill (CBFO)

We appreciate this opportunity to comment. If you have any questions, please contact Dr. Gary Shaffer at (410) 514-7638.

Sincerely,

Elizabeth J. Cole
Administrator
Archeological Services

EJC/GDS
cc: Dr. Susan Langley

MARYLAND HISTORICAL TRUST

Archaeology Office

Parris N. Glendening
Governor

Patricia J. Payne
Secretary, DHCD

October 26, 1995

Dr. James F. Johnson, Chief
Planning Division
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

Dr. Johnson:

This office has reviewed only the underwater sections of the Public Notice application (and are therefore speaking for underwater concerns - terrestrial issues will be addressed by our compliance office) for the Chesapeake Bay Oyster Recovery Project in Maryland. Our office recognizes that several areas on the proposed project have significant historical properties within their boundaries. In order to preserve and protect these properties, this office should be contacts on specific areas selected, to preform our review and make appropriate determinations. Some zones represented may require a Phase I underwater survey before work can proceed. For example, Kedges Straits is an historically important area with a high potential for significant submerged cultural resources. A Phase I survey will be required here.

We also have concerns about comments made in the Corps letter of October 11, 1995, "Generally, the actions will mimic historic oystering activities in the same areas, which have been done for centuries. The bed formation will only minimally impact the surface of the submarine sites". While it is true bed formation will have minimal impact, harvesting will have and historically has had, a devastating effect on submerged heritage resources. Hence our concern that beds be created only in areas where cultural remains have first been inventoried, assessed, evaluated, and where necessary avoided or mitigated.

This office should be contacted for each specific area selected as the project proceeds, so the effect can be determined. Phase I underwater survey should be carried out by a qualified professional archeologist, and performed in accordance with the "Standards and Guidelines for Archeological Investigations in Maryland" (Shaffer and Cole 1994) and with Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (1983). Based upon the results of the survey, we will be able to determine whether or not the project will effect any submerged archeological resources and make appropriate recommendations. Further consultation with our office will be necessary to fulfill compliance with Section 106 of the National Historic Preservation Act of 1966; and we will discuss field methods and techniques with the archeologist selected to perform the requested survey.

Thank you for your cooperation and assistance. If you have any questions or require further information, please contact Dr. Susan Langley at (410) 514-7662 or Mr. Bruce Thompson at (410) 514-7663.

Sincerely,

Susan B.M. Langley, Ph.D.
State Underwater Archaeologist

SBML/BFT/SRB
9502235
cc: Mr. William Matuszeski
Ms. Elizabeth Gillelan
Mr. Timothy E. Goodger
Mr. Jeri L. Berc, Ph.D.
Ms. Elizabeth J. Cole
Honorable Jane T. Nishida
Mr. Daniel J. O'Leary
Mr. W. Peter Jensen
Honorable John R. Griffin
Mr. William C. Baker
Mr. John P. Wolflin
Mr. Roy E. Denmark, Jr.
Mr. W. Michael McCabe
Mr. Mark Mendelsohn
Dr. Gary Shaffer

CONVERSATION RECORD

TIME: DATE:10/25/95 FILE NAME:

TYPE:

TELEPHONE: VISIT:

incoming:

outgoing:x CONFERENCE:

Name of person(s) contacted:	Organizatlon:	Phone No.:
Richard Pelz	Circle C Oyster Ranch	

SUBJECT: OYSTER RECOVERY PROJECT

SUMMARY:

I called hime in response to his undated letter. His comments/concerns were as follows:

- Kingston and Little N. Solomon Creek are have NOB's at entrances.

- Kingston creek did not open into Patuxent until 1960's.

- Dredging for Navigation will eliminate flow through connecting channels which are where his oyster ground are.

- Channel dredging is for 40 ft. to accomondate development.

- He has talked to Mr. Winand in Regulatory Division of COE about proposed dredging.

- He said that his biggest concern with the Oyster Project is the proposed maintenance dredging which is not a part of the Oyster Project but the Patuxent is an ORA which should be considered.

- I told him that we would address his concerns and I would contact Mr. Winand and relay them which I did.

ACTION REQUIRED:

NAME OF PERSON DOCUMENTING CONV.	SIGNATURE	DATE
Mark Mendelsohn		10/25/95

ACTION TAKEN:

SIGNATURE	TITLE	DATE

CIRCLE C OYSTER RANCHERS ASSOCIATION
1190 MANOR DRIVE
MECHANICSVILLE, MARYLAND
20659
301-373-8662

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, BALTIMORE
P.O. BOX 1715
BALTIMORE MARYLAND 21203-1715

SUBJECT: CENAB-PL-EC

Dr. James E. Johnson

DEAR SIR:

I am replying to your notice of October 10, 1995 regarding the Chesapeake Bay Oyster Project and information I gathered by attending the public hearing in St. Mary's County. I have several questions.

1. Since this recovery plan was designed by the Maryland Oyster Round Table why have the members not been notified or asked for input?

2. Since there are 6 ORA rivers why are the first experimental projects concentrated on the Choptank and Chester rivers?

3. It appears that all of the work is intended to benefit commercial fishing interests giving them a competitive advantage over aquaculture. Why?

4. Maintenance dredging scheduled in the Patuxent ORA will damage Circle C oyster grounds unless there is a change in engineering design. I understand COE is opposing any change. Why?

Concerned,

RICHARD A. PELZ
member Maryland Oyster Round Table

cc Peter Fricke, John F. Wood Jr., Brad Powers

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Habitat and Protected Resources
Division
904 South Morris Street
Oxford, Maryland 21654

6 October 1995

Dr. James F. Johnson
Chief, Planning Division
Baltimore District
Corps of Engineers
P. O. Box 1715
Baltimore, Maryland 21203-1715

Dear Dr. Johnson:

Reference is made to your letter, dated 8 September 1995, relative to the Chesapeake Bay Oyster Recovery Project in Maryland. As requested, the National Marine Fisheries Service prepared detailed information relevant to the physical, chemical, and biological characteristics of Chesapeake Bay that will aid in drafting an Environmental Impact Statement for the proposed project. The information, which was provided to your staff under separate cover, was prepared collaboratively with the NOAA Chesapeake Bay Program Office in Annapolis. The maps were provided by the Maryland DNR Mapping and Analysis Program at the Cooperative Oxford Laboratory.

I have enclosed recommendations, which are to be incorporated into the previous submission. If you have questions concerning the recommendations or the previously submitted information, please direct them to John Nichols at (410) 226-5771 or Lee Crockett at (410) 267-5672.

Sincerely,

Timothy E. Goodger

Timothy E. Goodger
Assistant Coordinator

MARYLAND OYSTER RECOVERY PROJECT
NATIONAL MARINE FISHERIES SERVICE RECOMMENDATIONS
AVOIDANCE/MINIMIZATION OF IMPACTS
OCTOBER 4, 1995

RESOURCE/ENVIRONMENTAL IMPACTS

A. Impacts associated with cultivation and/or bagless dredging to recover shell (cultch) buried by sediment deposition

Sediment re-suspension is an anticipated consequence of both cultivation and bagless dredging. Because it is preferred that these activities are done during late spring or early summer, just prior to oyster spawning and spat set, they will likely occur simultaneously with critical activities of other important resources. For example, spawning and nursery activities for anadromous fish species occur during spring months, while most species of submerged aquatic vegetation experience vigorous growth and reproduction also during the spring.

NMFS recommends time-of-year restrictions on many types of instream activities that generate re-suspended sediments as a means of protecting anadromous fish resources and SAV from adverse impacts of these activities. For anadromous fish spawning/nursery activities, instream work is generally restricted from March 1 to June 15 (restriction period begins on February 15 when yellow perch spawn in the project area). For SAV beds lying within 500 yards of instream work activities, the restriction period extends from April 15 to October 15. Consequently, the need to perform cultivation and bagless dredging during spring and summer will conflict with our recommendations for time-of-year restrictions.

If late-spring/early-summer cultivation and/or bagless dredging are to be carried out during recommended restriction periods, other measures should be taken to ensure that impacts to local resources are minimized. Some of these measures are given below.

1. Cultivation and/or bagless dredging should be avoided within 500 yards of SAV beds, as documented by the Virginia Institute Of Marine Science aerial surveys, or groundtruth surveys. Because SAV is generally intolerant of chronic sediment deposition, areas where cultivation and bagless dredging are most suited will likely also be less important to SAV colonization.

2. Other bottom repletion activities (e.g., shell/seed planting) should be avoided within existing SAV beds. In general, most SAV beds in the Chesapeake Bay occur at depths of 6 feet (MLW) or less, minimizing potential conflict with ORP bottom repletion activities.

3. In general, cultivation and bagless dredging will occur downstream of primary anadromous fish spawning areas. However, because larval and juvenile anadromous fish move downstream into tidal oligohaline nurseries within a relatively short time after adult spawning, they will be subject to potential impacts from these bottom repletion activities. Therefore, cultivation and bagless dredging operations that occur during spring months should be carefully monitored for potential impacts on larval and juvenile anadromous fish. Cultivation and/or bagless dredging should be discontinued in areas where mortality is observed in association with a repletion activity, or restricted to periods outside the anadromous fish spawning/nursery season.

B. Impacts associated with intensive oyster aquaculture

Intensive aquaculture of oysters can degrade local water and sediment quality through increases in organic loading to the sediments. Increased organic loading results from biodeposition of oyster pseudofeces and feces, and changes in local circulation and sediment deposition patterns from structures suspended in the water column. Research is needed to develop environmental criteria for evaluating the suitability of specific sites for intensive aquaculture, especially relative to their ability to handle increases in organic loading. However, until such criteria are available, aquaculture sites should be selected based on their general hydrologic and sedimentary characteristics, and oyster culture densities anticipated in the operation. Areas with poor to moderate circulation and organically-rich sediments should be avoided, or limited to low-density operations. Furthermore, sedimentary parameters for bottom areas associated with intensive aquaculture should be monitored throughout the operational life of a facility, and mitigative measures implemented should adverse changes be detected. Sedimentary parameters most indicative of adverse changes due to organic loading, and which should be included in a monitoring program are: 1) sediment oxygen demand; 2) thickness of the sediment redox discontinuity layer; 3) sulfide production; and, 4) organic nitrogen and carbon levels.

INTER-FISHERY CONFLICTS

A. ORA management conflicts with the soft-shell clam fishery

Although there is good correspondence between the Yates Grounds and legal oyster bar boundaries throughout most of the ORAs, some disparity exists between the two areas; e.g., within the Chester River ORA. While clamming is excluded from areas within legal bar boundaries, ORA management actions taken in areas outside of the legal bars could result in conflicts with local soft-shell clam fisheries.

Oyster management actions within the ORAs should be sensitive to potential impacts to other existing fisheries. Any ORA management actions taken outside legal bar boundaries should be fully coordinated with local clamming interests. Furthermore, clamming grounds of historical importance to the clam fishery, and/or with currently good clam production, should remain open to clam harvest, and generally avoided relative to oyster management actions.

OYSTER MANAGEMENT ACTIONS WITHIN LOW SALINITY ZONES

Transplanting of seed oysters into low salinity areas (i.e.., ORA Zones A and B) has been proposed to control the effects of disease-related mortality on the oyster fishery. However, while disease prevalence and intensity is lower in these zones, oysters are also subject to adverse effects from low/oscillating salinities and freshets. For example, oyster mortality in low salinity areas during 1994 ranged from 20-72% in the Chester River, and 21-90% in the Choptank River, attributed to winter freshets during the 1993-1994 winter (Homer & Scott, 1995). Consequently, any gains in reducing disease prevalence and disease-related mortality in low salinity zones will likely be off-set by increased salinity-related mortality.

Both the historical and environmental oyster-producing capacity of an area should guide decisions on how far upstream seed/shell repletion activities extend. Historically low oyster production and low/fluctuating salinities characteristic of ORA Zone A in the Chester and Choptank River ORAs, and upper Zone B in the Nanticoke, Patuxent, Severn, and Magothy ORAs, may warrant limited expenditures of effort and funds within these areas. Alternatively, the upstream limit on management actions under the Oyster Recovery Project should be set at a point that will strike a balance between limiting disease prevalence and effects of freshwater flows.

LITERATURE CITED

Homer, Mark, L., and R. Scott. 1995. 1994 annual fall dredge survey and related topics. Maryland Department Of Natural Resources, Tidewater Administration, Fisheries Division, Shellfish Program, Annapolis. Report No. MDDNRSP1-95

October 6, 1995

Planning Division

Dr. J. Rodney Little
State Historic Preservation Officer
Maryland Historic Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville, Maryland 21032-2023

Dear Dr. Little:

The purpose of this letter is to provide you with a field report regarding the proposed Chesapeake Bay Oyster Recovery Project, a joint venture of the Baltimore District Corps of Engineers and the Maryland Department of Natural Resources. Enclosure 1 is a copy of the Public Notice, which provides general information on the project. This letter is prepared in accordance with Sections 106 and 110 of the National Historic Preservation Act of 1966 and its implementing regulation, 36 CFR 800 "Protection of Historic Properties".

The proposed project will involve the creation of new oyster beds at certain locations within the Chesapeake Bay. Project activities proposed over a five year period include the following: creation of new oyster bars and rehabilitation of existing non-productive bars; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters or "spat"; placing of hatchery-produced and seed bar spat on new and rehabilitated bars; and monitoring of implemented projects.

As a result, some minor construction will be done at the two oyster hatcheries. We conducted field investigations to determine if these modifications could affect cultural resources, and to provide avoidance strategies in the event that potentially significant cultural resources were within the project areas. The results of these investigations are provided in Enclosure 2.

Additionally, the project will involve the overboard dumping of oyster spat in selected locations of the Bay. Enclosure 3 provides a map of the estuaries selected for bed formation. Generally, the actions will mimic historic oystering activities in the same areas, which have been done for centuries. The bed formation will only minimally impact the surface of the submarine sites.

We request any comment you have regarding the enclose project information, our efforts to identify historic properties, or additional investigations required to comply with Section 106 for this project. If you have any questions regarding this matter, please contact Mr. Kenneth Baumgardt, at (410) 962-2894.

Sincerely,

Dr. James F. Johnson
Chief, Planning Division

Enclosures

BAUMGARDT/ses/CENAB-PL-RP
BANK/CENAB-PL-RP 10/6
LADD/CENAB-PL-R
JOHNSON/CENAB-PL

Marks # 1105
/export/home/k9b/oyster.ltr

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway ● Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

September 26, 1995

Dr. James F. Johnson
Department of the Army
Baltimore District
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore MD 21203-1715

Dear Dr. Johnson:

Thank you for the opportunity to comment on the plans to implement the recommendations of the Maryland Oyster Roundtable Action Plan. The Maryland Department of the Environment (MDE) would certainly like to see oysters restored to healthy, self-sustaining populations. In addition to the economic benefits, healthy oyster populations will facilitate MDE's mission of improving water quality by filtering out some of the excess algae and converting it to tasty biomass.

There are a few issues I would like to bring to your attention for consideration. Recovery areas which are to become harvestable in the future should be placed in areas where pollution sources will not have an effect on the future harvest of shellfish. For example, harvesting is prohibited in the vicinity of wastewater treatment facility outfalls and may be restricted in areas affected by unsewered areas where septic system failures are common or stormwater run off near heavily populated areas. The MDE has the responsibility of classifying shellfish waters that are safe for harvesting. MDE's shellfish program has been gathering data for many years to protect oyster resource and safeguard public health by assuring that oysters are harvested from approved waters. MDE has an extensive data base on bacteriological water quality and shellfish tissue available for those areas targeted in the Chesapeake Bay Oyster Recovery Project.

In addition, MDE's sediment monitoring program has information available on chemical contaminants in sediments for some of the Project areas. Somewhat elevated concentrations of chemical contaminants have been observed in the sediments of the Severn and Magothy Rivers. You may want to obtain such data to assure yourselves that these areas are suitable to your goals. In these rivers, however, there are healthy, harvestable oysters and our tissue monitoring data indicate that contaminant levels in oysters from these rivers are below human health levels of concern.

More general concerns relate to your statement that over harvesting is a part of the current problem. In addition to habitat restoration and locating seed areas in lower salinity waters, MDE agrees that revised resource management is extremely important for the success of the Oyster Recovery Project.

I hope you find these comments helpful. If you have any questions regarding this response, please contact Richard Eskin, Ph.D., at (410) 631-3902.

Sincerely,

Michael S. Haire
Director
Technical and Regulatory Services
Administration

MSH:plm

cc: Ms. Jane T. Nishida, Secretary

CONVERSATION RECORD

TIME: DATE: FILE NAME:

TYPE:
TELEPHONE: VISIT:
incoming:
outgoing:x CONFERENCE:

Name of person(s) contacted:	Organizatlon:	Phone No.:
Edgar Mercardo	MDE	410/631-3240

SUBJECT: OYSTER RECOVERY PROJECT

SUMMARY:

I called him to ask if the project was in a Clean Air Act non-conformity area. He said that Baltimore/Washington were non-attainment for ozone. He said that parts of Baltimore City and Prince Georges County were classified as non-conformance for carbon monoxide but MDE is trying to get this reclassified.

ACTION REQUIRED:

NAME OF PERSON DOCUMENTING CONV.	SIGNATURE	DATE
Mark Mendelsohn	M. Mendelsohn	

ACTION TAKEN:

US Army Corps
of Engineers
Baltimore District

Notice of Availability

CHESAPEAKE BAY OYSTER PROJECT
MARYLAND

ALL INTERESTED PARTIES:

In accordance with the National Environmental Policy Act (NEPA), the U. S. Army Corps of Engineers, Baltimore District, is conducting public coordination for the enclosed Environmental Assessment (EA) prepared for the proposed project to restore oyster habitat and to increase oyster populations in the Maryland portion of the Chesapeake Bay. Oyster populations have declined dramatically since the turn of the century, largely due to parasitic diseases, overharvesting, and loss of habitat.

Project activities proposed over a five year period would include the following: creation of new oyster bars and rehabilitation of existing non-productive bars; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters or "spat"; planting of hatchery-produced, and seed bar spat on new and rehabilitated bars. Monitoring will be conducted during implementation and for three years afterwards. Project activities are planned to occur within Oyster Recovery Areas (ORAs) established by the Maryland Oyster Roundtable Action Plan in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers, and potentially in other waters of the Chesapeake Bay.

In accordance with NEPA, the Corps of Engineers is soliciting comments from Federal, state, local agencies, officials and other interested parties in order to consider and evaluate the impacts of the proposed project. Any comments received will be considered by the Corps of Engineers in the decision to implement the proposed actions. Comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, wetlands, recreation, fish and wildlife, and other public interest factors, and will be incorporated into the EA pursuant to NEPA.

This notice has been sent to organizations and individuals known to have an interest in the project (shown on the enclosed mailing list). Written comments for the EA must be submitted within 30 days of the date of this notice. Comments on the EA should be addressed to:

Baltimore District, U. S. Army Corps of Engineers
ATTN: CENAB-PL-EC, Mr. Mark Mendelsohn
P. O. Box 1715
Baltimore, Maryland 21203-1715
(Internet address: m9m@cenabpl.nab.usace.army.mil)

James O. Johnson

Dr. James E. Johnson
Chief, Planning Division

Enclosures

September 8, 1995

Planning Division

Mr. William Matuszeski
Director
Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, Maryland 21403

Dear Mr. Matuszeski:

The Baltimore District, U.S. Army Corps of Engineers, in cooperation with the Maryland Department of Natural Resources, has initiated planning, engineering, and design of the Chesapeake Bay Oyster Recovery Project in Maryland. The multi-year project is based on recommendations of the Maryland Oyster Roundtable Action Plan. The purpose of the project is to restore oyster habitat and increase oyster populations in the Maryland portion of the Chesapeake Bay. Oyster populations in the Bay have declined dramatically since the turn of the century, largely due to parasitic diseases, overharvesting, and a loss of habitat.

Project activities proposed over a five-year period include creation of new oyster bars and rehabilitation of existing non-productive bars to create oyster habitat; upgrading of state-owned hatcheries at Piney Point and Horn Point; construction of seed bars for production and collection of seed oysters or "spat"; planting of spat collected from seed bars and produced at hatcheries on new and rehabilitated bars; and monitoring of implemented projects. Project activities will occur within Oyster Recovery Areas (ORAs) designated by the state of Maryland in the Chester, Choptank, Nanticoke, Patuxent, Magothy, and Severn Rivers, and potentially in other Maryland waters of the Bay (see enclosed map). Project activities will be consistent with strategies identified in the Maryland Oyster Roundtable Action Plan for zones within ORAs. In Zone A, which is generally the lowest salinity area in the ORA, shellfish harvesting has been temporarily suspended, and only oyster seed certified as disease-free can be planted. Zone B is generally located downstream of Zone A, or it is the lowest salinity zone in rivers without a Zone A. In Zone B, shellfish harvesting is allowed, but only disease-free seed can be planted. Zone C is a large zone generally downstream from Zone B. Shellfish harvesting is allowed in Zone C, and natural oyster seed can be planted in this zone.

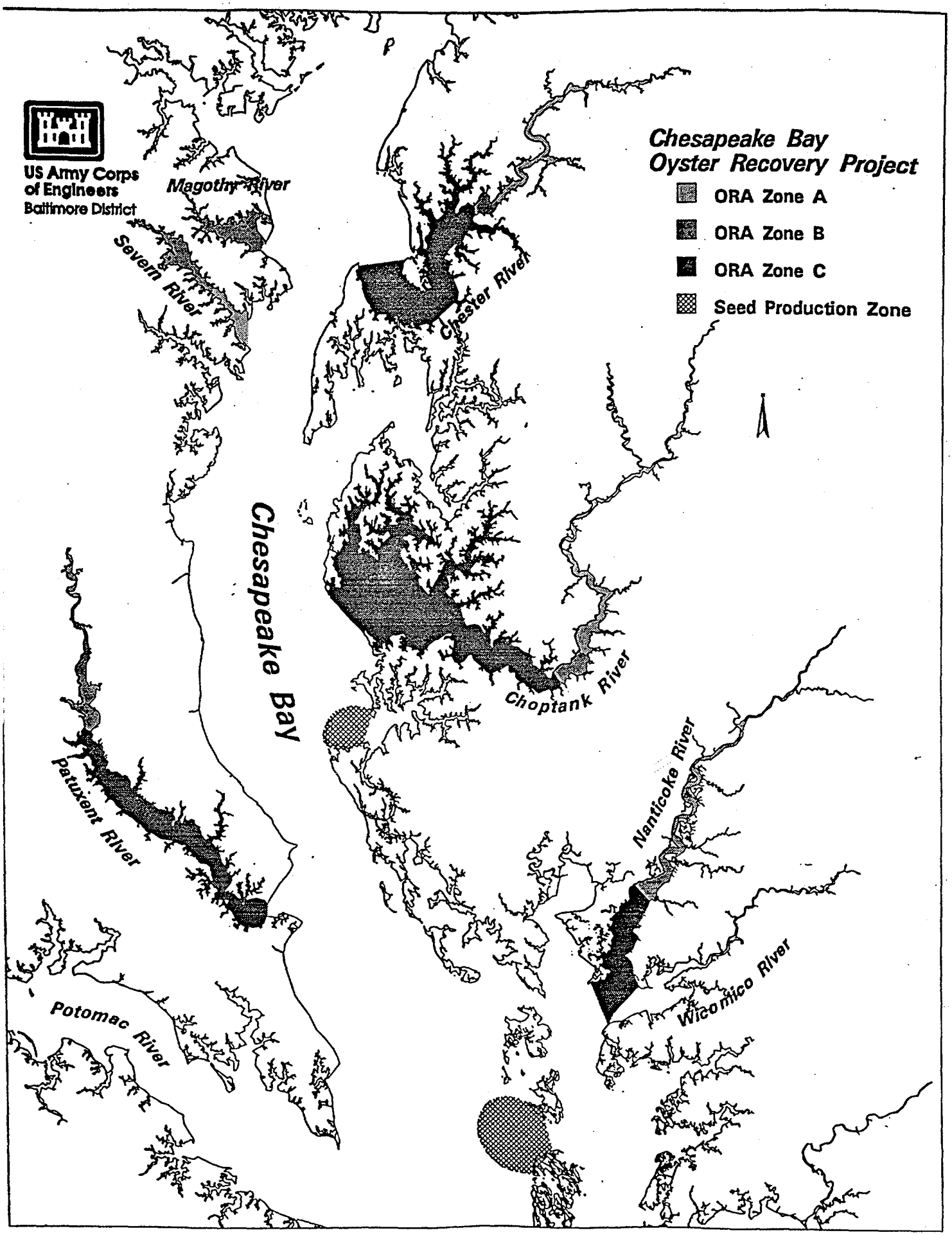
Seed bars 20 to 40 acres in size would be created in Kedges Straits near Smith Island and/or in the mouth of the Little Choptank River near James Island. New bars would be constructed in a variety of shapes and sizes from 5 to 10 acres, and the effects of bar morphology on oyster productivity and disease prevalence would be evaluated. Spat harvested from seed bars would be used to plant new and rehabilitated bars located in Zones B and C of the ORAs. Hatchery-produced seed would be planted on new bars in Zone A of the ORAs. Rehabilitation of non-productive bars would involve the placement of shell to raise bar profiles and the cleaning of sediment from existing bars using oyster dredges and/or hydraulic clam dredges. Project activities would be monitored for rate of spat set, oyster growth and mortality, disease prevalence, and other factors. Monitoring results would be used to determine subsequent project locations and activities.

Environmental documentation for the project will be prepared in accordance with the National Environmental Policy Act (NEPA). Existing environmental conditions in the project area will be assessed, and the effects of the proposed activities on existing resources in the immediate and surrounding areas will be evaluated. To assist us in identification of environmental issues that may affect implementation of proposed activities, please provide comments concerning interests within your agency's area of responsibility. Specific issues of concern include the presence of any threatened or endangered species, significant cultural resources, and other environmental considerations.

Identical letters have been sent to agencies on the enclosed mailing list. Your response within 30 days of the date of this letter will be greatly appreciated. Questions or information regarding this matter should be directed to Mr. Mark Mendelsohn, at (410) 962-9499.

Sincerely,

Dr. James F. Johnson
Chief, Planning Division


US Army Corps
of Engineers
Baltimore District
Chesapeake Bay
Oyster Recovery Project
ORA Zone A
ORA Zone B
ORA Zone C
Seed Production Zone
Magothy River
Severn River
Chester River
Chesapeake Bay
Choptank River
Patuxent River
Nanticoke River
Wicomico River
Potomac River

Identical coordination letters are being sent to the following:

Mr. William Matuszeski
Director
Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, Maryland 21403

Ms. Elizabeth Gillelan
Chief
NOAA Chesapeake Bay Office
410 Severn Avenue
Annapolis, Maryland 21403

Mr. Timothy E. Goodger
Assistant Coordinator
National Marine Fisheries Service, NOAA
Habitat & Protected Resources Division
904 South Morris Street
Oxford, Maryland 21654-0279

Mr. Jeri L. Berc, PHD
State Conservationist
USDA Natural Resources Conservation Service
John Hanson Business Center, Suite 301
339 Busch's Frontage Road
Annapolis, Maryland 21401-5534

Ms. Elizabeth J. Cole
Maryland Historic Trust
Administrator, Archeological Services
Historical & Cultural Programs Division
100 Community Place
Crownsville, Maryland 21032

Honorable Jane T. Nishida
Secretary
Maryland Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

Mr. Daniel J. O' Leary
Chief
Water Quality Certification Division
Maryland Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

Mr. W. Peter Jensen
Director
Fisheries Division, Tidewater Administration
Maryland Department of Natural Resources
Tawes State Office Building
Annapolis, Maryland 21401

Honorable John R. Griffin
Secretary
Maryland Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Mr. William C. Baker
President
Chesapeake Bay Foundation
162 Prince George Street
U.S. Fish and Wildlife Service
Annapolis, Maryland 21401

Mr. John P. Wolflin
Supervisor
Annapolis Field Office
U.S. Fish and Wildlife Service
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

Mr. Roy E. Denmark, Jr.
U.S. EPA, Region III
Environmental Planning and Assessment
Section
841 Chestnut Building (3ES43)
Philadelphia, Pennsylvania 19107

Mr. W. Michael McCabe
Regional Administrator
U.S. Environmental Protection Agency,
Region III
841 Chestnut Building (3RA00)
Philadelphia, Pennsylvania 19107-4431

US Army Corps
of Engineers
Baltimore District

24 August 1995

Public Notice

ALL INTERESTED PARTIES:

The Baltimore District, U.S. Army Corps of Engineers, in cooperation with the Maryland Department of Natural Resources, has initiated the planning, engineering, and design of the Chesapeake Bay Oyster Recovery Project in Maryland. The multi-year project is based on recommendations of the Maryland Oyster Roundtable Action Plan. The purpose of the project is to restore oyster habitat and to increase oyster populations in the Maryland portion of the Bay. Restoration of the oyster is critical to the economic and environmental survival of the Chesapeake Bay. Oyster populations have declined dramatically since the turn of the century, largely due to parasitic diseases, overharvesting, and a loss of habitat. Oysters, which are filter feeders, improve water quality in the Bay, and oyster bars provide valuable habitat for fish, blue crabs, and other species.

Project activities proposed over a five-year period would include the following: creation of new oyster bars and rehabilitation of existing non-productive bars; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production and collection of seed oysters or "spat"; planting of hatchery-produced and seed bar spat on new and rehabilitated bars; and monitoring of implemented projects. Project activities are planned to occur within Oyster Recovery Areas (ORAs) designated by the State of Maryland in the Severn, Nanticoke, Chester, Choptank, Patuxent, and Magothy Rivers, and potentially in other Maryland waters of the Chesapeake Bay. Project activities will be consistent with strategies identified in the Maryland Oyster Roundtable Action Plan for zones within ORAs. In Zone A, which is comprised of the lowest salinity area in the ORA, shellfish harvesting has been temporarily suspended and only seed certified as disease-free can be planted. Zone B is located downstream of Zone A or is the lowest salinity area in rivers without a Zone A. In Zone B, shellfish harvesting is allowed, but only certified disease-free seed can be planted. Zone C is a large zone generally downstream from Zone B. Shellfish harvesting is allowed in Zone C, consistent with management objectives, and natural seed can be planted.

Seed bars 20 to 40 acres in size would be constructed in Kedges Straits or in the mouth of the Little Choptank River near James Island. New bars would be constructed in a variety of shapes and sizes from 5 to 10 acres, and the effects of bar morphology on oyster productivity and disease prevalence will be evaluated. Spat harvested from seed bars would be used to plant new and rehabilitated bars in Zones B and C of ORAs. Hatchery-produced spat would be planted on new bars in Zone A of ORAs. Rehabilitation of non-productive bars would involve placement of shell to raise bar profiles and the cleaning of sediment from existing bars using oyster dredges and/or hydraulic clam dredges. Project activities would be monitored for rate of spat set, oyster growth and mortality, disease prevalence, and other factors. Monitoring results would be used to determine locations and activities for subsequent project years.

Design and construction of the project is being coordinated with the Maryland Department of Natural Resources, Oyster Recovery Partnership, Chesapeake Bay Program, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Maryland Department of the Environment, and Maryland Historical Trust.

In accordance with the National Environmental Policy Act (NEPA), the Baltimore District is preparing environmental documentation for the project which will include descriptions of proposed activities, existing site conditions, project impacts, and public involvement. A preliminary evaluation of the impact of the proposed project on waters of the U.S. will be performed pursuant to guidelines promulgated by the Administrator of the Environmental Protection Agency under authority of Section 404 of the Clean Water Act. The project complies with and will be conducted in a manner consistent with the approved Maryland Coastal Zone Management Program. The environmental documentation for this project is anticipated to be an Environmental Assessment and Finding of No Significant Impact, which will be available upon request.

Any person who has an interest in the proposed project may make comments and/or request a public hearing. This public notice is being distributed to organizations and individuals known to have an interest in this project. Please communicate the foregoing information to any other organizations or individuals with an interest in this matter. Comments and requests must be submitted within 30 days of the date of this notice to: Baltimore District, U.S. Army Corps of Engineers, ATTN: CENAB-PL-EC, Mr. Mark Mendelsohn, P.O. Box 1715, Baltimore, Maryland 21203-1715 (Internet address: m9m@cenabpl.nab.usace.army.mil).

A public involvement program is being conducted by the Baltimore District and the Maryland Department of Natural Resources. Public information meetings will be held on September 7, 1995, at 7 p.m. at the County Commission Meeting Room of the Governmental Center, located on Highways 5 and 245, Leonardtown, Maryland, and on September 12, 1995, at 7 p.m. at the Dorchester County Public Library, located at 303 Gay Street, Cambridge, Maryland.

The Baltimore District, U.S. Army Corps of Engineers, has applied for Water Quality Certification from the State of Maryland. Any comments relating to water quality concerns should also be forwarded to the Maryland Department of the Environment, Standards and Certification, 2500 Broening Highway, Baltimore, Maryland 21224, within 30 days of the date of this notice.

FOR THE COMMANDER:

Harold L. Nelson
for DR. JAMES F. JOHNSON
Chief, Planning Division

Date: 24 August 1995

APPENDIX II

REFERENCES

References

Chesapeake Bay Program. 1994. *Chesapeake Bay 1994 Oyster Fishery Management Plan.* 34 pp.

Jordan, Steve. 1994. *Maryland Chesapeake Bay Oyster Recovery Areas: Summary of Technical Information.* Maryland Department of Natural Resources Tidewater Administration. 45 pp.

Leffler, Merrill. 1995. *The New Oyster Wars: Battling Disease in the Lab and the Bay.* Maryland Marine Notes, Volume 13, Number 3. Maryland Sea Grant College. 4 pp.

Lippson, Alice Jane and Robert L. 1984. *Life in the Chesapeake Bay.* The Johns Hopkins University Press. Baltimore, MD. 229 pp.

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Maryland Oyster Roundtable. 1993. *Maryland Oyster Roundtable Action Plan.* 26 pp.

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U.S. Environmental Protection Agency. 1995. *Chesapeake Bay; Introduction to an Ecosystem.* 29 pp.

U.S. Environmental Protection Agency. 1995. *The State of the Chesapeake Bay 1995.* 45 pp.

White, Christopher P. 1989. *Chesapeake Bay, Nature of the Estuary, A Field Guide.* Tidewater Publishers. Centreville, MD. 212 pp.

APPENDIX II

REFERENCES

References

Chesapeake Bay Program. 1994. *Chesapeake Bay 1994 Oyster Fishery Management Plan.* 34 pp.

Jordan, Steve. 1994. *Maryland Chesapeake Bay Oyster Recovery Areas: Summary of Technical Information.* Maryland Department of Natural Resources Tidewater Administration. 45 pp.

Leffler, Merrill. 1995. *The New Oyster Wars: Battling Disease in the Lab and the Bay.* Maryland Marine Notes, Volume 13, Number 3. Maryland Sea Grant College. 4 pp.

Lippson, Alice Jane and Robert L. 1984. *Life in the Chesapeake Bay.* The Johns Hopkins University Press. Baltimore, MD. 229 pp.

Maryland Department of Natural Resources. 1995. *Shellfish Program - Overview.* Unpublished Report.

Maryland Oyster Roundtable. 1993. *Maryland Oyster Roundtable Action Plan.* 26 pp.

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Rothschild, B.JI, et al. 1994. *Decline of the Chesapeake Bay oyster population: a century of habitat destruction and overfishing.* Marine Ecology Progress Series. Volume 111: 29-39.

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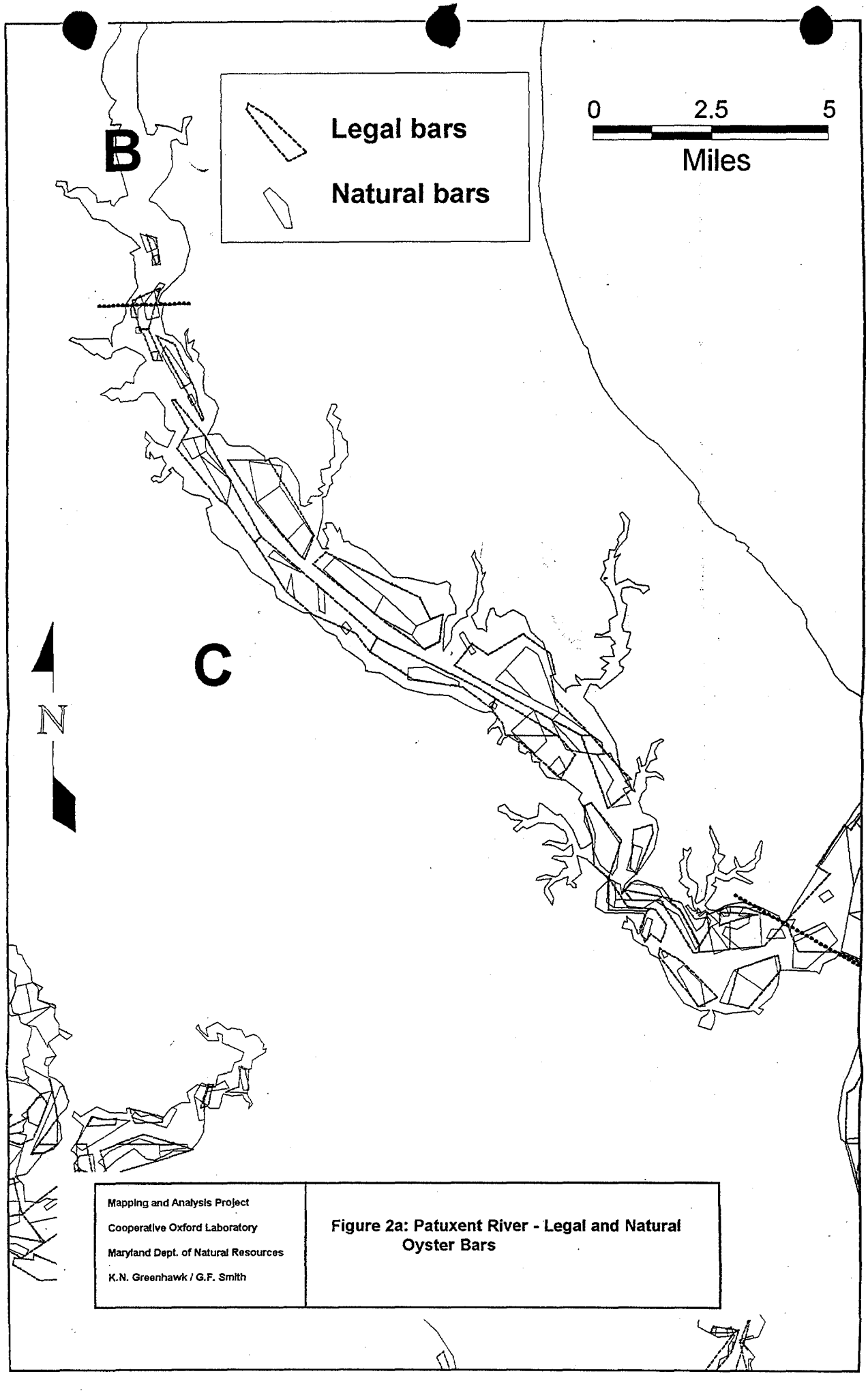
U.S. Environmental Protection Agency. 1995. *The State of the Chesapeake Bay 1995.* 45 pp.

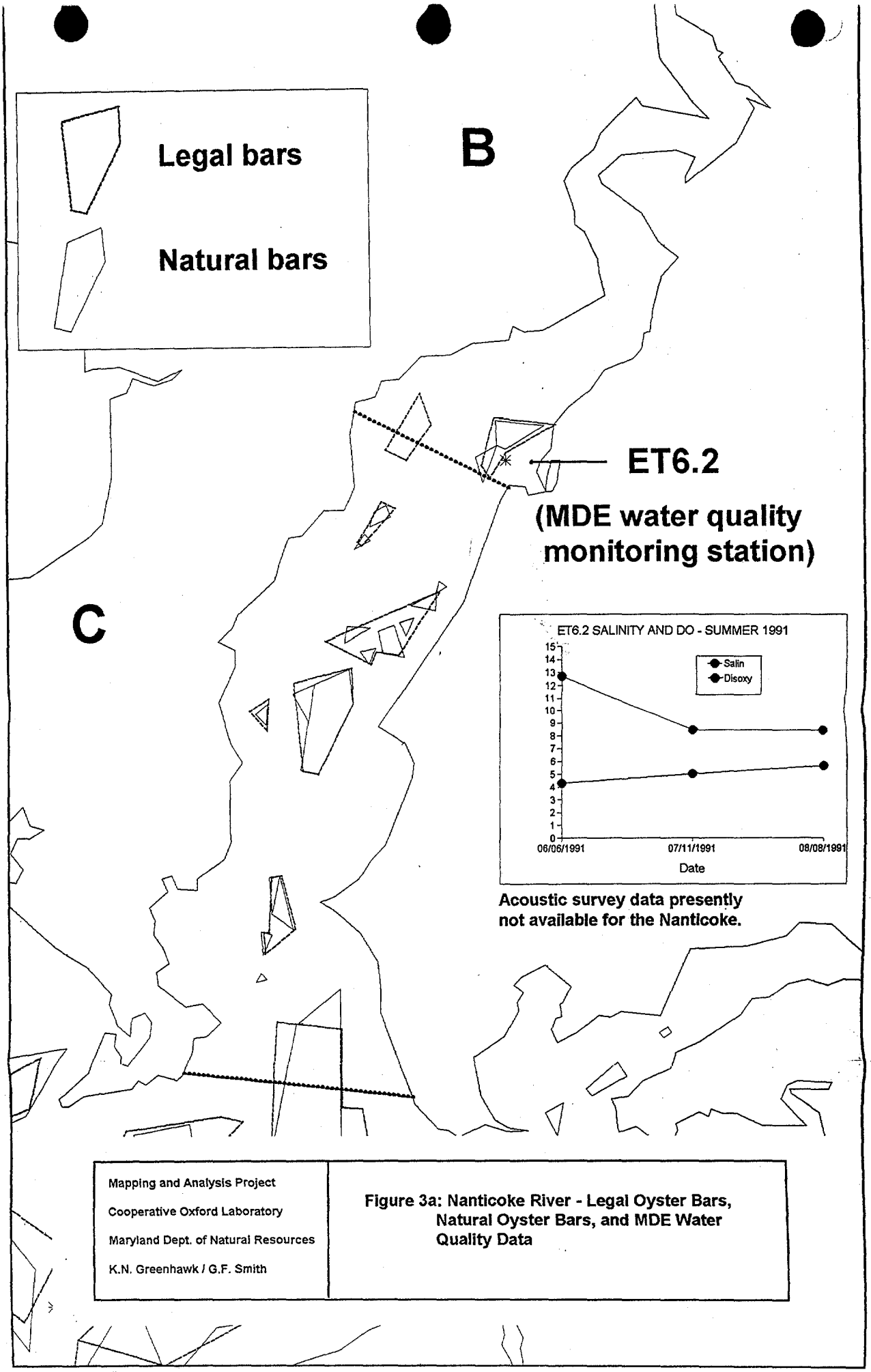
White, Christopher P. 1989. *Chesapeake Bay, Nature of the Estuary, A Field Guide.* Tidewater Publishers. Centreville, MD. 212 pp.

APPENDIX III

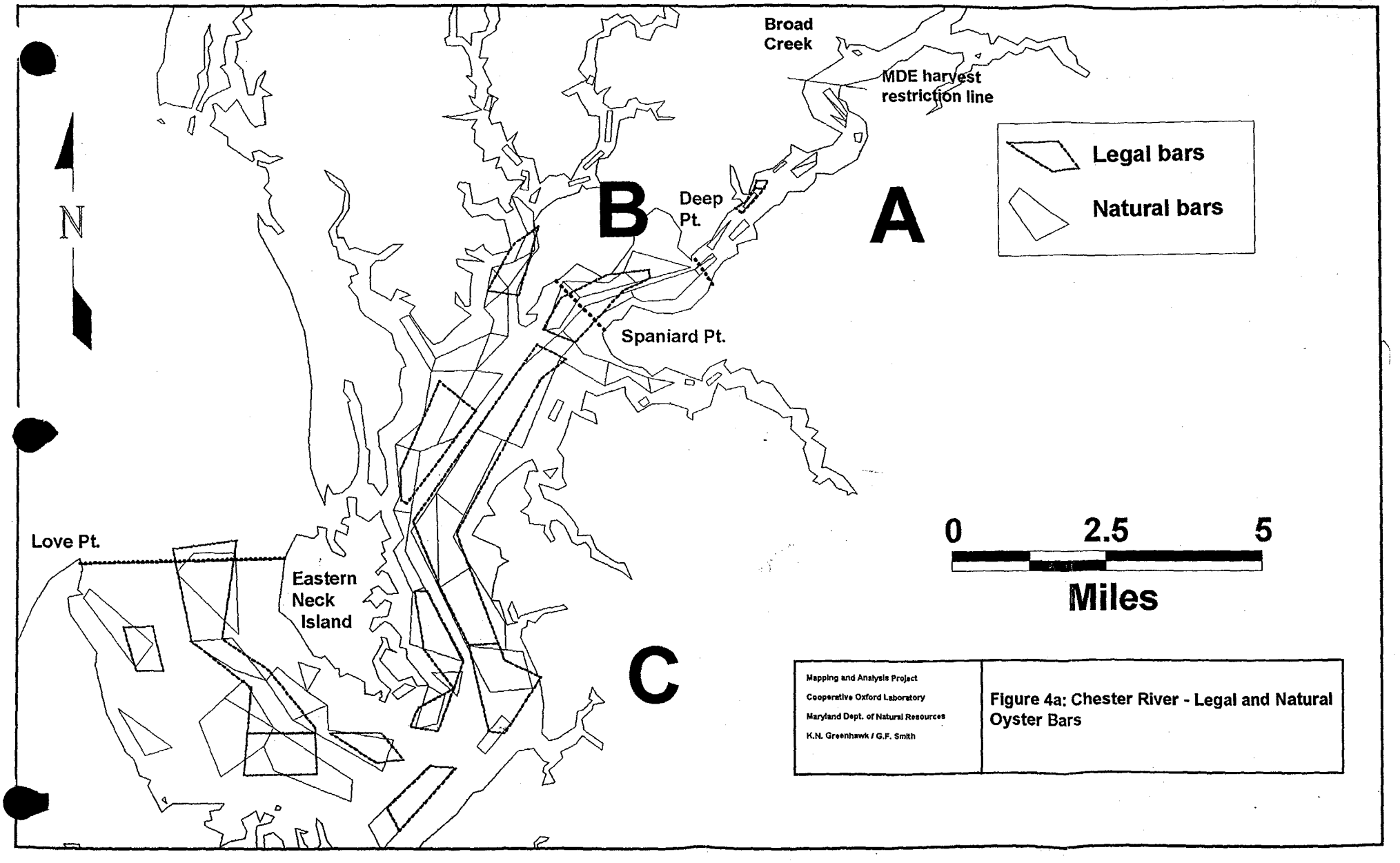
FIGURES



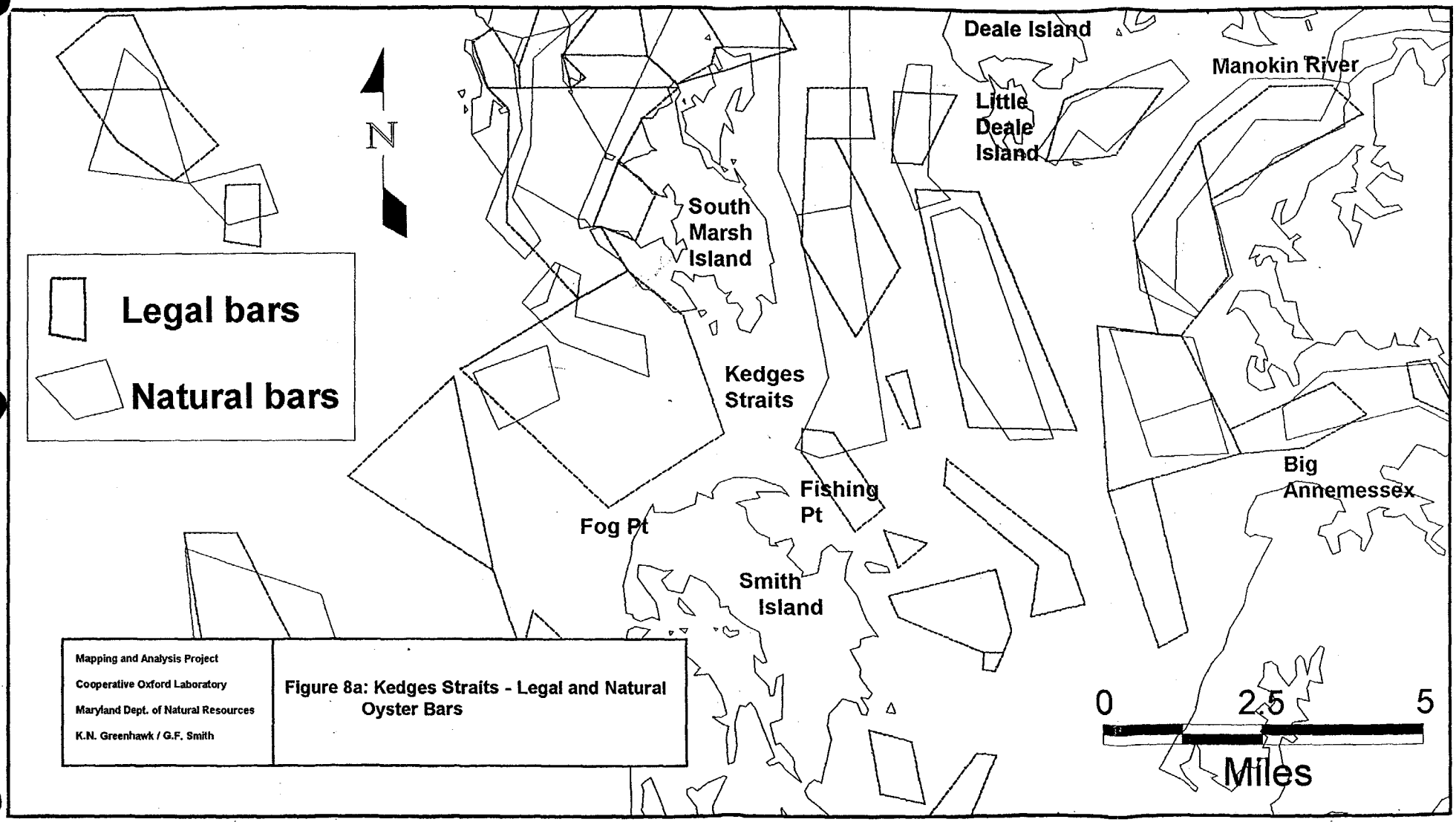
Mapping and Analysis Project Cooperative Oxford Laboratory Maryland Dept. of Natural Resources K.N. Greenhawk / G.F. Smith	**Figure 2a: Patuxent River - Legal and Natural Oyster Bars**



Mapping and Analysis Project Cooperative Oxford Laboratory Maryland Dept. of Natural Resources K.N. Greenhawk / G.F. Smith	**Figure 3a: Nanticoke River - Legal Oyster Bars, Natural Oyster Bars, and MDE Water Quality Data**

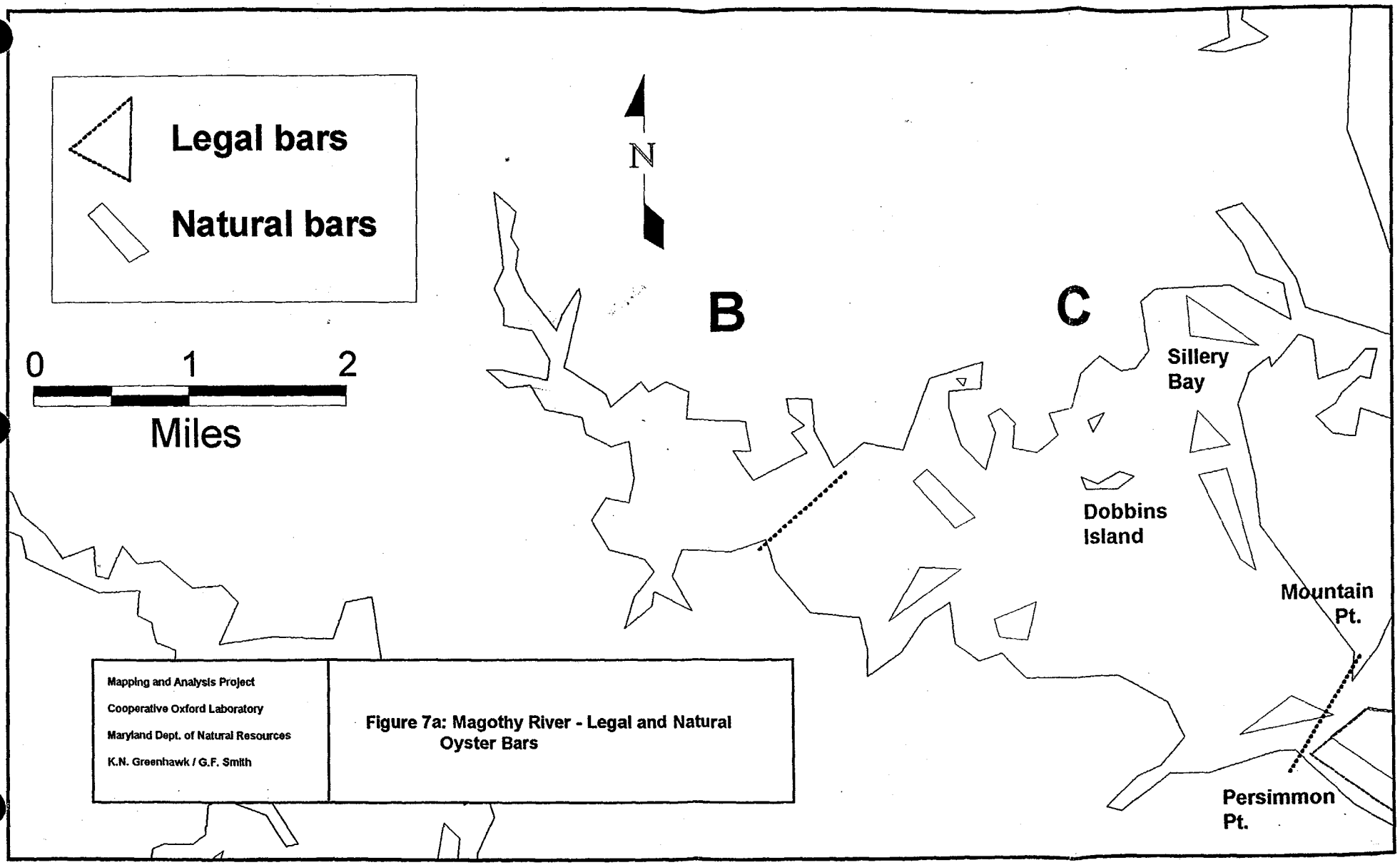


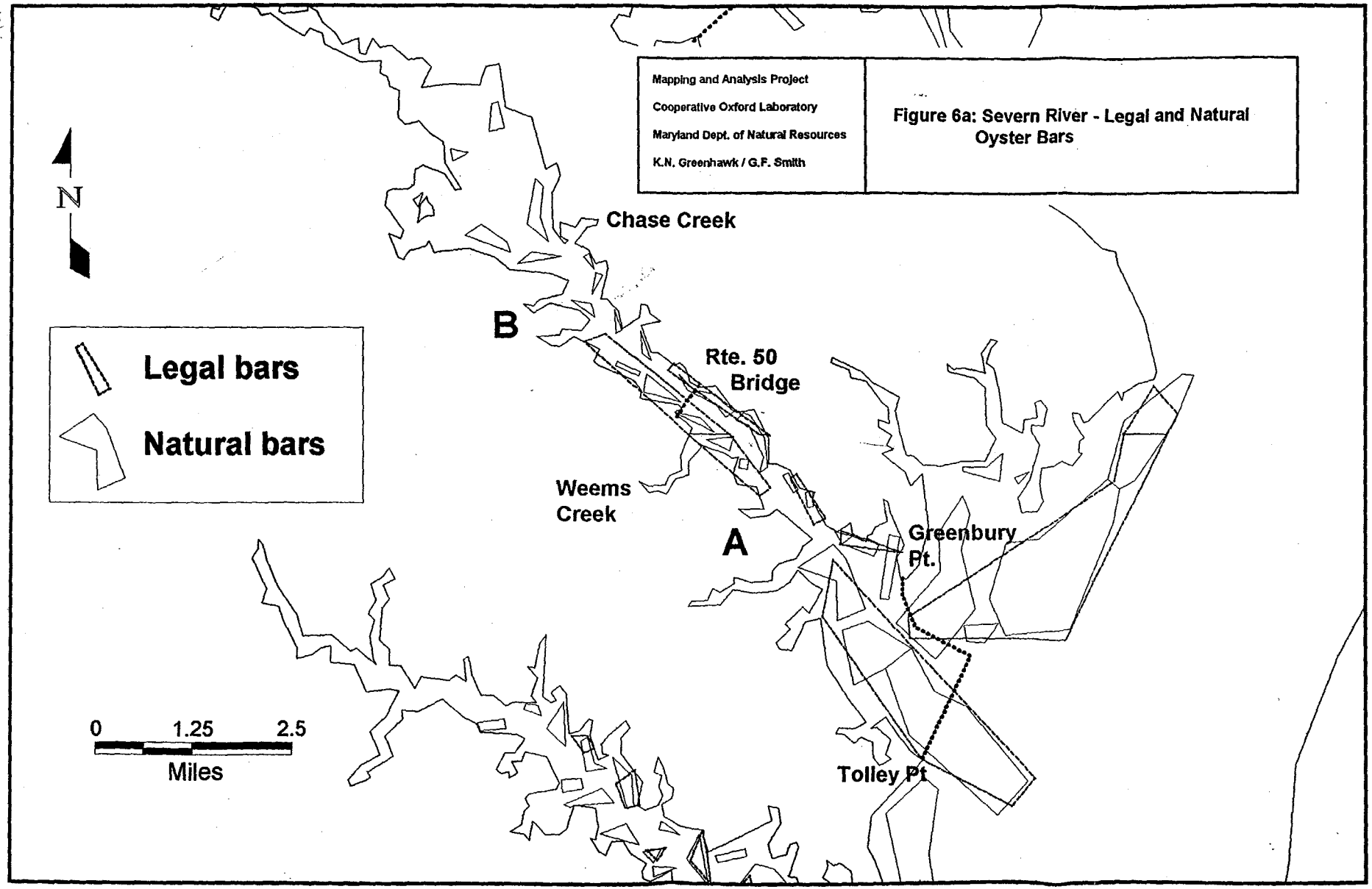
Mapping and Analysis Project Cooperative Oxford Laboratory Maryland Dept. of Natural Resources K.N. Greenhawk / G.F. Smith	Figure 4a: Chester River - Legal and Natural Oyster Bars

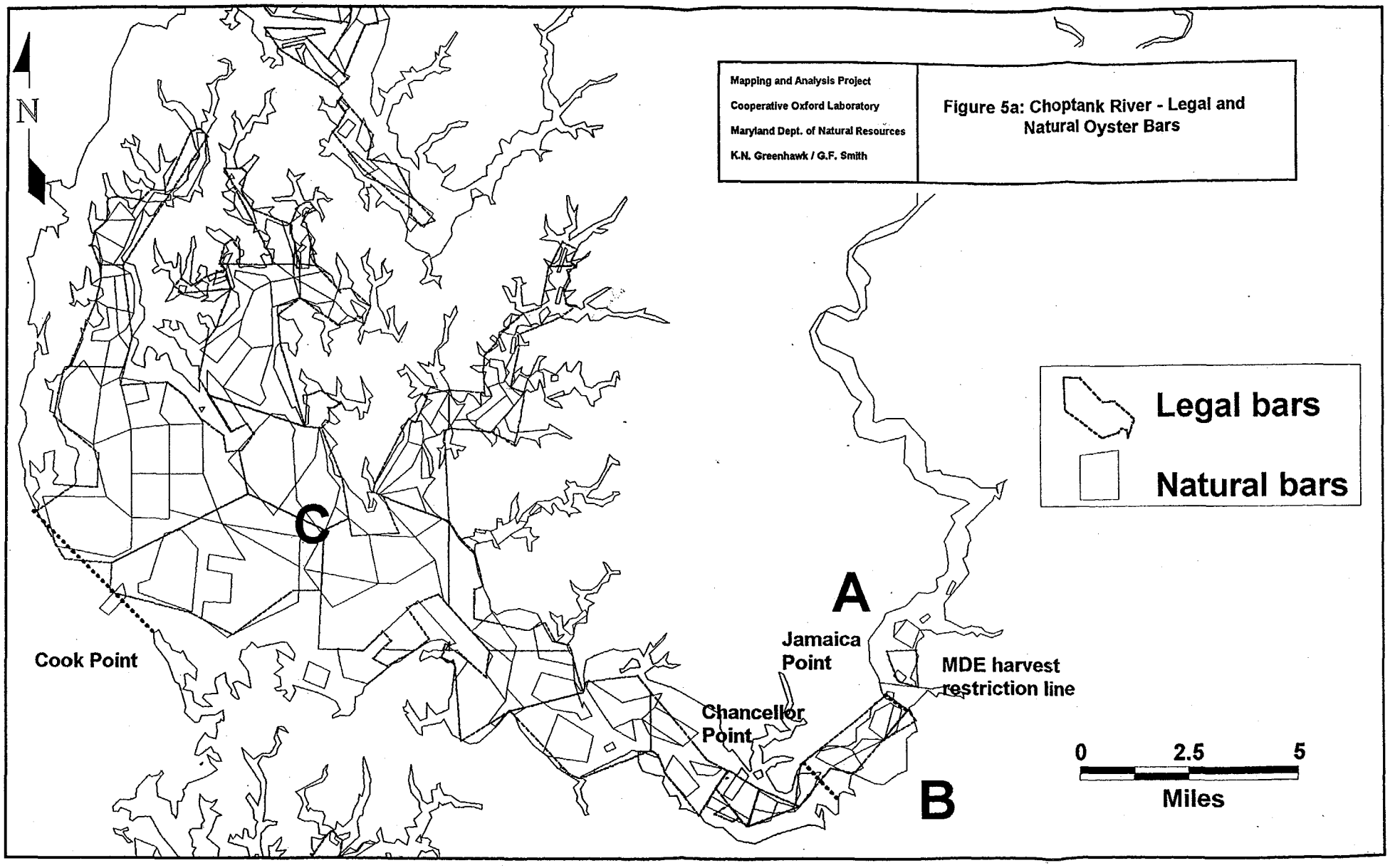


Mapping and Analysis Project
Cooperative Oxford Laboratory
Maryland Dept. of Natural Resources
K.N. Greenhawk / G.F. Smith

Figure 8a: Kedges Straits - Legal and Natural Oyster Bars


Legal bars
Natural bars
N
0
1
2
Miles
B
C
Sillery Bay
Dobbins Island
Mountain Pt.
Persimmon Pt.
Mapping and Analysis Project
Cooperative Oxford Laboratory
Maryland Dept. of Natural Resources
K.N. Greenhawk / G.F. Smith
Figure 7a: Magothy River - Legal and Natural Oyster Bars


Mapping and Analysis Project
Cooperative Oxford Laboratory
Maryland Dept. of Natural Resources
K.N. Greenhawk / G.F. Smith
Figure 6a: Severn River - Legal and Natural Oyster Bars
N
Legal bars
Natural bars
Chase Creek
B
Rte. 50
Bridge
Weems
Creek
A
Greenbury
Pt.
Tolley Pt
0
1.25
2.5
Miles


N
Mapping and Analysis Project
Cooperative Oxford Laboratory
Maryland Dept. of Natural Resources
K.N. Greenhawk / G.F. Smith
Figure 5a: Choptank River - Legal and Natural Oyster Bars
Legal bars
Natural bars
C
A
B
Cook Point
Jamaica Point
Chancellor Point
MDE harvest restriction line
0
2.5
5
Miles

APPENDIX IV

FISH SPECIES LISTS

TABLE 4-1 FINFISH - CHESTER RIVER

	COMMON NAME	SCIENTIFIC NAME
1	Alewife	Alosa pseudoharengus
2	American Eel	Anguilla rostrata
3	Atlantic Menhaden	Brevoortia tyrannus
4	Atlantic Needlefish	Strongylura marina
5	Atlantic Silverside	Menidia menidia
6	Banded Killifish	Fundulus diaphanus
7	Blueback herring*	Alosa aestivalis
8	Bay Anchovy	Anchoa mitchilli
9	Feather Blenny	Hypsoblennius hentzi
10	Fourspine stickleback	Apeltes quadracus
11	Gizzard Shad	Dorosoma cepedianum
12	Hickory Shad*	Alosa mediocris
13	Inland Silverside	Menidia beryllina
14	Mummichog	Fundulus heteroclitus
15	Naked Goby	Gobiosoma bosci
16	Northern Pipefish	Syngnathus fuscus
17	Oyster Toadfish	Opsanus tau
18	Rainwater Killifish	Lucania parva
19	Sheepshead Minnow	Cyprinodon variegatus
20	Skilletfish	Gobiesox strumosus
21	Spot	Leiostomus xanthurus
22	Spotted Seatrout	Cynoscion nebulosus
23	Striped Bass*	Morone saxatilis
24	Striped blenny	Chasmodes bosquianus
25	Striped killifish	Fundulus majalis
26	Yellow Perch*	Perca flavescens
27	White Perch	Morone americana

Taken from 1987 DNR juvenile fish index survey from Cedar & Coursey Points and Corsica River stations (unless otherwise indicated)

*Taken from O'Dell et al. 1980. Survey and inventory of anadromous fish spawning areas for Chester River Drainage

Source: Planning Aid Report, NMFS, September 1995

TABLE 4-2 FINFISH - CHOPTANK RIVER

	COMMON NAME	SCIENTIFIC NAME
1	Alewife	Alosa pseudoharengus
2	Atantic Croaker	Micropogon undulatus
3	Atlantic Menhaden	Brevoortia tyrannus
4	**Atlantic Needlefish**	Strongylura marina
5	**Atlantic Silverside**	Menidia menidia
6	Banded Killifish	Fundulus diaphanus
7	**Bay Anchovy**	Anchoa mitchilli
8	**Blueback Herring**	Alosa aestivalis
9	**Bluefish**	Pomatomus saltatrix
10	Gizzard Shad	Dorosoma cepedianum
11	**Inland Silverside**	Menidia beryllina
12	Inshore Lizardfish	Synodus foetens
13	**Mummichog**	Fundulus heteroclitus
14	Northern Pipefish	Syngnathus fuscus
15	**Rough Silverside**	Membras martinica
16	Skilletfish	Gobiesox strumosus
17	**Spot**	Leiostomus xanthurus
18	**Striped Anchovy**	Anchoa hepsetus
19	**Striped Bass**	Morone saxatilis
20	**Striped Killifish**	Fundulus majalis
21	Summer Flounder	Paralichthys dentatus
22	**White Perch**	Morone americana
23	Winter Flounder	Pseudopleuronectes americanus
24	Yellow Perch*	Perca flavescens

Taken from 1989-1993 DNR juvenile fish index survey from Hambrooks Bar station (unless otherwise indicated)
Species with common names in bold were taken 2 or more years during the five-year period

*Taken from Weinrich et al. 1985. Survey and inventory of anadromous fish spawning areas in lower Choptank River Drainage
Source: Planning Aid Report, NMFS, September 1995

TABLE 4-3 FINFISH - NANTICOKE RIVER

	COMMON NAME	SCIENTIFIC NAME
1	**Alewife**	Alosa pseudoharengus
2	American Eel	Anguilla rostrata
3	**Atlantic Croaker**	Micropogon undulatus
4	**Atlantic Menhaden**	Brevoortia tyrannus
5	**Atlantic Silverside**	Menidia menidia
6	Banded Killifish	Fundulus diaphanus
7	**Bay Anchovy**	Anchoa mitchilli
8	Blackcheek Tonguefish	Symphurus plagiusa
9	Blueback herring*	Alosa aestivalis
10	**Bluefish**	Pomatomus saltatrix
11	**Channel Catfish**	Ictalurus punctatus
12	Crevalle Jack	Caranx hippos
13	Gizzard Shad	Dorosoma cepedianum
14	**Harvestfish**	Peprilus alepidotus
15	Hogchoker	Trinectes maculatus
16	Inland Silverside	Menidia beryllina
17	**Mummichog**	Fundulus heteroclitus
18	Naked Goby	Gobiosoma bosci
19	Pigfish	Orthopristis chrysoptera
20	Sheepshead Minnow	Cyprinodon variegatus
21	Silver Perch	Bairdiella chrysoura
22	Spanish Mackerel	Scomberomorus maculatus
23	**Spot**	Leiostomus xanthurus
24	**Spotted Seatrout**	Cynoscion nebulosus
25	**Striped Anchovy**	Anchoa hepsetus
26	**Striped Bass**	Morone saxatilis
27	**Striped Killifish**	Fundulus majalis
28	Striped Mullet	Mugil cephalus
29	Summer Flounder	Paralichthys dentatus
30	**Weakfish**	Cynoscion regalis
31	**White Catfish**	Ictalurus catus
32	**White Perch**	Morone americana
33	Yellow Perch*	Perca flavescens

Taken from 1989-1994 DNR juvenile fish index survey from Tyaskin station (unless otherwise indicated)
Species with common names in bold were taken 2 or more years during the six year period
Taken from Weinrich et al. 1987. Survey and inventory of anadromous fish spawning areas in the Nanticoke River Drainage
Source: Planning Aid Report, NMFS, September 1995

APPENDIX V

404(b)(1) EVALUATION

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION
CHESAPEAKE BAY OYSTER RECOVERY PROJECT
MARYLAND

JANUARY 1996

I. PROJECT DESCRIPTION

a. Location - The proposed project will occur within the Maryland portion of the Chesapeake Bay. Project activities will occur in Oyster Recovery Areas (ORAs) established by the Maryland Oyster Roundtable Action Plan in the Chester, Choptank, Nanticoke, Patuxent, Magothy, and Severn Rivers. Seed bar creation will occur at Kedges Straits between South Marsh Island and Smith Island and/or in the mouth of the Little Choptank River.

b. General Description - Based on recommendations of the Maryland Oyster Roundtable Action Plan, a multi-year project was formulated. Project construction will occur over a five-year period and will include the following activities: construction of new oyster bars and rehabilitation of existing bars to create oyster habitat; upgrading of state-owned hatcheries at Horn Point and Piney Point; construction of seed bars for production of seed oysters; and planting of seed oysters collected from seed bars and produced at hatcheries on new and rehabilitated bars. Monitoring of implemented activities will continue for three years after implementation.

c. Purpose - The purpose of the proposed project is to restore oyster habitat and increase oyster populations in the Maryland portion of the Chesapeake Bay.

d. General Description of Discharge Material - Project activities will involve the placement of oyster shell obtained by dredging fossil oyster shell or other means. Seed bars, approximately 5 to 15 acres in size, will be constructed during the project. Shell will be placed at a rate of 12,500 bushels per acre to create seed bars. New bars will be created by placing shell at 5,000 and 10,000 bushels per acre. Bar rehabilitation will include the placement of shell on existing non-productive bars in mounds and in even layers at 5 thousand bushels per acre. Rehabilitation will also include the cleaning of sediment from existing bars utilizing an oyster dredge (bagless dredging) or a hydraulic clam dredge.

e. Description of the Proposed Discharge Sites - Specific locations for project activities will be determined based on bottom composition, salinity, water depth, water currents, levels of dissolved oxygen, and disease prevalence. The GIS being developed at DNR Cooperative Oxford Laboratory will also be utilized. The project requires flexibility in activity locations to meet changing environmental conditions, including changes in salinity and disease virulence. Information gained from monitoring of completed activities will also be used to site subsequent activities.

f. Description of Discharge Method - Dredged oyster shell will be transported to project sites by barge and placed overboard by front-end loader and/or high pressure water "cannons".

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope - Project activities will occur in water depths of 6 to 30 feet from MLW. The elevation of the existing substrate will be raised 2 to 6 inches by the creation of seed bars and new bars. Mounds of approximately 8 cubic yards of shell (20 to 40 mounds per acre) will also be placed on existing bars.

(2) Sediment Type - New bars and seed bars will be constructed on firm bottoms.

(3) Dredged/Fill Material Movement - Minimal movement of material placed during this project is expected.

(4) Physical Effects on Benthos - The placement of shell and other fill material will cover the existing substrate and benthos, but will provide enhanced habitat for recolonization by benthic epifauna.

(5) Other Effects - N/A.

(6) Actions Taken to Minimize Impacts - The fill material will be discharged in a manner to minimize the disruption of bottom sediments. Environmental protection measures will be employed at project sites to avoid and minimize impacts to the aquatic environment. Construction specifications will state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

(a) Salinity - No change expected.

(b) Chemistry - No change expected.

(c) Clarity - Minor and temporary change expected during construction due to turbidity.

(d) Color - Minor and temporary change expected expected during construction due to turbidity.

(e) Odor- No change expected.

(f) Taste - N/A.

(g) Dissolved Gas Levels - No change expected.

(h) Nutrients - No change expected.

(i) Eutrophication - Not expected to occur.

(j) Others as Appropriate - None.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow - Minimal effects are expected. Elevation of oyster bars may increase flow and turbulence in the vicinity of the bar, resulting in enhanced mixing and food delivery downstream.

(b) Velocity - No significant change in velocity is anticipated.

(c) Stratification - No change expected.

(d) Hydrologic Regime - No change expected.

(3) Normal Water Level Fluctuations - No change expected.

(4) Salinity Gradients - N/A.

(5) Actions to Minimize Impacts - N/A.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Project Sites - Minor and short term impacts are expected to occur during construction. Turbidity levels are expected to rapidly return to background levels once construction is completed.

(2) Effects on Chemical and Physical Properties of the Water Column

(a) Light Penetration - A minor, temporary decrease may occur during construction. No change expected after construction.

(b) Dissolved Oxygen - Minor, temporary, and localized reduction in dissolved oxygen due to turbidity may occur during construction. No change is expected after construction.

(c) Toxic Metals and Organics - No toxic metals or organics are expected to be released into the water column. No change expected after construction.

(d) Pathogens - No pathogens are expected to be released into the water column.

(e) Aesthetics - No adverse impacts are anticipated.

(f) Others as Appropriate - N/A.

d. Contaminant Determinations - Determination of project sites will include coordination with appropriate agencies and a review of historical data concerning potential contaminants. Clean fill material (oyster shell, etc.) will be used for construction. Therefore, no significant levels of contaminants will be released into the water column.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton - No effect expected.

(2) Effects on Benthos - Benthic organisms will be covered by the placement of shell and displaced by bar cleaning. However, new oyster bars will be created and existing bars will be enhanced. Oyster bars are three-dimensional structures which provide more surface area for

the attachment of oysters and other sessile organisms (mussels, barnacles, hydroids, algae, etc.) than that provided by relatively flat bottom.

(3) Effects on Nekton - Nekton are expected to be temporarily disturbed during construction, but to return after project completion. New and rehabilitated bars will increase available habitat for organisms associated with oyster bars, including fishes, amphipods, shrimp, worms, and crabs.

(4) Effects on Food Web - Organisms associated with oyster bars recycle nutrients and organic matter, and are prey for commercially and recreationally important finfish species.

(5) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges - N/A.

(b) Wetlands - N/A.

(c) Tidal flats - N/A.

(d) Vegetated Shallows - Oysters are generally restricted to subtidal areas from 6 to 30 feet in depth. Therefore, project activities are not expected to displace or adversely impact submerged aquatic vegetation (SAV). However, appropriate measures will be implemented during shell recovery activities as necessary to protect SAV in adjacent areas from elevated turbidity.

(6) Threatened and Endangered Species - No effects to threatened and endangered species are expected as a result of this project.

(7) Other Wildlife - No change expected.

(8) Actions to Minimize Impacts - Construction activities will be limited to the immediate project areas. Impacts to the environment will be minimized through the employment of environmental protection measures.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determinations - N/A.

(2) Determination of Compliance with Applicable Water Quality Standards - Fill will be clean material that will meet applicable water quality standards. Work will be performed in accordance with all applicable State water quality standards.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply - No effect expected.

(b) Recreational and Commercial Fisheries - Project is expected to enhance and create habitat for oysters and other organisms, including finfish and blue crabs.

(c) Water Related Recreation - No effect expected.

(d) Aesthetics - No effect expected.

(e) Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites, and Similar Preserves - No effect expected.

g. Determination of Cumulative Effects on the Aquatic Ecosystem - The project is expected to increase the acreage of available oyster habitat. The cumulative impact of this project and other restoration projects is expected to be positive, with the creation of more diverse and productive habitat.

h. Determination of Secondary Effects on the Aquatic Ecosystem - Secondary effects are expected to be positive, resulting in increased habitat for finfish, blue crabs, and other species.

III. FINDING OF COMPLIANCE

a. No adaptations of the Section 404(b)(1) Guidelines were made relative to this evaluation.

b. The planned placement of material will be in compliance with State water quality standards.

c. The proposed placement of material is not expected to violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.

d. The proposed project will not negatively affect any endangered species.

e. No Marine Sanctuaries, as designated in the Marine Protection, Research, and Sanctuaries Act of 1972, are in the project area.

f. The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be adversely affected. Positive effects on aquatic ecosystem diversity and productivity are expected as a result of the proposed project.

g. Appropriate steps to minimize potential impacts of the placement of fill material in aquatic systems will be followed.

h. On the basis of the guidelines, the proposed discharge sites are specified as complying with the inclusion of appropriate and practical conditions to minimize contamination or adverse effects to the aquatic ecosystem.

APPENDIX VI

TABLE OF REGULATORY COMPLIANCE REQUIREMENTS

Regulatory Compliance Requirements

Federal Statutes	Level of Compliance
Anadromous Fish Conservation Act	N/A
Archeological and Historic Preservation Act	FULL
Clean Air Act	FULL
Clean Water Act	FULL
Coastal Barrier Resources Act	FULL
Coastal Zone Management Act	FULL
Comprehensive Environmental Response, Compensation and Liability Act	N/A
Endangered Species Act	FULL
Estuary Protection Act	FULL
Federal Water Project Recreation Act	FULL
Fish and Wildlife Coordination Act	FULL
Land and Water Conservation Fund Act	N/A
Marine Mammal Protection Act	FULL
National Historic Preservation Act	FULL
National Environmental Policy Act	FULL
Resource Conservation and Recovery Act	FULL
Rivers and Harbors Act	FULL
Watershed Protection and Flood Prevention Act	N/A
Wild and Scenic Rivers Act	N/A
Executive Orders, Memoranda, etc.	
Protection and Enhancement of Cultural Environment (E.O. 11593)	FULL
Floodplain Management (E.O. 11988)	FULL
Protection of Wetlands (E.O. 11990)	FULL
Prime and Unique Farmlands (CEQ Memorandum, 11 Aug 80)	N/A
Environmental Justice in Minority and Low-Income Populations (E.O. 12898)	FULL

Note:

Full Compliance (Full): Having met all requirements of the statute, E.O. or other environmental requirements for the current stage of planning.

Partial Compliance (Partial): Not having met some of the requirements that normally are met in the current stage of planning.

Non-Compliance (NC): Violation of a requirement of the statute, E.O. or other environmental requirement.

Not Applicable (N/A): No requirements for the statute, E.O. or other environmental requirement for the current stage of planning.