**Appendix A – Harris Creek Tributary Plan**

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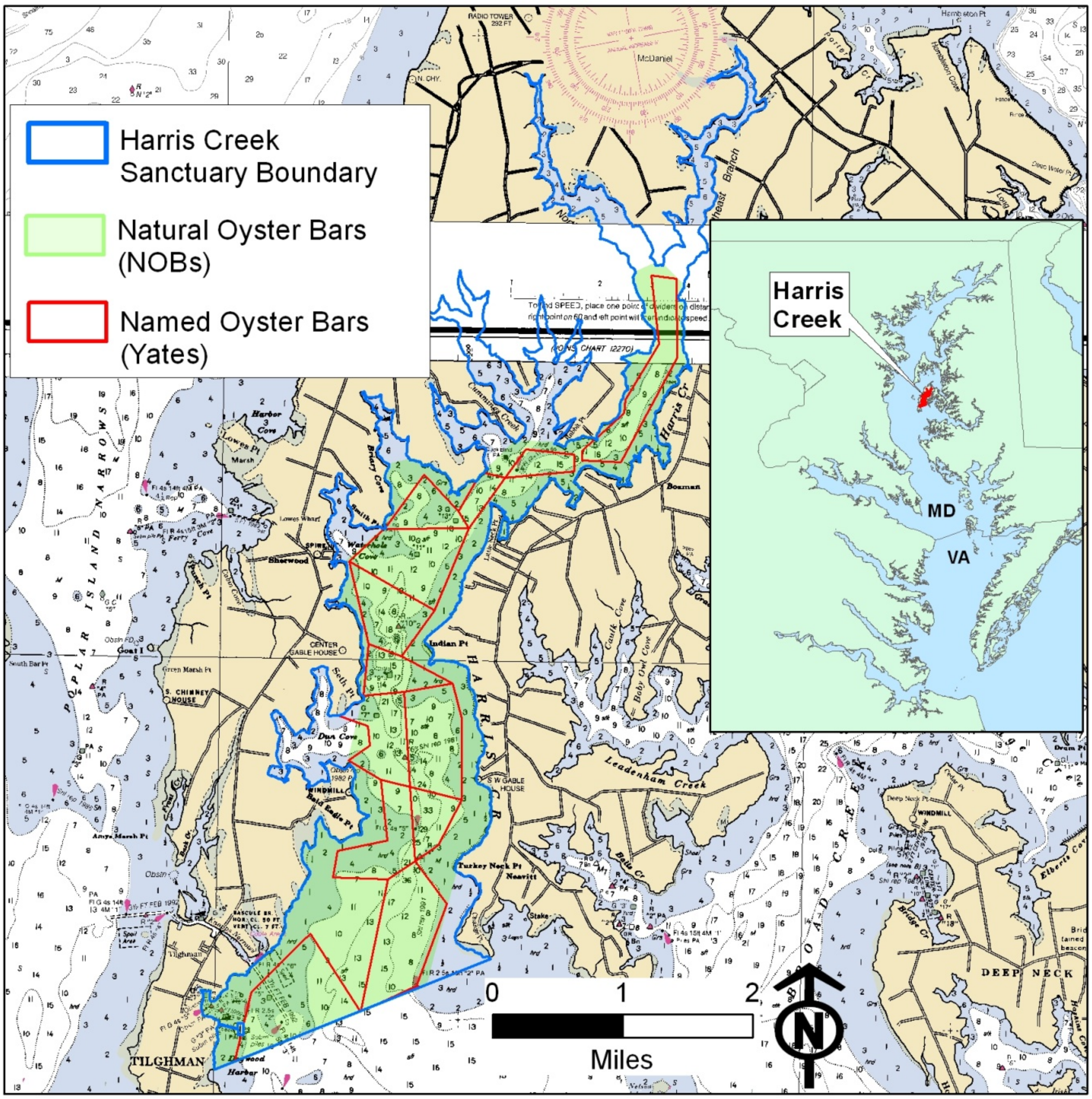
# Appendix A – Harris Creek Tributary Plan

# Harris Creek Oyster Restoration Tributary Plan:

A blueprint to restore the oyster population in Harris Creek,
a tributary of the Choptank River on Maryland's Eastern Shore

**As drafted by the**
**Maryland Interagency Oyster Restoration Workgroup of the**
**Sustainable Fisheries Goal Implementation Team**
**January 2013**



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# Harris Creek Oyster Restoration Tributary Plan

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The appendices are available on the Internet at:
ftp://ftp.chesapeakebay.net/noaa/Harris%20Creek%20Draft%20Sep%202012/

**Executive Summary**

In May 2009, President Obama issued Executive Order 13508, "Chesapeake Bay Protection and Restoration." The oyster outcome associated with this executive order is to restore oyster populations in 20 Chesapeake Bay tributaries by 2025. The Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) is charged with advancing this goal. The GIT previously convened the Oyster Metrics Workgroup, which established a Bay-wide, science-based, consensus definition of a "restored tributary" per the executive order goal. The GIT has now convened interagency workgroups in Maryland and Virginia to plan restoration work in each state, in consultation with appropriate partners.

Based on consideration of salinity levels, available restorable bottom, protection from harvest, historical spat set, and other factors, the Maryland Interagency Workgroup, in consultation with Maryland oyster restoration partners, selected Harris Creek as its first tributary for large-scale oyster restoration. Harris Creek is a tributary on the north shore of the Choptank River, near the mouth, on Maryland's Eastern Shore, as shown in Figure 1. It is an oyster sanctuary (closed to wild oyster harvest).

What follows is the Harris Creek Oyster Restoration Tributary Plan. It details the restoration site selection process, and the reef construction, seeding, and monitoring required to bring Harris Creek in line with the oyster metrics definition of a successfully-restored tributary. It calls for restoring 377 acres of oyster reefs in Harris Creek, and includes:

- a description of the process used to develop the tributary plan,
- a map showing which areas of the creek are targeted to receive plantings of substrate (reef material) and oyster seed,
- a needs analysis for oyster seed and substrate,
- a cost analysis, and
- a discussion of monitoring, implementation and progress tracking.

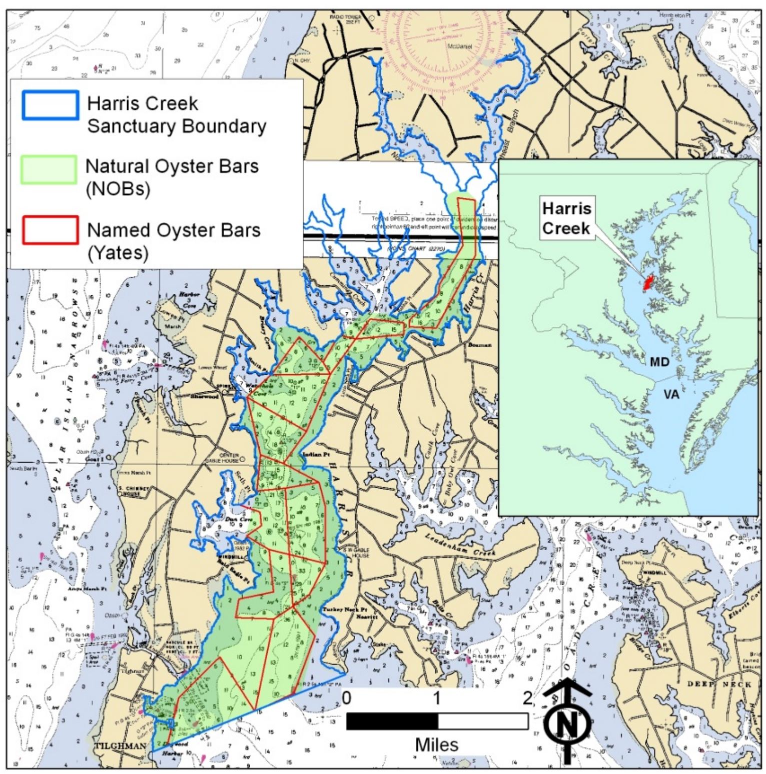


**Figure 1: Harris Creek Location Map**

The implementation time frame will depend primarily on availability of funding. Existing oyster seed production capacity is sufficient to allow for implementation of this plan in 3 to 5 years.

However, for planning purposes, this document assumes a worst-case scenario where Harris Creek does not receive any natural recruitment (spat set) over the course of plan implementation. Until 2000, the creek regularly received large spat sets. From 2000 through 2010, only one significant spat set occurred, and even that was lower than historic levels. Fortunately, partway through this planning process, Harris Creek received a natural spat set. This may mean some areas targeted for restoration herein, that initial surveys indicated fell short of the restoration goals per the oyster metrics report, may now already meet the restoration goals per the oyster metrics report. Thus, it is likely that the seed and cost estimates herein are high. It is also possible that the creek may receive future natural spat sets during the implementation timeframe, yielding additional boosts. Ultimately, the intent is for the added broodstock to reproduce and jumpstart spat sets in Harris Creek to levels recorded prior to 2000.

This plan represents an unprecedented scale of oyster restoration in a single tributary in Maryland. Significant data collection and analysis went into the development of the tributary plan, including benthic sonar mapping with video and patent tong ground-truthing to identify suitable bottom for restoration, water quality analysis, examination of historic oyster bars, consideration of past and current oyster recruitment, an evaluation of sediment and shell volume on existing oyster shell bottom, and two coordinated surveys to determine current oyster populations in Harris Creek. Additionally, public participation was encouraged during an open house held to hear input on the plan. It is expected that this tributary plan will serve as a model for the restoration of other tributaries in support of the Executive Order goal.

DNR, NOAA, and USACE are charged with implementation of the Harris Creek tributary plan. However, the productive collaboration of academic, non-governmental, and local groups involved in Chesapeake Bay restoration will greatly help achieve restoration success.

**Summary: Harris Creek Oyster Restoration Tributary Plan**

| | |
|---|---|
| **Total Acres Targeted for Restoration** | **377** |
| **Total Seed Required** | **2,093,000,000** |
| **Total Substrate Needed (cubic yards)** | **350,000** |
| **Total Implementation Cost (restoration an d monitoring)** | **$31,651,000** |

# Harris Creek Oyster Restoration Tributary Plan

## Context and Scope:

President Obama's Executive Order 13508 called for federal agencies to establish specific measurable environmental goals for restoring the Chesapeake Bay. These environmental goals were laid out in the May 2010 *Strategy for Protecting and Restoring the Chesapeake Bay Watershed*; this strategy specifically called for restored oyster populations in 20 Chesapeake Bay tributaries by 2025. In support of the executive order, the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) convened the Oyster Metrics Workgroup to develop a science-based, common definition of a successfully-restored tributary for the purpose of tracking progress toward the goal. The workgroup was composed of representatives from the state and federal agencies involved in Chesapeake Bay oyster restoration, as well as oyster scientists from academic institutions. The workgroup produced a report detailing these success metrics (Oyster Metrics Workgroup, 2011). These metrics serve as the basis for the Harris Creek tributary plan. The following criteria were among those set forth in the metrics report:

- A successfully-restored reef should:
  - have a minimum mean density of 50 oysters and 50 grams dry weight/square meter ($m^2$) covering at least 30 percent of the target restoration area at 6 years post restoration;[1]
  - have two or more age classes present; and
  - exhibit stable or increasing spatial extent, reef height and shell budget.
- A successfully-restored tributary is one where 50 to 100 percent of the currently-restorable bottom has oyster reefs that meet the reef-level metrics above. Restorable bottom is defined as area that, at a minimum, has appropriate bottom quality and water quality for oyster survival).
- An ideal candidate tributary is one where 50 to 100 percent of the currently restorable bottom is equivalent to at least 8 percent, and preferably more, of its historic oyster bottom.

In 2012, USACE drafted a native oyster restoration master plan that evaluated tributaries of the Chesapeake Bay to determine those tributaries with the potential to support large-scale oyster restoration efforts. In 2012, the GIT established the Maryland Interagency Workgroup consisting of representatives from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Army Corps of Engineers' Baltimore District (USACE), and the Maryland Department of Natural Resources (DNR). The purpose of this group is to facilitate oyster restoration by coordinating efforts among the state and federal agencies, in consultation with the scientific, academic and oyster restoration communities. The workgroup utilized the

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[1] In addition, a minimum threshold for restoration success was set at a mean density of 15 oysters and 15 grams dry weight biomass/$m^2$ covering at least 30 percent of the target restoration area at 6 years post restoration activity. Minimum threshold is defined as the lowest levels that indicate some degree of success. However, this tributary plan is focused on the 50 oysters/$m^2$ target density for a successfully restored reef.

USACE Native Oyster Restoration Master Plan and the Maryland Oyster Restoration and Aquaculture Development Plan as the foundations of its work. The workgroup's specific efforts over the past year have included selecting tributaries for restoration using science-based criteria, and drafting the Harris Creek tributary plan.

The purpose of this plan is to describe the actions necessary to bring Harris Creek to the oyster metrics definition of a successfully restored tributary. It includes specific areas targeted for restoration work, and an analysis of the amount of seed and substrate required and associated estimated costs. Included too is a monitoring framework that will allow for the determination of whether or not Harris Creek can be considered "successfully restored" per the oyster metrics definition. It is recognized that this monitoring plan is not exhaustive. Many research questions may remain unanswered if only this basic level of monitoring is implemented. Thus, an additional section is included that lays out recommended research topics for which Harris Creek may be a suitable study site.

This plan estimates the funding required to restore Harris Creek per the oyster metrics definition is just over $31.5 million. Some funds have already been identified (see implementation section); identifying the balance will need to be an ongoing effort for the oyster restoration partners. Even acquiring the large amount of required substrate (350,000 cubic yards) is a substantial challenge. The hope is that laying out this plan will clarify the needs, and allow agencies, non-profit organizations, academics and other stakeholders to collectively identify the remaining resources needed for implementation.

## <u>Harris Creek Tributary Plan Process</u>

The Harris Creek Oyster Restoration Tributary Plan was accomplished using the following steps:

1. Identify tributary for restoration and set restoration acreage target:

   Harris Creek, a tributary near the mouth of the Choptank River on Maryland's Eastern Shore, was selected as the initial candidate for restoration by the Maryland Interagency Workgroup based on the findings of the USACE master plan, DNR's fall survey data, the Maryland oyster sanctuary list, and bottom survey data from the Maryland Geological Survey and NOAA. Criteria used in the tributary selection included water quality (salinity and dissolved oxygen appropriate for survival and reproduction), availability of restorable bottom (hard bottom capable of supporting oysters and substrate), historic spat set data (Appendix A), potential for larval retention, sanctuary status, and tributary size. Harris Creek scored favorably for all criteria.

2. Define restoration goal (target acreage):

   As noted earlier, the oyster metrics report defined a successfully restored tributary as one where 50 to 100 percent of currently restorable bottom, constituting at least 8 percent of historic oyster habitat, consists of restored reefs. NOAA performed a Harris Creek restorable bottom analysis (Appendix B) based on data from the USACE master plan, the oyster sanctuary boundaries, and bottom survey data from Maryland Geological Survey and NOAA. This analysis showed 600 acres of potentially restorable bottom in Harris Creek (Appendix B). Historically, there were 3,479 acres of oyster habitat identified by the Yates Survey in 1913; accordingly, 8 percent of the historic habit (3,479) is 278 acres. Hence, the restoration goal for Harris Creek was set at 300 to 600 acres to meet both of the success criteria defined by the Oyster Metrics Workgroup.

3. Conduct pre-restoration oyster population surveys:

   NOAA contracted Versar, Inc., to perform a spatially-explicit population survey in Harris Creek. As part of a NOAA-funded Bay-wide project involving DNR, the Paynter Labs at the University of Maryland also conducted a Harris Creek population survey. These surveys were done in the winter of 2011-2012.

4. Develop a blueprint draft map summarizing major datasets:

   The workgroup summarized the available geographic information systems (GIS) data in an initial blueprint map, showing potential locations for different reef restoration treatments. Details of the GIS analysis are described in a later section of this document. From here, the workgroup selected initial areas suitable for two types of treatment: seed only, or substrate plus seed. The workgroup also identified areas currently meeting the oyster density goal, as determined by the population surveys. General planning guidance from the U.S. Coast Guard was also considered during this process. This guidance includes setbacks of 250 feet from marinas and navigational aids and 150 feet from federally maintained channels.

5. Conduct public open house:

   The initial blueprint map was presented to the public at an open house held March 21, 2012, at the Chesapeake Bay Maritime Museum in St. Michaels, Maryland. Comments received from the public were favorable, with specific recommendations to maintain access to the Indian Point Community Association dock, Dun Cove, and the Knapps Narrows channel; to avoid disturbing the Marylanders Grow Oysters Program's planting site; and to be mindful of the potential impact of illegal harvest.

6. Revise blueprint map:

   Incorporating feedback from the open house, a revised map was created showing potential oyster restoration sites for each treatment type. Estimates were made for amount of seed and substrate needed; and from those, cost estimates were derived.

7. Send draft blueprint map to the Coast Guard:

The draft blueprint map was sent to the Coast Guard's waterways management section for review and advance coordination of a potential Section 10 permit and as part of ongoing NEPA (National Environmental Policy Act) coordination. In addition to a formal written review, the workgroup met informally with the Coast Guard staff to describe the tributary plan process and draft blueprint map.

8. Send draft blueprint map and tributary plan to consulting scientists for review:

In addition to input from the Coast Guard, the workgroup is coordinating the draft tributary plan, including the blueprint map, with a group of Chesapeake Bay scientists from the academic community, Federal and state resource agencies, and non-profit organizations. This review includes both a formal written review as well as an informal meeting to discuss any concerns or suggestions for improvement. It is expected that communication with the scientific community will be ongoing throughout restoration.

9. Finalize reef blueprint map and tributary plan:

Using the inputs from the consulting scientists, and the Coast Guard, the workgroup will finalize the Harris Creek tributary plan into a living document, to be updated as appropriate based on adaptive management.

10. Obtain Section 10 permit or NEPA clearance, as needed:

Restoration partners (DNR and USACE) are currently limited to placing substrate in locations where 8 feet of water depth (clearance) will remain above the reef. The current water depth requirements severely limit the spatial scale at which reefs can be constructed in Harris Creek, and would prevent achieving the restoration goal.

Depending on the implementation strategy, further regulatory actions may be required. If implementation is performed by the State of Maryland (DNR), then the existing Section 10 permit may need to be modified since it currently only allows an 8-foot depth clearance. Similarly, USACE's NEPA documentation to date has limited the federal actions to the 8-foot clearance as well. Subsequently, DNR is applying for a permit modification to allow substrate placement per this plan (allowing minimum of 5 feet of clearance). USACE is continuing its NEPA coordination to incorporate this change. Due to the target restoration acreage, shallower depths must be utilized. The process to get regulatory clearance for the shallower areas has been started.

11. Implement seeding and substrate activities:

The tributary plan is expected to be primarily implemented by the key federal and state agencies involved in oyster restoration. Specifically, USACE is expected to continue to play a large role in the placement of substrate. NOAA is planning to continue to be involved funding seeding activities, as well as mapping and survey actions. DNR is planning to contribute both to the seeding and substrate placement efforts, as well as mapping and survey activities. All three partners plan to fund and conduct project planning and monitoring efforts.

12. Monitor project performance and adaptively manage:

    Using the protocols discussed in the oyster metrics report, the workgroup will monitor the performance of the restoration sites in Harris Creek. Key parameters to be monitored include reef structure, population density, total reef population, and the number of age classes. Additionally, the workgroup will monitor water quality and other parameters that affect project success. Monitoring is planned to occur several times within 6 years of implementation. Depending on the results of the monitoring, additional seeding or other adaptive management actions will be undertaken. Details of the monitoring plan are found in the monitoring section of this document.

## Data Used in the Harris Creek Tributary Plan

This section details the parameters considered in the selection of Harris Creek as the first target tributary for intensive oyster restoration, the selection of restoration sites within the creek, and the determination of location and type of reef treatment. Some of these parameters were considered in greater depth in the USACE master plan process and/or the Maryland Oyster Restoration and Aquaculture Development Plan process. They warrant mention here, though, since the Harris Creek tributary plan largely builds on these plans. Further description of each parameter is discussed in the ensuing paragraphs.

**Table 1: Criteria Considered During the Harris Creek Tributary Plan Process**

| | |
|---|---|
| **Physiochemical** | Water quality (dissolved oxygen (DO), salinity, temperature) |
| **Physical** | Bottom quality, sedimentation, depth |
| **Biological** | Location and quantity of existing oyster population, historical spat set, larval transport |
| **Other** | Sanctuary boundaries; land use; location relative to other estuarine habitats (SAV); input from public, Coast Guard, and consulting scientists |

### Physiochemical Criteria

Harris Creek is classified as a mesohaline tributary. Salinity and dissolved oxygen (DO) data were compiled and screened through USACE's master plan efforts by Versar, Inc. Point data were gathered by DNR, the Maryland Department of the Environment, the Alliance for Chesapeake Bay, and the Chesapeake Bay Program. The same salinity dataset was also used to evaluate Harris Creek for the potential risk from freshets. Temperature is not a limiting factor in Harris Creek and needed no further consideration. Details of the physiochemical selection criteria are provided in the USACE master plan.

Physical Criteria

Only areas between 4 and 20 feet in water depth were considered suitable for restoration. Deeper waters typically experience low DO conditions and higher sedimentation that are not suitable for oysters or the reef community. Shallower waters conflict with other uses of the waterway. Water depth between 4 and 6 feet deep was considered unsuitable for substrate additions due to concerns about navigational interference of placing alternate substrates. Thus, only water depths between 6 and 20 feet were considered suitable for substrate additions.

Adequate bottom must be available for oyster restoration. Hard bottom capable of supporting shell or other material likely to catch spat as well as areas that currently hold oyster shell were identified by bottom surveys using sonar in conjunction with various ground-truthing methods. Side-scan sonar surveys were conducted by the Maryland Geologic Survey (MGS) in 2010 to identify bottom type, specifically, whether the bottom surface was exposed shell habitat, buried shell, or hard bottom. Seabed-type polygons were classified by NOAA using the Coastal and Marine Ecological Classification Standard (CMECS)[2] surface geology component. GIS polygons were created from combining the MGS 2010 side-scan sonar mosaic; NOAA Chesapeake Bay Office's 2011 video, ponar grabs, and acoustic classification; the Paynter Labs' 2011 patent-tong survey; and Versar's 2011 patent-tong survey (Appendices C, D).

Shell sedimentation was investigated by Versar surveys in January 2012 and the Paynter Labs in January 2012. Sediment was classified as high, medium, or low on all existing oyster bars by the Versar survey. (Appendix C).

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[2] Chesapeake Bay-CMECS is the integration of several digital maps that identify the boundaries and distribution of seabed materials and bottom habitats in the Chesapeake Bay. It is a hierarchical ecological classification system that is universally applicable for coastal and marine ecosystems. It was developed by the NOAA Coastal Services Center, in partnership with NatureServe and others, to create a standard classification system that integrates different types of data from multiple sources to fully characterize a specific area. Raw survey data were acquired by the NOAA Chesapeake Bay Office and the Maryland Geological Survey with acoustic seafloor survey systems and validated with video and sediment grab samples. Final seabed habitat polygons were classified using a variant of the CMECS. CB-CMECS places an emphasis on describing the American oyster reef community, and the sediments that encompass it. The oyster reef units described in CB-CMECS are those that can be acoustically derived and differentiated, and are classed based upon their morphological characteristics. CMECS reef attributes in addition to other spatial data sources inform the restoration potential of targeted sites. An example is the "aggregate patch reef" which describes oyster bottom that comprises shell mounds surrounded by soft sediments. Healthy oyster communities exist on this type of habitat, but in most cases restoration potential would be low. More CMECS information, including a description of the classifications, is at http://ftp.ncbo.cgclientx.com/ecoscience/Chesapeake_Bay_Benthic_Habitat_Polygons_CMECS/.

Biological Criteria

Oyster population assessments for size and density, funded by NOAA, were completed separately by Versar, Inc. and the Paynter Labs of the University of Maryland in January 2012. The Versar surveys provided spatially explicit estimates of oyster densities and population structure within the extent of restorable oyster bottom, based on a regular sampling grid. A total of 510 patent-tong samples were collected in Harris Creek. Live oyster density estimates were determined for bottom depths ranging from 4 to 20 feet. The Paynter Labs conducted a patent-tong, stratified-random sample population survey on recent Oyster Recovery Partnership (ORP) seed plantings, higher quality shell bottom determined from the CMECS seabed map, lower quality shell bottom, and non-shell bottom. Shell volume and live oyster density were recorded. Shell abundance scores documented by the Paynter Labs' surveys, were merged with the Versar sampling data to classify shell volume on existing oyster bars as low, medium, or high volume (Appendices C and D).

Larval transport modeling was conducted by Dr. Elizabeth North of the University of Maryland Center for Environmental Science (UMCES 2011). The purpose of this modeling was to investigate larval transport processes in Harris Creek and the lower Choptank River. A three-dimensional, coupled hydrodynamic and larval transport model was used to simulate oyster larval transport from a suite of proposed reef locations.

Spat set data compiled by DNR's fall survey from 1980 to 2010 were considered in an effort to understand spat set levels and patterns in Harris Creek (Appendix A). Fall survey spat set data are available for five locations in Harris Creek: Tilghman Wharf, Mill Point, Eagle Point, Wild Cherry Tree, and Little Neck. Consistent records are not available for all stations, but the complete data record for Harris Creek spans 1980 through 2010. Data from 1985-2012 was used to make the conservative assumption that there will be no natural spat set over the next 6 years (see seed needs analysis section below). This dataset is complete, and is the most recent available, thus it was assumed to be most relevant to current conditions in the creek. Historical spat set was also considered and used in selecting Harris Creek as a target tributary (Krantz and Meritt from 1939-1975; Appendix A).

The oyster diseases Dermo (*Perkinsus marinus*) and MSX (*Haplosporidium nelsoni*) are more virulent in higher salinity waters, leading to higher mortality in these areas. Reproduction is also more successful in higher salinity areas. To balance reproduction and disease-related mortality, mesohaline areas were considered to be high priority for restoration.

Harmful algal blooms (HAB) resulting from *Prorocentrum minimum* and *Karlodinium veneficum* blooms have been documented in the Choptank River (Brownlee et al. 2005; Glibert et al. 2001), but Harris Creek has not been identified to have significant HAB problems or susceptibilities.

Other Criteria

The State of Maryland has designated 4,519 acres within Harris Creek as oyster sanctuary, where no commercial harvest of oysters is permitted.

Land use in the watershed draining to Harris Creek is largely agricultural with some forested and developed areas. This information was used by USACE in its oyster restoration master plan, which in turn informed the selection of Harris Creek as a site for large-scale oyster restoration under Executive Order 13508.

Four federally listed rare, threatened, or endangered species have been identified in Harris Creek watershed: Delaware fox squirrel, Eastern fox squirrel, dwarf wedge mussel, and Seth Forest water scavenger beetle (as listed by Landscope 2012 for Talbot County).

Submerged aquatic vegetation (SAV) habitat, as designated by the Chesapeake Bay Program, exists in Harris Creek. However, there were no SAV beds documented from 2006 through 2010 (VIMS 2012). In 2011, SAV beds were present, mainly in the upper creek.

Based on the National Wetlands Inventory data, there are 1,216 acres of wetlands in Harris Creek watershed.

## Spatial Analysis

Initial analyses performed for the USACE master plan determined that salinity and dissolved oxygen were suitable throughout Harris Creek (USACE 2012). Spatial data were overlaid in ArcGIS to locate proposed restoration sites. This GIS analysis included the bottom classification, population survey results (Versar and Paynter), shell volume (Versar), and sedimentation characterization (Versar and Paynter) (Appendices C and D).

The workgroup used three primary data layers for the GIS analysis. Specifically, these layers were:

- A data layer identifying seabed suitable for substrate placement was defined based on areas determined to be existing mollusk (oyster) habitat with oyster densities of less than 5 oysters per square meter (population surveys), and CMECS bottom characterization of muddy sand, unclassified hard bottom, sand, and sandy mud.
- Versar and Paynter population survey data were interpolated to develop live oyster density polygons within CMECS shell bottom polygons and in depths greater than 4 feet and less than 20 feet. The interpolation method used was the Nearest Neighbor/Inverse Distance Weighted method.
- A combined data layer for shell volume and sediment was developed using the intersection of interpolated shell volume and shell sedimentation polygons within CMECS shell bottom polygons and in depths greater than 4 feet and less than 20 feet.

Shell volume and sedimentation data were interpolated. The resulting values were grouped into high, medium and low categories, relative to each other, based on summary statistics. The intersection polygons provide an estimate of the location of dense, clean surface shell.

**Blueprint Map**

The foundation of this tributary plan is the blueprint map (Figure 2) showing where restoration actions are targeted. Sites that met all the following criteria were considered suitable for restoration in the Harris Creek oyster sanctuary:

- Hard benthic habitat;
- Outside of a 250-foot radius around aids to navigation;
- More than 150 feet from the federally-maintained navigation channel (Knapps Narrows);
- Not on leased bottom;
- Within a legal natural oyster bar;
- More than 250 feet from a marina;
- Not identified by the general public or the Coast Guard as a concern;
- In areas with depths of 4 to 20 feet; and
- Have an existing population of fewer than 50 oysters per square meter[3].

Hard benthic habitat was defined as areas that, per acoustic surveys, were found to have the CMECS classifications of artificial reef, aggregate patch reef, fringe reef, patch reef, sand and scattered oyster shell, sandy mud, sand, and muddy sand. Buffers around navigational aids and the Knapps Narrows channel were included in response to Coast Guard input. The 20-foot maximum depth cutoff was used due to concerns about potential hypoxia at greater depths. The shallow depth limit was based on the practical limit of the vessels used for restoration activities, as well as the limits of the acoustic surveys used to create the restorable bottom analysis. However, for substrate placement, a depth limit of 6 feet was used to allow for safe navigation overtop of the substrate.

As discussed earlier, the initial restorable bottom analysis identified 600 acres in Harris Creek as potentially restorable (Appendix B). However, upon more detailed analysis, it was determined that some of these sites were not suitable for restoration, so these areas were eliminated from the blueprint map. The eliminated areas consisted of: (1) sites deeper than 20 feet; (2) sites initially classified as hard-bottom but when ground-truthed for the 2012 efforts were found to be too soft to support substrate; and (3) areas that are otherwise suitable for substrate placement, but are in 4-6 feet water depth and thus pose a potential navigational concern. Also, generally very small areas (<1 acre) were excluded for practical implementation

[3] Areas with more than 50 oysters per square meter currently meet the minimum density goal per the oyster metrics report, so these areas are not being targeted for initial seeding. However, they may need additional seeding in future years. This is further described in the seed needs section.

reasons. This processed winnowed the initial estimate of 600 acres down to 487 acres for potential reef restoration activities.

Once the 487 acres for potential reef treatment were identified, the workgroup then determined the specific treatment (seeding versus substrate plus seeding) for each site. Adding seed only is less costly than adding both substrate and seed, and so it is the first-choice treatment. However, the seed-only option is only suitable where sufficient shell base currently exists. In the absence of existing suitable shell base, substrate must be added to create a hard reef structure. Seed oysters can then be planted on top of the new substrate base. Substrate may be any combination of oyster shell, clam shell, or alternative substrate such as crushed concrete or granite. Reef balls can be added for additional three-dimensional structure, either with or without seed oysters set onto them.

For this effort, the existing density of oysters was a key consideration in determining whether an area would be targeted for seed only, or substrate and seed. The assumption was that an area that supported existing oysters in quantity (by consensus, that amount was 5 oysters per square meter) should not be overplanted with substrate. This would risk smothering existing oysters. Also, the presence of oysters in such quantity served as an indication that existing substrate was suitable, thus the area would likely do well with the addition of seed only. Areas with fewer than 5 oysters per square meter were assumed to be in need of substrate in addition to seed. Prior to implementation, these areas will be ground-truthed before substrate or seed is placed per this plan (See description below of ground-truthing protocol to be employed). The treatment type will be adapted as needed based on the additional ground-truthing information.

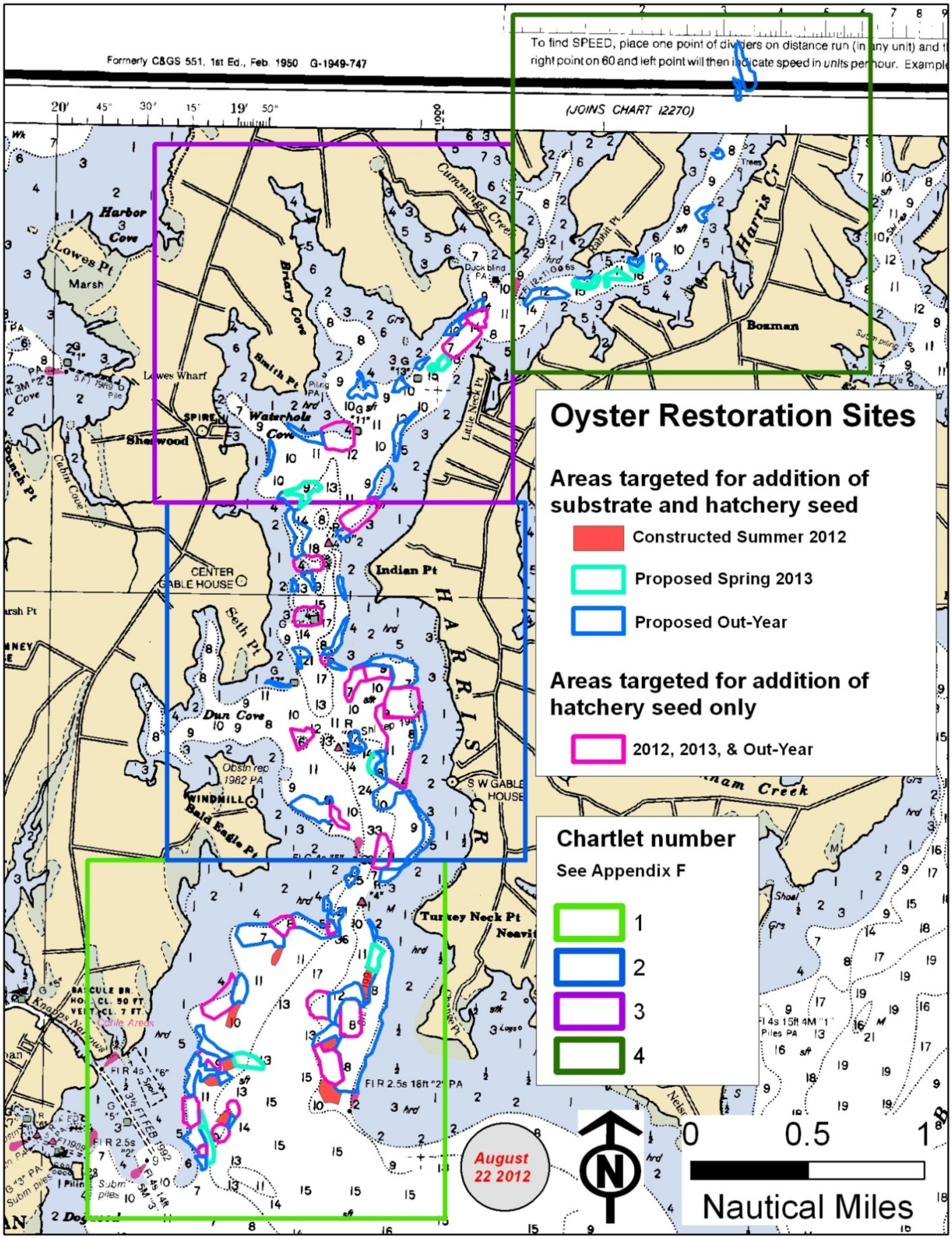
To summarize the above discussions, the criteria used for selection of the reef treatment were:

- Seeding only if existing population was equal to or greater than 5 oysters per square meter; and
- Substrate plus seeding if the existing population was less than 5 oysters per square meter.

Appendix E shows detailed information about each numbered site/GIS polygon in the tributary plan, including the acreage of each polygon, the restoration treatment it is slated to receive, volume of seed needed, and volume of substrate needed. Appendix F is a series of smaller maps ("chartlets"), which shows the sections of Harris Creek in greater visual detail. These charts use the NOAA nautical chart as a background to help the reader locate the sites. All of the restoration sites targeted for each type of reef treatment are depicted in the blueprint map in Figure 2.

**Figure 2: Blueprint Map**

This figure shows the areas targeted for restoration in Harris Creek, along with the planned restoration treatment type (seed only or substrate and seed).



Ground-Truthing

Ground-truthing will be performed on all sites targeted in the tributary plan prior to restoration treatment. The purpose of the ground-truthing is to validate the acoustic surveys, and to modify the boundaries of target sites if needed to ensure the treatment proceeds on optimal benthic habitat. Ground-truthing of any given site is expected to occur within a few months prior to restoration work.

*Diver ground-truthing protocol*: Seed-only sites will normally undergo diver ground-truthing. Diver ground-truthing will be accomplished by running several transects within each target area. The number of transects depends on the size of the area. Typically, each transect will be 200 meters long, marked every 2 meters for reference. Transect lines will be laid out haphazardly within the target polygon; divers will then swim along the line and report the condition of the bottom every 2 meters. Parameters to characterize bottom condition will be recorded at each 2-meter interval. The parameters include: amount of exposed shell, substrate type, substrate penetration and oyster density. Divers will determine a score for each parameter. Table 2 outlines the score for each category, with increasing metric values indicating bottom-type improvement.

**Table 2: Summary of Ground-Truthing Protocols**

| Exposed Shell | Value | Substrate Type | Value * | Penetration (cm) | Value * |
|---|---|---|---|---|---|
| Zero | 0 | Silt | 0 | 70 | 0 |
| Very Little / Patch | 1 | Mud | 1 | 40 | 1 |
| Some | 2 | Sandy Mud | 2 | 20 | 2 |
| Exposed | 3 | Sand | 3 | 10 | 3 |
| Oyster Bar | 4 | Rock / Bar Fill / Debris | 4 | 5 | 4 |
| | | Shell Hash | 5 | 0 | 5 |
| | | Loose Shell | 6 | | |
| | | Oyster | 7 | | |
| * Increasing metric values show bottom-type improvement | | | | | |

The data for each transect will be recorded directly into a Microsoft Access database created specifically for the Paynter Labs. The mode value of each category will be used to determine whether each transect can be categorized as preferred, acceptable, or unacceptable bottom. The bottom-type category will be determined as the category within which two of the three data types (exposed shell, substrate type and penetration) fall. Table 3 outlines the requirements for each bottom-type categorization.

**Table 3: Summary of Bottom-Type Categorization**

| Category | Exposed Shell Range | Substrate Type Range | Penetration Range |
|---|---|---|---|
| Preferred | 3-4 | 4-7 | 5 |
| Acceptable | 2 | 3-4 | 3-4 |
| Unacceptable | 1-0 | 0-2 | 0-2 |

This information will be then relayed to ORP staff and the workgroup to help make decisions about which target areas may not be suitable for planting spat on shell.

Blueprint Map Summary

The polygons identified in the blueprint map (Figure 2) as areas targeted for oyster restoration activity add up to 487 acres. However, past diver ground-truthing expeditions have generally shown that initial target areas based on sonar surveys tend to overestimate suitable hard bottom; actual suitable restoration area tends to be smaller. For planning purposes, it was assumed that the actual suitable area will be reduced by 30 percent upon diver ground-truthing. This estimate is based on past diver field experience. Table 4 shows the areal reductions by the type of reef treatment (Note that areas treated in 2012 have already been ground-truthed, so the acreage is actual, not planned, and thus in the table below is not reduced by 30 percent. The same is true for areas that already meet the density goal).

In summary, the oyster metrics report defined a successfully restored tributary as one where 50 to 100 percent of the currently restorable bottom, constituting at least 8 percent of historic bottom, meets the reef-level goals. In Harris Creek, the restorable bottom analysis (Appendix B) showed 600 acres of restorable bottom, so the minimum goal is 300 acres of restored reefs. The tributary plan targets 377 acres, allowing for the possibility that some of that acreage may not respond sufficiently to the restoration activity.

**Table 4: Acreage by Reef Treatment (with anticipated reductions)**

| Reef Treatment | Acres Identified in Blueprint Map | Suitable Acreage (Reduced by 30%, Where Appropriate) |
|---|---|---|
| Currently meets target density of 50+ oysters/m$^2$ | 3 | 3 |
| | | |
| Reef treatment:<br>Add seed only; seeded in 2012 | 88 | 88 |
| Reef treatment:<br>Add seed only; not yet seeded | 98 | 69 |
| Reef treatment:<br>Add substrate and seed; constructed in 2012 | 22 | 22 |
| Reef treatment:<br>Add substrate and seed; not yet constructed | 279 | 195 |
| **Total Acreage Requiring Reef Treatment** | **487** | **374** |
| | | |
| **Total for All Restoration Sites** | **490** | **377** |

**Seed Needs Analysis**

A projected 2.09 billion oyster seed will be required to implement this plan. This number was derived by first examining the current oyster population on each target reef site, then calculating the number of additional oysters needed on each site to reach the oyster metrics density goal of 50 oysters per square meter over 30 percent of the reef area. The oyster metrics report calls for that density to be achieved within 6 years of restoration activity, so this plan lays out oyster survival projections over 6 years. To do this, assumptions were made regarding survival rates of both planted seed and existing oysters. It is recognized that oyster survival rates are highly variable, and that the actual survival rate is unknown. However, for planning purposes it was necessary to make reasonable assumptions as to survival rates. These assumptions may be revised in future iterations of this plan if more accurate rates are determined through the recommended monitoring (see monitoring section below). Oyster survival rates were set as follows, based on Volstad et al (2008) and Oyster Recovery Partnership's field experience with hatchery-produced spat-on-shell in Maryland:

Planted spat-on-shell: first year survival rate = 15 percent;
out-year annual survival rate = 70 percent;

Existing oysters (on the reef in January 2012): annual survival rate = 70 percent.

Approximately 3 acres of reefs in Harris Creek already meet the density goal, thus initially they would require no additional seed to meet the goal. Reefs with fewer oysters will require more seed to meet the density goal. However, the oyster metrics report also lays out a goal of having at least two year classes present on each reef. Subsequently, this plan conservatively incorporates a second seeding of all reefs to achieve the two-year class goal, including the 3 acres that currently meet the goal. For future seed planting, natural spat set may deem a second seed planting unnecessary. Population monitoring will be critical to determining the need for the additional seeding.

A key unknown is the level of natural spat sets that might occur in Harris Creek over the implementation time frame and what density of oysters might result from these spat sets. The workgroup dealt with this unknown by making a very conservative assumption that there would be no natural spat set over the course of implementation. This assumption was based on the fact that from 2000 to 2010, there was only one sizable spat set in Harris Creek. Prior to this period, there were sizable spat sets two to three times per decade. By making this assumption, the tributary plan calls for planting enough seed to reach the density goals in 6 years, even with no natural spat set in the creek. Thus, the intent is to plan for a very conservative scenario, and adapt the tributary plan as needed. The tributary plan calls for an initial large planting on most reefs, followed by monitoring 3 years later in following years, and an additional smaller planting to ensure a multi-age-class population and target density.

Appendix E identifies the specific targeted reefs by number, along with the amount of seed and substrate each reef is slated to receive. A summary of the 2.09-billion seed calculation is provided in Table 5; the seeding cost estimate is provided in Table 6.

**Table 5: Seed Needs and Oyster Survival Assumptions**

| Type of Reef Treatment | First Planting (seed per acre) | First Planting, First Year Survival* | First Planting, Year 2-6 Annual Survival Rate* | Second Planting (seed per acre) | Second Planting, First Year Survival* | Second Planting, Year 2 Survival* | Existing Oyster Density (oysters per m$^2$) | Existing Oysters, Year 1-6 Annual Survival Rate* | Oyster Density After 6 Years – Surviving Oysters from Plantings and Existing Oysters (oysters per m$^2$) | Area Targeted for Restoration in Harris Creek (acres) | Total Amount of Seed Needed for Treatment Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Substrate and seed | 5,000,000 | 0.15 | 0.7 | 1,000,000 | 0.15 | 0.7 | 0 | N/A | 59 | 217 | 1,302,000,000 |
| Seed only (current density = 5-50 oysters per m$^2$) ** | 4,000,000 | 0.15 | 0.7 | 1,000,000 | 0.15 | 0.7 | 5 | 0.7 | 53 | 157 | 785,0000 |
| Seed only (current density = >50 oysters per m$^2$) | 0 | 0 | 0.7 | 2,000,000 | 0.15 | 0.7 | 50 | 0.7 | 57 | 3 | 6,000,000 |
| **Total for Tributary Plan** | | | | | | | | | | **377** | **2,093,000,000** |

* Source: Steve Allen, Oyster Recovery Partnership (personal communication, 2012), and Volstad et al (2008).

** While some sites may have greater than 5 oysters/m$^2$ density, it was assumed for planning purposes that all sites in this category had a starting density of 5 oysters/m$^2$.

**Table 6: Seed Cost Analysis**

| Reef Treatment | Area to be Treated (acres) | Seed Required per Acre | Seed Required for Treatment Type | Seed Cost for Treatment Type (at $7,500 per million)* |
|---|---|---|---|---|
| Substrate and seed | 217 | 6,000,000 | 1,302,000,000 | $9,765,000 |
| Seed only (current density = 5-50 oysters/$m^2$) | 157 | 5,000,000 | 785,000,000 | $5,888,000 |
| Seed only (current density >50 oysters/$m^2$) | 3 | 2,000,000 | 6,000,000 | $45,000 |
| **Total for Tributary Plan** | **377** | | **2,093,000,000** | **$15,698,000** |

* The seed cost of $7,500 per million was based on ORP's experience (Allen, May 2012).

## Substrate Needs Analysis

A projected 350,000 cubic yards of substrate is needed to implement the tributary plan. Substrate may be any combination of oyster shell, clam shell, or alternative substrates such as crushed concrete, granite, or reef balls. This projection of the substrate needs for Harris Creek assumes a 1-foot reef height, requiring 1,613 cubic yards of substrate per acre. The 1-foot reef height was selected to provide sufficient elevation off the bottom for the restored reefs. The computation of the substrate need is shown in Table 7, with the substrate placement cost estimated in Table 8.

**Table 7: Substrate Needs Analysis**

| Reef Treatment | Area to be Treated (acres) | Amount Substrate Needed per Acre (cubic yards)** | Amount of Substrate Needed for Treatment Type (cubic yards) |
|---|---|---|---|
| Substrate and seed* | 217 | 1,613 | 350,000 |
| Seed only (current density = >5 oysters per $m^2$) | 157 | 0 | 0 |
| Seed only (current density = >50 oysters per $m^2$) | 3 | 0 | 0 |
| **Total for Tributary Plan** | **377** | | **350,000** |

* Includes USACE reefs constructed in 2012

** Assumes a 1-foot reef height.

**Table 8: Substrate Cost Analysis**

| Reef Treatment | Area to be Treated (acres) | Substrate Required per Treatment Type (at 1,613 cubic yards per acre) | Substrate Cost (at $44.63 per cubic yard) |
|---|---|---|---|
| Substrate and seed | 217 | 350,000 | $15,620,000 |
| Seed only (current density = 5-50 oysters/m$^2$) | 157 | 0 | $ 0 |
| Seed only (current density >50 oysters/m$^2$) | 3 | 0 | $0 |
| **Total for Tributary Plan** | 377 | 350,000 | $15,620,000 |

* The substrate placement cost of $44.63 per cubic yard was based on USACE experience (O'Neill, May 2012).

## Monitoring and Research

The primary objective of the monitoring described herein is to determine whether or not the restoration work meets the definition of a "restored tributary" per the oyster metrics report. In addition, a set of "diagnostic" parameters are recommended. These are basic water quality and biological parameters which can help determine the cause of success or failure of the restoration work. The extent of the monitoring is consistent with the scope of this document and the oyster metrics report. A research section is included which lays out key topics that are relevant to large-scale oyster restoration, but beyond the immediate scope of this document.

### Monitoring of Oyster Metrics Success Goals

The principle goal of monitoring efforts in Harris Creek is to determine if the restored reefs can be considered "successful" per the oyster metrics standards. According to the oyster metrics report, evaluation of reef-level restoration success requires the determination of four parameters:

(1) structure of the restored reef (reef spatial extent, reef height, and shell budget),
(2) population density (as individual abundance and biomass),
(3) an estimate of total reef population (including biomass and number of individuals, and
(4) the number of age classes present on the reef.

In keeping with the oyster metrics report, these parameters will be measured as the basic monitoring protocol for Harris Creek under this plan, likely in partnership with academics, researchers, non-governmental organizations, private contractors, and other agencies. Table 9 describes in detail the recommended parameters to be monitored to evaluate progress towards the restoration goals.

Pre-restoration data on reef extent were collected by Maryland Geological Survey and NOAA using sonar, video, and grab samples. Baseline data on oyster population density were collected by Versar and Dr. Ken Paynter of the University of Maryland Paynter Labs, with NOAA funding. These data were used to estimate baseline oyster population size and densities in Harris Creek. Future monitoring results will be compared to these baseline data to determine the success of restoration efforts, and whether or not adaptive management actions are necessary. Table 9 lists estimated costs for monitoring per the oyster metrics success goals.

Diagnostic Monitoring

In addition to monitoring to evaluate the success or failure of restoration projects per the oyster metrics standards, it is wise to include further monitoring that will help determine the causes of the success or failure. These are deemed "diagnostic" monitoring parameters. These include basic water quality, disease, and physiologic factors that affect oyster health and reef structure persistence. Understanding these parameters alongside metrics of restoration success will allow practitioners to understand not only whether or not the project succeeded, but why. Table 10 lists the recommended diagnostic parameters.

Due to the large scope of monitoring, some of these factors will be measured only at "sentinel sites" within the Harris Creek tributary. Sentinel sites are fixed sites that are monitored at appropriate intervals. Collecting data on these recommended diagnostic monitoring parameters will likely require partnering with academic institutions, non-governmental organizations (NGOs), and other state and federal agencies. Table 10 shows suggested diagnostic monitoring activities and estimated costs of these activities.

## Table 9: Suggested Restoration Success Monitoring Activities

| Parameter | Sentinel Site Monitoring (assumes three 3-acre sentinel sites, monitored annually) | All Site Monitoring (pre- and post-construction, years 3 and 6) | Method of Measurement | Units/Performance Metric | Estimated Cost (assumes a 6-year monitoring timeline) |
|---|---|---|---|---|---|
| **Population- Density** | x | x | quadrat sampling or patent tong | number of oysters/$m^2$ | These three parameters are collected simultaneously; cost to monitor sentinel sites annually for 6 years = $18,000 ($3,000 per year). The cost to monitor entire tributary in years 3 and 6 = $168,000 ($84,000 per monitoring event). |
| **Population-Biomass** | x | x | regression | g wet or dry weight/$m^2$ | |
| **Size-Frequency Distribution** (multiple age classes) | x | x | quadrat sampling or patent tong | (length, number) | |
| **Spatset** (There are two established key bars in HarrisCreek -- Tilghman Wharf and Mill Point. These two sites can provide historical record.) | x | | quadrat sampling or patent tong | (spat/$m^2$) Evidence of successful recruitment during at least two separate recruitment periods | No additional cost (This data is collected as part of DNR's existing annual fall oyster survey.) |
| **Reef Height** | | x | sidescan or multibeam sonar/seismic profiling | (cm) Positive or neutral change in reef height from original structure | No additional cost (These three parameters are monitored as part of NOAA's existing program; the value of NOAA's data collection is $80,000 over 6 years.) |
| **Reef Area** | | x | sidescan or multibeam sonar/seismic profiling | ($m^2$) | |
| **Reef Patchiness** | | x | sidescan or multibeam sonar/seismic profiling | Percent of reef with hard substrate and/or 15 oysters $m^2$; target is >30% | |
| **Shell Volume** -- black/brown (shell budget) | | x | patent tong or quadrat sampling (if possible) | increase in brown shell/black shell ratio | No additional cost |
| **Total Additional Cost over 6 Years** | | | | | **$186,000** |

## Table 10: Suggested Diagnostic Monitoring Activities

| Parameter | Priority | Frequency | Number of Sites | Method of Measurement | Units/ Performance Metric | Notes | Estimated Cost |
|---|---|---|---|---|---|---|---|
| **Dissolved Oxygen** | High | Every 30 minutes | 3 sentinel sites | Data logger | mg/L or saturation? | DO is monitored to evaluate: (1)seasonal persistent DO (site in deepest water), and (2) diel-cycling. Locate probes as close to bottom as possible, <0.5 m. Is this covered by CBP monitoring? Is diel-cycling monitoring needed -- oysters can withstand short-term hypoxic/anoxic events? It may just be needed for deeper sites. | $147,000 over 6 years, including equipment and labor |
| **Temperature** | High | Every 30 minutes | 3 sentinel sites | Data logger | °C | | |
| **Salinity** (Conductivity) | High | Every 30 minutes | 3 sentinel sites | Data logger | PSU | A conductivity probe can be sited in shallower water in upriver area to monitor for freshet. Freshet monitoring would require only twice daily measurements. Monitoring of ambient salinity in tributary for oyster biology would require probes to be cited in upstream and downstream regions. | |
| **pH** | Medium | Every 30 minutes | 3 sentinel sites | Data logger | $-\log[H^+]$ | | |
| **Total Algae** (Chlorophyll a) | Medium | Every 30 minutes | 3 sentinel sites | Data logger | µg/l | For chlorophyll a and turbidity, suggest also having one site located away from reef to act as control. | |
| **Turbidity** | Medium | Every 30 minutes | 3 sentinel sites | Data logger | NTU | | |
| **Alkalinity** | Medium | Monthly | 3 sentinel sites | Titration | mg/L of $CaCO_3$ | Alkalinity needed to calculate carbonate saturation which could impact juvenile growth and larvae at modest pH changes; collect samples at depth of sensors. | $100 for test kits; data can be collected when sensors are changed |
| **Disease** (Dermo, MSX) | High | Annually in fall | 2 | Histology | Prevalance, intensity | There are two established key bars in Harris Creek -- Tilghman Wharf and Mill Point -- so we may not need to do anything else in Harris Creek, but nothing is covered in upstream portion. | No additional cost (included with DNR's fall survey unless additional sites are added) |
| **Predation** | Low | Annually in fall | Signs of predation will be assessed during populations surveys. No specifically targeted monitoring for predation. | Shell examination | N/A | In Harris Creek, predation exclusion devices are not viewed to be warranted. | No additional cost |
| **Poaching** | High | Constant | All | MLEIN | N/A | Harris Creek will be a target area for the MLEIN (MD Law Enforcement Network) radar and camera system | No additional cost (part of DNR's existing MLEIN program) |

Table 11 summarizes the costs of the suggested restoration success and diagnostic monitoring activities for the Harris Creek restoration sites.

**Table 11: Summary of Monitoring Costs**

| | |
|---|---|
| **Monitoring per Oyster Metrics Success Standards*** | **$186,000** |
| **Diagnostic Monitoring*** | **$147,000** |
| **Total Cost** | **$333,000** |

* This reflects the cost to monitor beyond what is already funded as part of ongoing federal, state and NGO programs.

Monitoring Protocols

More information is provided below for some of the monitoring identified in the restoration success monitoring table. Note that these are parameters already collected by agencies and or partners.

*Post-Planting Monitoring – Spat Growth and Mortality*

Growth and mortality of seed plantings are monitored 4 to 8 weeks after planting by collecting spat on shell. Spat on shell planted 4 to 8 weeks earlier are collected to assess growth and mortality. The 44- to 88-week window has been found to be the most effective in assessing these parameters. Focusing on a narrower window in time has proven difficult with weather and other variables affecting the opportunities to sample. Using the planting vessel's track lines as a target, divers collect hatchery shells from each survey location. Divers place a 0.3-meter x 0.3-meter quadrat on the bottom and collect all shells contained within the quadrat. Divers attempt to collect at least six quadrat samples at each site. When shell densities are too low for quadrat sampling, such that the diver could not find shell in areas with few track lines, the diver will instead haphazardly collect 50 to 100 shells from throughout the bar.

Each shell is examined for live spat, boxes, scars, and gapers. Additionally, the first 50 live spat observed in each sample are measured for shell height and, each shell is inspected for the presence of *Stylochus*. All shells are returned to the bar when sampling is complete. The number of spat per shell is multiplied by the total amount of shell planted on each bar to calculate the amount of spat detected on the bar by the post-planting monitoring survey. Spat survival is then calculated as the percentage of spat planted that was detected by the survey.

Environmental and biological factors such as dissolved oxygen, bottom quality, and salinity, are collected to investigate their relationship to growth; survival analyses are conducted to correlate various environmental and biological factors with growth and survival.

*Oyster Population Surveys*

Patent tong surveys are conducted on target reefs to assess restored oyster population dynamics including reef-level population estimates, oyster size frequency and disease dynamics, as well as spatial patterns of oyster and shell densities across a given reef.

A grid of 25-meter x 25-meter cells is overlaid onto the planted area using spatial tools in ArcGIS and each grid cell is sampled with hydraulic patent tongs. Number and size (mm) of live and dead (box) oysters are recorded at each grab. In addition, shell score (the amount of shell substrate collected in each tong grab) is quantified on a scale of 0 to 5[4]. The density of oysters at each point is calculated based on the grab area of the tongs (between 1 and 2 square meters depending on the vessel used) and a population estimate is generated using this density data. The total biomass of oysters at each reef is estimated according to Liddell (2007). The density of oysters and shell score at each patent tong survey point is spatially referenced using GIS. These spatial data allow for shell score and density plots to be generated to illustrate the spatial distribution of shell and oysters at each site. All oysters and shells, except those collected for disease sampling, are returned to the reef.

Reefs targeted for patent tong surveys are all reefs planted 3 and 6 years prior, in order to facilitate the consistent sampling of each reef. Sentinel reefs are targeted to act as long-term monitoring sites. These reefs are sampled every year (rather than every 3 years). This allows for the analysis of temporal trends in oyster population and disease levels, as well as how the spatial distribution of oyster density and shell base changes with time.

The dynamic nature of the conditions in the Chesapeake Bay and the ever-changing body of information on oysters and restoration in general require a flexible monitoring plan paired with controlled experiments to maximize restoration success and efficiency. Additionally, the productive collaboration of all agencies involved in Chesapeake Bay restoration has greatly helped with the success of restoration. The coordination of the efforts of the Maryland Geological Survey, NOAA Chesapeake Bay Office, ORP, and the Paynter Labs has allowed for the implementation of the most up-to-date data on the suitability of areas for planting. This coordination is critical to the success of oyster restoration.

<u>Research</u>

As previously stated, the purpose of this plan is to lay out the reef construction and seed plantings needed for Harris Creek to meet the definition of a restored tributary under the

[4] Oyster Recovery Partnership's tong fullness scale: 0=no shell in the tongs; 1= 1/5 full; 2= 2/5 full; 3= 3/5 full; 4= 4/5 full, 5= totally full. These values are for total volume of shell within the patent tongs.

implementation strategy for Executive Order 13508. The monitoring section describes the monitoring needed to determine whether the reefs in Harris Creek are, in fact, successfully restored per the goals defined in the oyster metrics report, and potential causes of success and/or failure.

Large-scale restoration provides a great opportunity for research beyond the scope of the monitoring plan. For example, none of the work laid out thus far, addresses ecosystem services. Increasing the ecosystem services is a major motivation behind the oyster restoration effort. Are the reefs constructed in Harris Creek actually providing increased services? One could assume they are, if functioning reefs are present in significantly increased numbers; but is that assumption correct, and can we quantify these services? Are we using restoration approaches that maximize those services? These types of questions are beyond the immediate scope of determining success or failure per the oyster metrics definition (and this document), but answering them is important.

The purpose of this section is to lay out these types of research needs. Harris Creek can serve as an excellent research platform for pursuing some of these studies. Others, though, might be better studied in tributaries where extensive restoration work has not yet begun, if true baseline information is required. Harris Creek received extensive seed plantings in 2011 and 2012, and 22 acres of newly-constructed reefs in 2012. Thus, depending on the study needs, the opportunity to collect baseline information may have passed. Other studies may require data from multiple tributaries with different ecological conditions (e.g., different salinity and temperature regimes) for comparative analysis.

The hope is that having the restoration plan herein outlined, and laying out some research needs (albeit not necessarily an exhaustive list), will allow researchers, agencies and funders to understand the intended restoration work slated for Harris Creek, and to determine if it may constitute a suitable study site for research. In fact, it may be possible to actually design reefs to facilitate certain studies by having agencies and researchers work collaboratively. The ideal approach to large-scale, tributary-based restoration is to maximize the gain in both restored reefs as well as knowledge about successful restoration strategies. The interest in optimizing learning from the effort may need to be tempered, though, with the realities of limited resources in a difficult economic climate.

From discussions with regional scientists, the following priority research needs were identified:

- Determination of the ideal substrate/s from which to construct oyster reefs – Shell is traditionally used to reconstruct oyster reefs, but the supply is limited. Alternatives such as granite, crushed concrete and reef balls have been used, but identification of the optimal substrate under various conditions remains unknown. Questions remain unanswered as to whether some types of substrate might impede poaching or interfere with legal fishing gear such as trotlines.

- Determination of the ideal height/s to which reefs should be constructed – The cost of constructing reefs is high, often made more so by material transport costs. Constructing higher reefs requires more material and is thus more expensive. Additionally, higher reefs may present additional permitting obstacles. The increased cost may be justified, though, if higher reef elevation increases oyster survival or provides other benefits. Permitting agencies may be swayed if ecological justification can be shown for the higher relief.
- Efficiency of oyster restoration practices generally – There are a number of topics that could be better understood to improve the efficiency of oyster restoration practices. Some of the above studies on reef substrate and height may be appropriate to include in this category. However, there are additional topics such as increasing survival of planted spat, increasing hatchery efficiency, reducing predation and poaching, optimizing the location where reefs are constructed to serve as larval sources or sinks, and increasing production at lower cost.
- Quantification of ecosystem services provided by oyster reefs – Implicit in the goal of restoring oyster reefs is the idea that the reefs will provide increased ecosystem services (e.g., denitrification and nitrogen sequestration; provision of habitat for finfish, invertebrates and sessile organisms; enhanced forage for waterbirds; enhancement of adjacent habitats such as SAV beds; water filtration; enhanced shoreline protection). The increase in these services following restoration has not been fully quantified. Such information could help assign an accurate value (dollar or otherwise) to rebuilding these reefs. Currently, it is comparatively easy to quantify the costs of oyster restoration, but difficult to accurately enumerate the benefits. A clear understanding of the benefits of a restored tributary would help funders and managers weigh the costs and benefits to further justify the investments. It does need to be recognized that it can be difficult to separate the impacts of an oyster reef from confounding factors (e.g., increased development in the watershed or extreme weather events may increase water turbidity, even if a new oyster reef is providing increased water filtration). As a result, careful study design is required to measure actual ecosystem services.
- Understanding disease dynamics – Disease continues to be a major source of mortality throughout much of the oyster's range in the Chesapeake Bay. Understanding how various restoration techniques influence disease rates (and associated mortality) could be significant in terms of improving restoration efficiency, increasing oyster survival, and reducing costs.
- Understanding predation dynamics – Spat are particularly susceptible to predation. Understanding how various reef construction and seed planting methods influence predation and survival could be significant in terms of improving restoration efficiency, increasing oyster survival, and reducing costs.
- Efficacy of restoration work in shallow water – Reefs naturally existed in shallow waters of the Chesapeake. Bay. However, due to concerns about interference with navigation, the restoration effort has been largely pushed into deeper waters. Information

documenting the resilience and productivity of shallow-water reefs would build a stronger case towards permitting of this type of restoration.

- Investigation of other restoration techniques – Currently, the tributary plan calls for just two basic restoration techniques: adding seed, or adding seed on top of new substrate. Other types of restoration techniques should be explored, such as placing biofilm on planted material to attract larval settlement. Testing and refining of existing techniques should be ongoing.
- Determination of sex ratio – It is assumed that as restoration sites age, an appropriate balance of male to females is achieved. If a balance is not achieved, reproduction from restored populations may be limited or compromised. Investigations into the sex ratio of restored reefs will confirm that there is a sufficient balance of male and female oysters and provide insight into reproductive process occurring on restored reefs.
- Relation of slope of oyster reefs within the seascape to water flow and design of oyster reefs – Proper water flow over an oyster bar is critical to maintain a sediment-free bar, provide food, and remove waste products. Shellfish growth is generally higher where currents are greater, delivering food and oxygenated water and carrying away waste by-products. Limited quantitative guidance is available in the scientific literature (Smith et al., 2003; Woods et al., 2004; Stanley and Sellers, 1986; Lenihan, 1999; and Seliger and Boggs, 1988).
- Understanding the role of currents in restoration success and larval transport – The concept of "source" and "sink" reefs has long been discussed, but determining current dynamics in Harris Creek and exactly how they influence this process remain unknown. Understanding these dynamics might help improve the efficiency of restoration work by maximizing natural spat set and reducing the amount of hatchery seed required. Additionally, currents may influence sedimentation rates and dissolved oxygen levels, two important factors in restoration success.

## Cost Analysis for Harris Creek Tributary Plan

The total estimated cost for implementing this plan is $31,651,000. Of that, $31,318,000 is for substrate (including material purchase and substrate placement) and hatchery-produced seed (including planting). The remaining $333,000 is for monitoring. Table 12 summarizes the plan implementation cost (details of the seed costs are in Table 6; details of substrate costs are in Table 8; and details of monitoring costs are in Table 11).

This estimate assumes a cost of $7,500 per million planted oyster seed (ORP, May 2012), and $72,000 to purchase and place substrate 1 foot high over 1 acre ($44.63 per cubic yard, USACE, Baltimore District, May 2012). This cost is for clam shell or granite, which are the substrate materials currently available in large quantities. The cost could be different for other materials, such as fossilized oyster shell, reclaimed oyster shell or other substrates, should they become available.

**Table 12: Summary of Total Costs**

| | |
|---|---|
| **Two Billion Seed** | **$15,698,000** |
| **350,000 Cubic Yards Substrate** | **$15,620,000** |
| **Monitoring** | **$333,000** |
| **Total Cost** | **$31,651,000** |

## Implementation of the Harris Creek Tributary Plan

The time frame for implementation of the Harris Creek tributary plan depends primarily on funding. The estimated cost for implementation is $31.7 million. Approximately $13 million of this has already been identified. Governor O'Malley has slated $7 million to the project in Fiscal Year (FY) 2013. NOAA contributed $1 million in FY11, and is contributing an additional $1 million in FY12. USACE's Baltimore District contributed $2 million in both FY11 and FY12. An additional $2-4 million is in the USACE FY13 budget, which is currently under consideration by Congress. Additional funds for hatchery operations and mapping is provided by DNR. Construction and seeding of Harris Creek oyster projects to support this tributary plan started in May 2012.

Project completion is also dependent upon oyster seed production and performance of the restoration actions. Current and anticipated seed production capacity from the University of Maryland's Horn Point facility is likely sufficient to supply the project over several years. The Horn Point hatchery currently produces, and ORP plants, about 500 million spat-on-shell annually; the hatchery has plans to expand to 1 billion annually over the next 3 years. The 2.1-billion seed demand for Harris Creek could be met within 3 to 5 years at current capacity, and sooner if capacity increases. However, other restoration projects, oyster gardening programs, aquaculture, and public re-seeding of the wild fishery grounds require seed from this partnership as well, so presumably not all of the Horn Point hatchery's annual production would go to the Harris Creek initiative. A natural spat set on the creek could significantly reduce anticipated costs, seed needs, and the timeframe in which restoration can be achieved.

Substrate for new reef construction may be a limiting factor. The amount of substrate needed to restore Harris Creek is estimated at 350,000 cubic yards. This could be any combination of oyster shell, clam shell, or alternative substrates such as crushed concrete, or granite. Reef balls can also be used for additional three-dimensionality. Oyster shell is a natural material, and relatively inexpensive if it can be found locally. However, it is currently in extremely short supply, and demand is high from both the restoration and aquaculture sectors. Further, oyster shell provides no protection from illegal harvesting/poaching. It may be possible to reclaim old shell from past unsuccessful restoration efforts, but it remains unclear how much of this shell is potentially recoverable and at what expense. Granite and concrete are readily available, and may help deter poaching. However, these materials are costly, and concerns exist about possible interference with other fisheries (e.g., trotlines (for crab harvest).

Reef balls are a good citizen outreach activity, and may help deter poaching. However, reef balls are costly as well, and concerns exist about possible interference with trotlines as well.

Another key component for implementation is permits. Currently, Section 10 permit restrictions limit placement of substrate in water depths that maintain a clearance of 8 feet of water depth above the planting. Assuming 1 foot of substrate is placed, 9 feet of water depth or greater is needed to maintain the 8-foot clearance. The analyses performed for the tributary plan show that in order to meet the restoration target, shallower areas need to be restored. Subsequently, DNR is applying for a permit modification and USACE is updating its NEPA coordination to allow substrate placement in depths as shallow as 6 feet.

**Adaptive Management and Project Tracking**

The Harris Creek Oyster Restoration Tributary Plan is meant to be an adaptive, living document. The expectation is that there will be many lessons learned, and that the plan will be adapted to reflect changing conditions and new information. The original document will be posted on the websites of the NOAA Chesapeake Bay Office and DNR. As the document is adapted, newer versions will be posted to ensure transparency.

NOAA, USACE-Baltimore District and DNR will produce annual reports describing progress that has been made on restoring the oyster population in Harris Creek. These reports will be produced annually by February for the previous calendar year. The reports will include: an accounting of the seed and substrate planted, a map showing the location of the seed and substrate plantings for the year, a summary of any major issues encountered by the project, and, a discussion of any adaptations made to the original plan, and planned work for the next year. These annual reports will be posted on the websites of the NOAA Chesapeake Bay Office and DNR.

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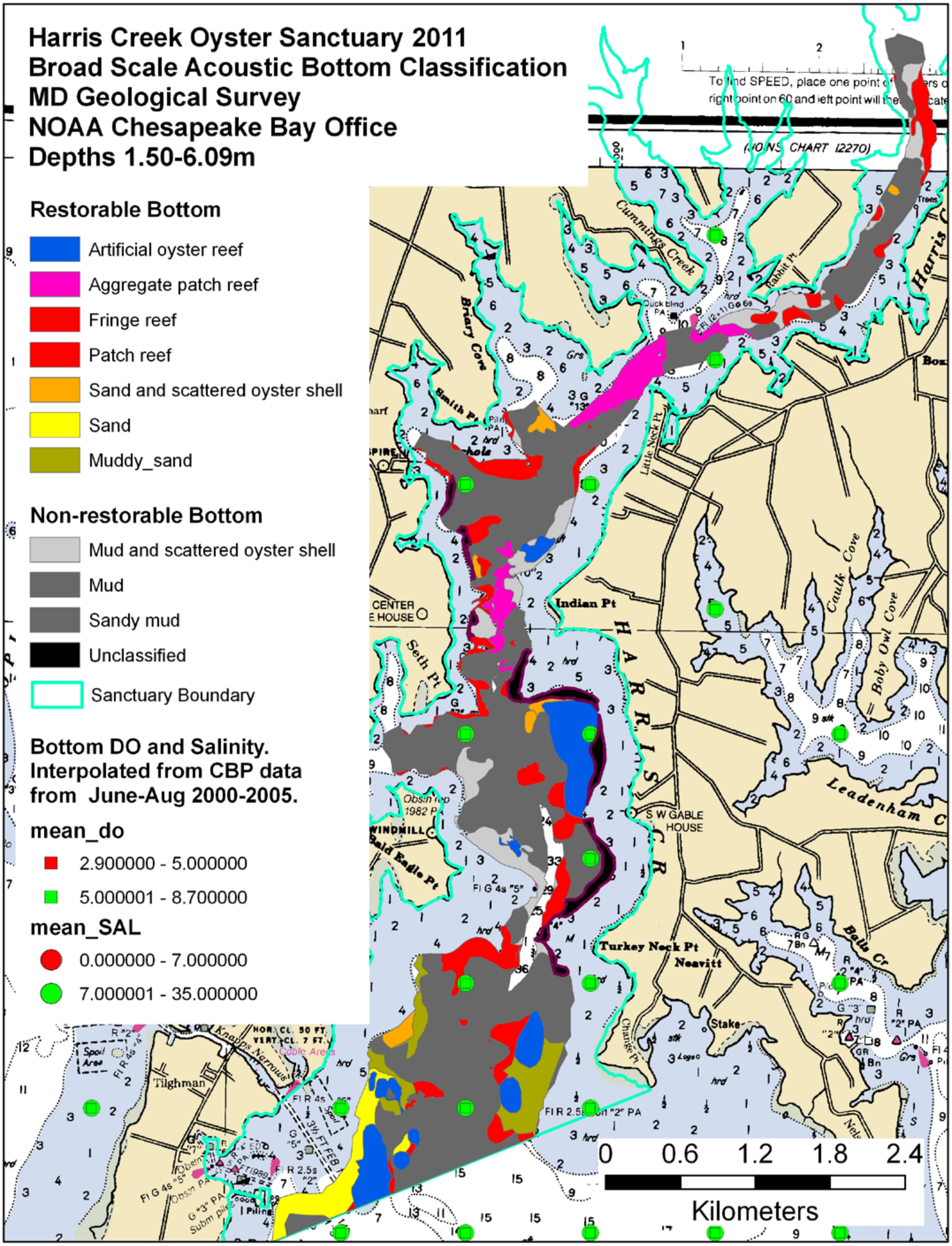
# Appendix B – NOAA Restorable Bottom Analysis


Harris Creek Oyster Sanctuary 2011
Broad Scale Acoustic Bottom Classification
MD Geological Survey
NOAA Chesapeake Bay Office
Depths 1.50-6.09m
Restorable Bottom
Artificial oyster reef
Aggregate patch reef
Fringe reef
Patch reef
Sand and scattered oyster shell
Sand
Muddy_sand
Non-restorable Bottom
Mud and scattered oyster shell
Mud
Sandy mud
Unclassified
Sanctuary Boundary
Bottom DO and Salinity.
Interpolated from CBP data
from June-Aug 2000-2005.
mean_do
2.900000 - 5.000000
5.000001 - 8.700000
mean_SAL
0.000000 - 7.000000
7.000001 - 35.000000
0 0.6 1.2 1.8 2.4
Kilometers
Cummings Creek
Brary Cove
Smith Pt
Indian Pt
Seth Pt
HARRIS CR
Caulk Cove
Baby Owl Cove
Leadenham Cr
S W GABLE HOUSE
Bald Eagle Pt
Turkey Neck Pt
Neavitt
Balls Cr
Knapps Narrows
Tilghman
Little Neck Pt
Rabbit Pt

Area summary for different habitat types within the Harris Creek Oyster Sanctuary in depths 1.5-6.09 m MLLW. Habitat characterization based on acoustic and ground truthing data collected by MD Geological Survey and the NOAA Chesapeake Bay Office 2010-2011. Shaded records identify habitats potentially suitable for varied restoration activities.

| Bottom Type | No. Habitat Segments | Minimum Area (Acres) | Maximum Area (Acres) | Average Area (Acres) | Total Area (Acres) |
|---|---|---|---|---|---|
| Patch reef | 12 | 0.1 | 14.2 | 2.2 | 26.1 |
| Sand and scattered shell | 6 | 1.4 | 9.1 | 4.4 | 26.2 |
| Unclassified | 7 | 1.4 | 16.0 | 7.5 | 52.6 |
| Sand | 3 | 0.1 | 58.1 | 20.3 | 61.0 |
| Sandy mud | 8 | 0.1 | 24.6 | 8.0 | 64.0 |
| Muddy sand | 4 | 3.8 | 44.1 | 18.2 | 72.8 |
| Aggregate patch reef | 5 | 1.6 | 43.2 | 15.6 | 78.1 |
| Mud and scattered shell | 19 | 0.0 | 30.0 | 6.3 | 119.1 |
| Artificial reef | 10 | 1.6 | 63.7 | 15.2 | 151.5 |
| Fringe reef | 36 | 0.0 | 30.6 | 5.1 | 182.7 |
| Mud | 13 | 0.0 | 327.0 | 72.6 | 944.1 |
| | | | | Sum all bottom= | 1778.2 |
| | | | | Sum restorable bottom = | 598.4 |

# Appendix C – MDNR Permit and Water Quality Certificate

**CENAB-OP-RMN (MD DNR Fisheries/ Harris Creek/ Oyster Restoration/Alternate Materials & Oyster Shell) 2012-61332-M24**

## MEMORANDUM FOR RECORD

**SUBJECT:** Department of the Army Environmental Assessment and Statement of Finding for Above-Numbered Permit Application

This document constitutes the Environmental Assessment, 404(b)(1) Guidelines Evaluation, Public Interest Review, and Statement of Findings.

1. Application as described in the public notice.

   APPLICANT: Maryland Department of Natural Resources Fisheries Service

   WATERWAY & LOCATION: The proposed project is located in Harris Creek, a tributary of the Choptank River, Talbot County, Maryland.

   LATITUDE & LONGITUDE: Latitude North: 38° 45' 15"
   Longitude West: -76° 15' 14"

   PROJECT PURPOSE:

   Basic: The basic project purpose is oyster restoration.

   Overall: The overall project purpose is to restore natural, self-sustaining, oyster populations and oyster bottom habitats in Harris Creek as part of federal and state coordinated strategy for oyster restoration.

   Water Dependency Determination: The project is water dependent.

   PROPOSED WORK: This project by the Maryland Department of Natural Resources (MD DNR) is to plant alternate materials within Maryland charted oyster bars in Harris Creek for the purpose of rehabilitating oyster bar habitat to work towards the re-establishment of an abundant and self-sustaining oyster population in support of the Chesapeake Bay Program 2000 Agreement and 2005 Oyster Management Plan. The permittee proposes, in accordance with the attached plans, to deposit, in various locations within Harris Creek, totaling approximately 184 acres within areas comprised wholly of existing Maryland State designated Natural Oyster Bars (NOBs), approximately 307,798 cubic yards of various materials/alternative substrates, including aged oyster shell, aged clam shell, concrete rubble, stone, marl, brick, crushed cinderblock, and/or reef balls to an approximate depth of 12 inches, as well as planting on this restored bottom, oyster spat on shell (seeded with eastern oyster, Crassostrea virginica, obtained from University of Maryland Horn Point hatchery and/or from MD DNR Piney Point hatchery, at a density of 5 million spat per acre) to a thickness of approximately 1 inch. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e. reef balls).

Therefore, in total, 13 inches is proposed as the overall depth of deposited materials, including the oyster spat on shell.

Avoidance and Minimization Information:

Avoidance: Complete avoidance of impacts to waters of the U.S. would mean recommending a "no action" alternative. The "no action" alternative would not achieve the overall project purpose to restore, natural, self-sustaining, oyster populations and oyster bottom habitats in Harris Creek. Therefore, the Corps has determined that the "no action" alternative is not practicable.

Minimization: As a minimization step, areas of Harris Creek were excluded from project consideration if they were located within 250 ft of any marinas, within 250 ft. of any aids to navigation, or within 150 ft. of the edge of a federal navigation channel.

Compensatory Mitigation: No

EXISTING CONDITIONS: The project sites are tidal open water with hard shell bottom, portions of which have been previously used for oyster restoration efforts in the Coastal Plain physiographic region of Maryland. The proposed restoration sites within Harris Creek, as shown on the plans, were based on the availability of restorable bottom (bottom that can support substrate --substrate in the proposed construction areas consists of hard sand, shell, and sand or mud mixed with shell), adequate dissolved oxygen, historic spat set, hydrodynamics favoring larval retention, and an intermediate salinity that balances the reproduction of high salinity waters with the disease refuge of low salinity waters. All work would occur on natural oyster bars as defined by statute in the Annotated Code of Maryland.

The depth range for Harris Creek ranges from less than 1 foot to over 30 feet. Harris Creek is classified as mesohaline, with a salinity ranging from 5 to 18 parts of thousand. Land use in the watershed draining to Harris Creek is largely agricultural with some forested and developed areas.

Areas of Harris Creek were excluded from project consideration if they were (1) located outside of areas where NOBs previously existed; (2) composed of mud bottoms or shell bottom with live oysters; (3) located in areas that had a density of live oysters greater than 51 square meters in size; (4) located within areas designated as Active Oyster Leases; or (5) located within 250 ft of any marinas, within 250 ft. of any aids to navigation, or within 150 ft. of the edge of a navigation channel.

2. Authority.

☒ Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403).

☒ Section 404 of the Clean Water Act (33 U.S.C. §1344).

☐ Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

3. Scope of Analysis.

a. NEPA. *(Write an explanation of rationale in each section, as appropriate)*

1. Factors.
(i)The regulated activity is not a corridor type project, therefore, does not comprise a link in a corridor type project.
(ii)The entire project will be within the Corps jurisdiction.
(iii)There are no aspects of the upland facility in the immediate vicinity of the regulated activity which affect the location and configuration of the regulated activity.
(iv)There is no cumulative Federal control and responsibility for the project.

2. Determined scope.
☒ Only within the footprint of the regulated activity within the delineated waters.
☐ Over entire property. *Explain.*

b. NHPA "Permit Area". The Maryland Historic Trust (MHT) commented on January 25, 2013 that the vast majority of the areas in the currently proposed undertaking were reviewed by MHT as part of the original authorization.MHT has determined that since no systematic archeological surveys of Harris Creek have been conducted that it is possible, albeit unlikely, that historic properties could be impacted.

(1) *Tests.* Activities outside the waters of the United States ☐are/☒are not included because all of the following tests ☒are/☐are not satisfied: Such activity ☐would/☒would not occur but for the authorization of the work or structures within the waters of the United States; Such activity ☒is/☐is not integrally related to the work or structures to be authorized within waters of the United States (or, conversely, the work or structures to be authorized must be essential to the completeness of the overall project or program); and Such activity ☒is/☐is not directly associated (first order impact) with the work or structures to be authorized.

(2) *Determined scope.* Based on the results of the above tests, the scope of this project (Permit Area) is only within the footprint limits of the regulated activity in the permitted oyster bars delineated as waters of the U.S.

c. ESA "Action Area".

1. Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

2. Determined scope. The action area is the permit area only.

d. Public notice comments. ☐ NA
A public notice was issued on January 15, 2013 soliciting comments about the proposed

work and announcing the date of a Corps Public Information Meeting/MDE Public Information Hearing on the subject application, and sent to all interested parties including appropriate State and Federal agencies. The comment period extended to March 21, 2013. The joint MDE public hearing/Corps public meeting was held in Easton on February 12, 2013. Approximately 70 people attended, and six individuals testified.

All comments received on this application have been reviewed and are summarized below:

(1) U.S. Environmental Protection Agency (EPA): No written comments were received. Therefore, it is assumed they have no objections to the proposed work.

(2) U.S. Fish and Wildlife Service (USFWS): No written comments were received. Therefore, it is assumed they have no objections to the proposed work.

(3) National Marine Fisheries Service (NMFS): On January 25, 2013, NMFS (Annapolis) commented with "no objection."

(4) State Historic Preservation Officer (SHPO): The Maryland Historic Trust (MHT) commented on January 25, 2013 that the vast majority of the areas in the currently proposed undertaking were reviewed by MHT as part of the original authorization. Historic wharves, shipwrecks and other archeological sites may be contained within the polygons and no systematic archeological surveys have been conducted in Harris Creek. Therefore MHT believes it is possible, albeit unlikely, that historic properties could be impacted. If any potential cultural resources (i.e. objects such as structural timbers, rigging, machinery, and glass, ceramic, and/or metal artifacts that could indicate the presence of a historic shipwreck, or other historic archeological site) are identified all bottom disturbing activities must immediately cease and MHT must be notified within 48 hours of the discovery.

(5) State and Local Agencies: MDE has issued the tidal Wetlands License, WQC and CZM.

(6) Organizations: Several organizations testified and several sent in letters or emails. Members from the Maryland Watermen's Association and Talbot County Watermen's Association testified against the project because of the impacts to the crab fishery in Harris Creek and impacts to sailboats with the proposed depth of -5 MLW. Bill Goldsborough, Chesapeake Bay Foundation, supports the permit mod to go to shallower depths and the project objective, which is to create sustainable oyster reef which supports other species, such as blue crabs. Stephanie Westby, NOAA, supports the permit mod to go shallower because dissolved oxygen is more of a problem with deeper water. She described the beneficial effects of oyster reefs such as ecosystem services, water filtration, removing nitrogen and providing critical structure. According to Ms. Westby, NOAA partnered with DNR and USACE providing a million dollars per year of funding. The Nature Conservancy submitted a letter in support of the project. Bob Dayhoff, from Marylanders Grow Oysters, sent in an email in support of the project.

(7) Individuals: In general, at the public meeting, watermen testified against the project because of the impacts to the crab fishery in Harris Creek, and questioned the need for the project since neighboring creeks, such as Broad Creek, had an abundant oyster population this past year with no DNR intervention. One waterman asked that the placement of alternate materials not occur from April through July, because it conflicts with crabbing.

Dave Slaughter, a private citizen with a summer home on Harris Creek, wrote in support of the project. He also manages the Lafarge aggregate quarries in Maryland and New York and wanted to offer his assistance in efforts to create oyster bars on Harris Creek.

(8) United States Coast Guard (USCG): Extensive coordination occurred between the Corps and the USCG . The USCG will require a 250 ft buffer zone around all federal aids to navigation and 150 ft buffer of designated channels. All proposed reef coordinates including minimum depth information must be forwarded to USCG as specified in the permit in advance of the proposed placement date.

In response to the Corps Public Notice, the USCG advised by email, dated 21 March 2013, that the Corps should accept the USCG's 6 March 2013 letter as their comments on this permit application. The USCG's 6 March 2013 letter was in further reply to their letter dated 9 November 2012 which was in response to the Corps 27 August 2012 letter requesting feedback on the Harris Creek tributary plan and in general, guidance regarding siting constraints for oyster restoration projects in the Chesapeake Bay and its' tributaries.

The USCG's 6 March 2013 letter identified concerns relative to both the Corps' Harris Creek Oyster Restoration project under Executive Order 13508, and the subject MDNR permit application. The USCG reiterated their continuing concerns that both of these projects were proposed in the middle of the navigable channel in Harris Creek, and recommended that the Corps conduct a Waterways Risk Assessment, including an analysis of vessel traffic and consultation with local waterway users to determine the effect of placing reef based obstructions in a navigable waterway and to ensure the permitted elevations are consistent with anticipated oyster restoration activities. However, the USCG acknowledged, that should the Corps determine that the projects proposed on Harris Creek are acceptable from a navigation standpoint, that the Corps should work closely with NOAA to ensure that the charts for Harris Creek are updated to reflect all of the permitted oyster restoration areas and associated project depths so that mariners are duly informed.

On 3 June 2013 the Corps convened a conference call with the USCG (Portsmouth and Baltimore offices) to discuss the USCG comments and concerns regarding the MDNR permit application and to review the project plans which included 2013 bathymetric survey data that the Corps collected which the USCG did not have when they did their review and provided comments. This bathymetric survey detailed the relationship of existing water depths to all of the currently proposed and permitted oyster restoration projects on Harris Creek.

The Corps advised the USCG that after further analysis, including consideration of the bathymetry data in relation the proposed and previously authorized work and the MDNR Boating Services March 2013 Waterway Assessment Survey and Hydrographic Analysis, as well as the USCG prior comments and recommendations, that a favorable permit decision was being formulated including a revised work description to clarify the scope of the work that the Corps would approve. The Corps advised the USCG that the proposed work would not in the Corps opinion, adversely affect general navigation on Harris Creek given the vertical distances and horizontal clearances that would be available for navigation as shown on the project plans. Specifically, the Corps advised that the USCG recommendations, to provide a 250 foot radius around all existing aids to navigation where no reef structures/work could occur would be reflected on the project plans and would be made a special condition of the Corps permit; that the prior reference from the previously approved work requiring a minimum 8 foot vertical clearance would be replaced with a new work description that would simply identify that the maximum amount of material that could be deposited would be limited to 13 inches above the bottom; that the permit would be conditioned to require that the permittee coordinate with the USCG regarding placement of Aids to Navigation (installation of new aids and / or relocation of existing aids) as a result of the Corps' approval; that the permittee would be required to work with NOAA for purposes of charting; that the permittee would be required to coordinate with the current owners of the cables shown on the project plans in the vicinity of Rabbit Point; that a special condition would be included to address potential future placement/maintenance of Aids to Navigation by the USCG; and finally that the permit would be conditioned from a standpoint of navigational servitude to address the potential in the future if the permitted work were determined to constitute a hazard to navigation or otherwise create an unreasonable obstruction to navigation.

The USCG advised that as a result of the conference call and receipt of the very detailed and updated information shown on the project plans provided by the Corps, that their prior concerns were satisfied. More specifically, they advised that they had no comments for the Corps in regards to the MDNR Boating Services March 2013 Waterway Assessment Survey and Hydrographic Analysis report, nor did they believe that any of the proposed project sites needed to be relocated. However, they did advise that the concept of keeping structures and work outside the marked/established channels, i.e., between shoreline and existing aids to navigation in order to not interfere with existing waterway use, was the USCG standing position, and further they advised that where no established and maintained channel exists, establishment of oyster sanctuaries and reefs should be sited outside/shoreward of line segments extended between adjacent aids to navigation. In conclusion, the USCG advised that these recommendations should be seriously considered in the future when siting locations for oyster restoration work by MDNR, the Corps, and the other Federal partners working on oyster restoration in the Bay.

(1) Site ☐ was/☒ was not visited by the Corps to obtain information in addition to delineating jurisdiction.

(2) Issues identified by the Corps: Extensive coordination occurred between the Corps and the USCG on navigation isuues. The USCG will require a 250 ft buffer zone around all federal aids to navigation and 150 ft buffer of designated channels. All proposed reef coordinates including minimum depth information must be forwarded to USCG as specified in the permit in advance of the proposed placement date. The USCG requirements are included as special conditions to the DA authorization.

(3) Issues/comments forwarded to the applicant. ☐NA/☒Yes.

(4) Applicant replied/provided views. ☐NA/☒Yes.

(5) The following comments are not discussed further in this document as they are outside the Corps purview. ☒ NA/☐ Yes *Explain.*

4. Alternatives Analysis.

a. Basic and Overall Project Purpose (as stated by applicant and independent definition by Corps).
☒Same as Project Purpose in Paragraph 1.
☐Revised: *Insert revised project purpose here and explain why it was revised.*

b. Water Dependency Determination:
☒Same as in Paragraph 1.
☐Revised: *Insert revised water dependency determination here if it has changed due to changing project purpose or new information.*

c. Applicant preferred alternative site and site configuration.
☒Same as Project Description in Paragraph 1.
☐Revised: *Explain any difference from Paragraph 1*

Criteria.

d. Off-site locations and configuration(s) for each. N/A

e. (☒ NA) Site selected for further analysis and why.

f. On-site configurations. N/A

g. Other alternatives not requiring a permit, including No Action. N/A

| Description | Comparison to criteria |
|---|---|
| No action | The "no action" alternative would not meet the overall project purpose and is, therefore, not a practicable alternative. |
| | |
| | |
| | |

h. Alternatives not practicable or reasonable. Alternatives that include a no-action plan are considered not practicable or reasonable. If no action were taken, to restore, natural, self-sustaining, oyster populations and oyster bottom habitats in Harris Creek.

i. Least environmentally damaging practicable alternative. The current proposed project is considered to be the least environmentally damaging practicable alternative to meet the applicant's needs. No wetlands or documented SAV will be impacted by this project.

5. Evaluation of the 404(b)(1) Guidelines. (☐NA)

a. Factual determinations.

| |
|---|
| Physical Substrate.<br>☒ See Existing Conditions, paragraph 1<br>☐ |
| Water circulation, fluctuation, and salinity.<br>☒ Addressed in the Water Quality Certification.<br>☐This permit is issued with the special condition that the applicant obtains a Water Quality Certification, which should address this. |
| Suspended particulate/turbidity.<br>☒ Turbidity controls in Water Quality Certification.<br>☐This permit is issued with the special condition that the applicant obtains a Water Quality Certification, which should address this. |
| Contaminant availability.<br>☐ General Condition requires clean fill.<br>☒ N/A |
| Aquatic ecosystem and organisms.<br>☒ Wetland/wildlife evaluations, paragraphs 5 & 7 below under Public Interest Factors.<br>☐ |
| Proposed disposal site.<br>☒ Public interest, paragraph 7 (xii).<br>☐ |
| Cumulative effects on the aquatic ecosystem.<br>☒ See Paragraph 7.e.<br>☐ N/A |
| Secondary effects on the aquatic ecosystem.<br>☒ See Paragraph 7.e.<br>☐ N/A |

b. Restrictions on discharges (230.10).

i. It ☒has/☐has not been demonstrated in paragraph 5 that there are no practicable nor less damaging alternatives which could satisfy the project's basic purpose. The activity ☐is/☒is not located in a special aquatic site (wetlands, sanctuaries, and refuges, mudflats, vegetated shallows, coral reefs, riffle & pool complexes). The activity ☐does/☒does not need to be located in a special aquatic site to fulfill its basic purpose.

ii. The proposed activity ☐does/☒does not violate applicable State water quality standards or Section 307 prohibitions or effluent standards (☐based on information from the certifying agency that the Corps could proceed with a provisional determination). The proposed activity ☐does/☒does not jeopardize the continued existence of federally listed threatened or endangered species or affects their critical habitat. The proposed activity ☐does/☒does not violate the requirements of a federally designate marine sanctuary.

iii. The activity ☐will/☒will not cause or contribute to significant degradation of waters of the United States, including adverse effects on human health; life stages of aquatic organisms' ecosystem diversity, productivity and stability; and recreation, esthetic, and economic values.

iv. Appropriate and practicable steps ☒have/☐have not been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (see Paragraph 8 for description of mitigative actions).

6. Public Interest Review: All public interest factors have been reviewed as summarized here. Both cumulative and secondary impacts on the public interest were considered. Public interest factors that have had additional information relevant to the decision are discussed in number 7.

+ Beneficial effect
0 Negligible effect
- Adverse effect
M Neutral as result of mitigative action

| + | 0 | - | M | |
|---|---|---|---|---|
| ☐ | ☒ | ☐ | ☐ | Conservation. |
| ☒ | ☐ | ☐ | ☐ | Economics. |
| ☐ | ☒ | ☐ | ☐ | Aesthetics. |
| ☐ | ☒ | ☐ | ☐ | General environmental concerns. |
| ☐ | ☒ | ☐ | ☐ | Wetlands. |
| ☐ | ☒ | ☐ | ☐ | Historic properties. |
| ☒ | ☐ | ☐ | ☐ | Fish and wildlife values |
| ☐ | ☒ | ☐ | ☐ | Flood hazards. |
| ☐ | ☒ | ☐ | ☐ | Floodplain values. |
| ☐ | ☒ | ☐ | ☐ | Land use. |
| ☐ | ☒ | ☐ | ☐ | Navigation. |
| ☐ | ☒ | ☐ | ☐ | Shore erosion and accretion. |
| ☐ | ☒ | ☐ | ☐ | Recreation. |

| | | | | |
|---|---|---|---|---|
| ☐ | ☒ | ☐ | ☐ | Water supply and conservation. |
| ☒ | ☐ | ☐ | ☐ | Water quality. |
| ☐ | ☒ | ☐ | ☐ | Energy needs. |
| ☐ | ☒ | ☐ | ☐ | Safety. |
| ☐ | ☒ | ☐ | ☐ | Food and fiber production. |
| ☐ | ☒ | ☐ | ☐ | Mineral needs. |
| ☐ | ☒ | ☐ | ☐ | Considerations of property ownership. |
| ☒ | ☐ | ☐ | ☐ | Needs and welfare of the people. |

7. Effects, policies and other laws.

a. ☐NA

Public Interest Factors. *(add factors that are relevant to specific project that you checked in number 6 above and add a discussion of that factor)*

(1) Conservation. The proposed project is expected to have a positive impact on the conservation of aquatic resources, since the purpose of rehabilitating oyster bar habitat is to work towards the re-establishment of an abundant and self-sustaining oyster population in support of the Chesapeake Bay Program 2000 Agreement and 2005 Oyster Management Plan.

(2) Economics (33CFR320.4(q)). The proposed project is expected to have temporary adverse impacts on recreational and commercial fishing of finfish and shellfish, which will be temporarily disrupted by the work. Upon completion of the work, however, it is likely that shellfish and finfish will return to the project areas. As a result of previous oyster projects, oyster populations in Harris Creek and surrounding creeks have increased, benefiting watermen harvesting oysters. A minor beneficial impact by providing employment for a marine contractor and employees will occur.

(3) Aesthetics. No detrimental or beneficial impacts to aesthetics are expected to occur as a result of the proposed projects. During construction the dredging equipment would be visible. However, the extent and perception of the aesthetic alteration would vary depending upon the nature of the surrounding area and the values of the public using the waterway.

(4) General environmental concerns (33CFR320.4(p)). General environmental concerns are addressed in my evaluation of the following public interest factors.

(5) Wetlands (33CFR320.4(b)). No detrimental or beneficial impacts are anticipated to wetlands as a result of the proposed project. The project will not impact wetlands.

(6) Historic and cultural resources (33CFR320.4(e)). Historic wharves, shipwrecks and other archeological sites may be contained within the polygons and no systematic archeological surveys have been conducted in Harris Creek. Therefore MHT believes it is possible, albeit unlikely, that historic properties could be impacted. If any potential cultural resources (i.e. objects such as structural timbers, rigging, machinery, and glass, ceramic, and/or metal artifacts that could

indicate the presence of a historic shipwreck, or other historic archeological site) are identified, all bottom disturbing activities must immediately cease and MHT must be notified within 48 hours of the discovery. Special conditions are added to the permit to address these impacts if potential cultural resources are found.

(7) Fish and wildlife values (33CFR320.4(c)).

(a) Endangered or threatened species. No endangered or threatened species or their identified critical habitats occur within the project area, therefore, there will be no detrimental or beneficial impacts to this resource.

(b) Anadromous fish. The proposed project has the potential to indirectly benefit anadromous fish, as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species and improve water quality.

(c) Submerged aquatic vegetation (SAV). SAV is an important component of the food chain, providing a food source for waterfowl, fish, and shellfish, as well as providing habitat and nursery areas for many species of fish and invertebrates. SAV also substantially contributes to maintaining water quality at the level necessary to support fisheries as it removes nitrogen, phosphorus, and suspended sediments from the water. The applicant is required to survey recovery/planting areas for SAV prior to dredging and planting. No alternate material placement will occur within 300 feet of SAV beds. Therefore, no adverse impacts to SAV are anticipated as a result of the proposed project.

(d) Fish habitat and benthics. The proposed project has the potential to indirectly benefit fish and wildlife values, as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species. Benthics should colonize the alternate material shortly after placement.

(e) Essential Fish Habitat (EFH). The project site lies in or adjacent to EFH as described under Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) for Scopthalmus aquosos (windowpane flounder) juvenile and adult; Pomatomus saltatrix (blue fish) juvenile and adult; Paralicthys dentatus (summer flounder) juvenile and adult; Peprilis triacanthos (Atlantic butterfish) eggs, larvae, juvenile and adult ; Centropristus striata (black sea bass) juvenile and adult; eggs, larvae, juvenile, and adult stages of Sciaenops ocellatus (red drum), Scomberomorus cavalla (king mackerel), Scomberomorus maculatus (spanish mackerel), and Rachycentron canadum (cobia), all managed species under the MSFCMA. NMFS concurred with the measures discussed in our EFH Assessment, which include 1) Requiring the applicant to survey recovery/planting areas for SAV prior to placing material; and, 2) restricting planting within 300' of documented SAV. The project has the potential to beneficially impact forage and/or shelter habitat since rehabilitated oyster bar habitat will provide a more productive area for forage and shelter for smaller species.

(8) Flood hazards. No detrimental or beneficial impacts are predicted for flood heights

and drift as a result of the proposed work.

(9) Floodplain values (33 CFR 320.4(l)). No detrimental or beneficial impacts are predicted for floodplain values as a result of the proposed work.

(10) Land use. No detrimental or beneficial impacts are predicted for land use in the area as a result of the proposed work as the project is compatible with current land use in the area and additional shoreline development is not anticipated as a result of the project.

(11) Navigation (33 CFR 320.4(o)). Under the Commerce Clause of the United States Constitution, the Federal Government has authority to control the navigable waters of the nation. Federal rights to navigation are protected by the Commerce Clause and the Federal navigation servitude. There are two related aspects to this authority. First, there is a Federal power to regulate activities affecting navigable waters because of their relationship to interstate commerce. Second, there is a Federal navigational servitude, which was recognized in some of the earliest decisions examining the scope of Congressional authority under the Commerce Clause. The navigational servitude encompasses the power of Congress to regulate navigation, prohibit or remove obstructions to navigation, and improve or destroy the navigable capacity of the nation's waters. When Congress acts within the scope of the navigational servitude, state regulatory power and private riparian rights must give way.

Federal statutory law prohibits the creation of any obstruction of the navigable waterways except as authorized by Congress. Congress has power to exclude structures from the navigable waterways and has delegated power to the Army Corps of Engineers to decide what structures will be allowed.

The Corps exercises jurisdiction under the Rivers and Harbors Act of 1899. Under the Act, the Corps has authority to regulate the construction of structures and to prevent obstructions to the navigable capacity of any of the waters of the United States. From the Corps regulatory perspective under Section 10 of the RHA, an 'obstruction' is interpreted quite broadly, to mean the diminution or decrease of the navigable capacity of a waterway in any respect.

"Navigable channel" under the RHA is generally any route or path commonly traveled by vessels, commercial, or recreational and is not limited to the dredged/ buoy marked channels.

"Obstruction" is defined by regulation as "anything that restricts, endangers, or interferes with navigation." 33 C.F.R. 245.5.

The proposed work, [newly proposed by this application and as advertised by PN 13-03 dated 15 January 2013, as well as the oyster restoration work previously approved by the Corps under permits CENABOP-RMN (MD DNR/Alternate Materials) 2007-03659, and CENABOP-RMN (MD DNR Fisheries Service/Shell Recovery Program) 2007-0363] will result in the discharge of fill material in the form of shells and alternate materials (oyster shell, clam shell, concrete rubble, stone, marl, brick, crushed cinderblock, and concrete reef balls), to a depth of approximately 13 inches above the bottom, over a combined area of approximately 744 acres within Harris Creek.

The United States Coast Guard (USCG) has installed and maintains "Aids to Navigation" on Harris Creek from the mouth adjacent to Change Point (Red – #2H marker) to just south of Rabbit Point (Harris Creek Junction Buoy). This marking by the USCG essentially represents a demarcation of "best available waters" for purposes of navigation on the main stem of Harris Creek, rather than a specific channel designation/demarcation such as is the case for Knapps Narrows. The "best available waters" term is simply that, "best available waters" for purposes of navigation. As such, some of the oyster restoration work is proposed within this area of "best available waters" or channel as marked by the USCG and as shown on NOAA chart 12266 while other oyster restoration work is proposed outside/landward of that "best available waters" or channel area.

Harris Creek main stem is less than 8 miles long and the creek bottom is mostly muddy with intermixed, patchy sand and scattered shell deposits. Overall Harris creek is uniformly deep in the more central areas of creek from the mouth to just above Rabbit Point where the creek naturally narrows and becomes somewhat progressively shallower. The water depths within the "best available waters" or channel area on Harris Creek generally ranges from approximately 13 to 32 feet deep (MLLW), while the controlling depth (the point on the waterway where the natural water depth becomes shallower which would restrict or limit passage ["controls the extent of vessel passage past this point"] of vessels further upriver, which is located just north of Rabbit Point) is approximately 11.5 feet at MLLW. Therefore, water depths are presently adequate for safe passage of vessels with drafts up to approximately 11.5 feet from the mouth of Harris Creek to just north of Rabbit Point. No major shipping occurs in the creek as it is primarily used by recreational boaters and commercial watermen. The average draft of the registered vessels on Harris creek is 4 to 5 feet. There are two federally maintained channels in the area, Tilghman Island Harbor (Dogwood Harbor) which provides a channel 60 feet wide and 6 feet deep (MLLW) and Knapp's Narrows which provides a channel of 75 feet wide and 9 feet deep (MLLW), both located generally south of the project site. Harris Creek is accessible by many boaters given its connection as a tributary of the Chesapeake Bay and in-turn the Atlantic Ocean and beyond. It is not uncommon to have boaters from all over the world visit the Chesapeake Bay region in various forms of boats with varying drafts that would not necessarily be typical of the boats that regularly and typically use Harris Creek.

Harris Creek has a few coves that draw larger vessels, both power boats and sail boats. These vessels travel to these coves from around the Chesapeake Bay region and beyond to stay the weekend and /or to get away from storms. Dun Cove is one location along Harris Creek that is considered a "safe harbor" or "harbor of refuge". A safe harbor/harbor of refuge is one that allows protection normally to transient vessels from storms and other adverse weather conditions. Typically vessels that utilize this cove are mostly larger sailing vessels with deep drafts and keels ranging in size depending on make and hull design. Waterhole Cove is another area where transient vessels moor overnight or spend weekends.

The USCG recommended keeping structures and work outside the marked/established channels, i.e., between shoreline and existing aids to navigation in order to not interfere with existing waterway use. They advised that this was the USCG's standing position, and further they recommended where no established and/or maintained channel exists, establishment of oyster sanctuaries and reefs should be sited outside/shoreward of line segments extended between adjacent aids to navigation. In conclusion, the USCG advised that these recommendations should be seriously considered in the future when siting locations for oyster restoration work by MDNR, the Corps, and the other Federal partners working on oyster restoration in the Bay.

In response to the USCG recommendations, the applicant worked with the USCG and performed a Waterway Assessment Survey and Hydrographic Analysis (March 2013), which included a concept plan showing a navigational path where none of the newly proposed work would be located. However, the establishment a navigational path that does not take into account the previously approved/permitted work, is of little import for this application, and additionally, from the Corps' perspective, this navigational path otherwise has no bearing or legal significance. Again, from the Corps perspective, the navigation path concept that MDNR and the USCG developed, has no practical application overall regarding the proposed works effect on general navigation on Harris Creek, but rather it establishes a suggested framework for siting future oyster restoration work on the tributaries of the Chesapeake Bay under Executive Order 13508 or otherwise.

As previously cited, the Corps maintains two Federal Channels on nearby waterways, Tilghman Island Harbor and Knapps Narrows where channel widths are 60 feet and 75 feet with project depths of 6 feet (MLLW) and 9 feet (MLLW) respectively. These channels are used by both recreational and commercial (fishing, crabbing, clamming) vessels. Generally where channels are designed for two way boat traffic (passing of two vessels side by side) a factor of 5 times the beam (widest part of the vessel) width of vessels typically expected to use the channel is used. Therefore, while MDNR's Waterway Assessment Survey and Hydrographic Analysis did not provide the beam widths for the vessels that were included in their surveys, it is generally expected that vessels using Harris Creek would typically have beams ranging from 10 to 20 feet, while it is also likely that some vessels using Harris Creek could be less than 10 feet wide, while there could be some vessels that could have somewhat greater beam widths. Consequently, using the 5 times the beam width factor for this range of vessels would provide channels for navigation ranging from 50 to 100 feet in width.

For Harris Creek, where the USCG has marked the waterway as "best available waters", from the mouth of the Creek up to the Harris Creek Junction buoy, located just south of Rabbit Point, the channel design criteria (5 times the beam width) is not particularly relevant other than to provide a comparative basis for purposes of defining potentially, a channel for navigational purposes that could range from approximately 50 to 100 feet. However, other factors such as vessel speed, vessel size, effects of wind, waves, and currents would also come into play.

During the Corps review of the proposed work with regards to the effects of the work on general navigation, the Corps considered the relationship of current water depths shown by the Corps bathymetric survey (February 2013) to the newly proposed and previously approved work as referenced above. As a result of this bathymetric data, the Corps was able to consider the relationship of the newly proposed and previously approved work to current water depths in contrast to the water depths/bathymetric data for Harris Creek (1945 data) as shown on the NOAA chart 12266. Accordingly, see plans (Corps Bathymetric Survey Data with Polygons- sheets 1-5 dated June 2013) as well as the tables showing pre and post water depths that were included on the PN. As noted on these plans varying degrees of horizontal and vertical distances/clearances exist relative to both the newly proposed and previously approved work ranging from approximately 1400 feet horizontally near Change Point (Location A from Table entitled Harris Creek Water Depths and Open Water Distances) to approximately 75 feet horizontal in the vicinity of Rabbit Point (Locations V, W, X, and Z from Table entitled Harris Creek Water Depths and Open Water Distances) with vertical clearances of greater than -12.8 feet @ MLLW, and greater than -12 feet @ MLLW respectively. This bathymetric plan clearly shows that there is ample / sufficient clearances horizontally and vertically to allow for safe navigation for the types of vessels typically using, or would be typically expected to use Harris Creek, and would also allow for both vessels greater in size and smaller in size to safely navigate despite the locations of some of the proposed work within what the USCG refers to as "Best Available Waters". However, it is also clear, that despite some of the proposed work being sited within these areas delineated as "Best Available Waters", sufficient vertical clearances would be maintained that would not be shallower that the 11.5 foot controlling depth. Further, the practical effect of some of this work being located within these areas of "Best Available Waters" is that the proposed work does not limit or otherwise obstruct navigation beyond that resulting from the natural controlling depth on Harris Creek. The controlling depth of water on Harris Creek (approx. - 11.5 feet at MLLW) naturally limits navigation such that, neither the newly proposed work, or the previously approved work, would obstruct navigation or decrease the navigable capacity, or adversely affect transit/navigation of vessels from the mouth of Harris Creek to just north of Rabbit Point where the Creek gets naturally shallower and narrower. Therefore, the Corps position is that there is sufficient room for general navigation and safe passage of vessels on Harris Creek just as there is at present without any of the proposed work being performed.

While the Corps did not receive any objections from waterfront property owners along Harris Creek or from other members of the regulated public in response to the Corps PN, it is expected that some of the proposed oyster restoration work could have some effect on general navigation on Harris Creek and cause some interference with boating interests as a result of the proposed work. It is also expected that some of the property owners on Harris Creek and other users of Harris Creek may need to modify their past or possibly more traditional water routes that they may have used in past for navigation as a result of this proposed oyster restoration work especially where areas that may have been used in past for navigation are altered by the deposition of the materials for oyster restoration and where the waterway may no longer provide sufficient vertical clearances that would enable safe passage. However, while some interference with boating interests may occur, it is expected that the practical effect will be more of an inconvenience to boaters that would need to alter their course from what they may have used in past to navigate on Harris Creek, rather than an undue interference with general navigation . A special condition will be included in the Corps' authorization that these oyster restoration sites be properly marked on the NOAA charts for Harris Creek, which should provide the boating interests with specific information regarding the locations of these reef structures that in turn should enable them to safely navigate on Harris Creek and avoid those areas of the waterway where the proposed work and the drafts of their vessels may not be compatible. However, given that this overall oyster restoration work is proposed within a sanctuary where no shellfish harvesting would be allowed, it is possible that in the future the growth of oysters on the materials deposited under the Corps authorization could become problematic from a navigation standpoint. It is well documented that historically in the past, when Capt. John Smith navigated the Chesapeake Bay that oyster reefs were so prolific that navigation was impaired, ("reefs were so abundant, oysters rose out of the water and posed a hazard to navigation"), and there is no reason to believe that this could not occur in the future. However, the applicant has opined that while it is hoped that the overall Harris Creek oyster restoration work will be successful, it is unlikely that there would be such growth that navigation would be compromised significantly. However, while the Corps understands the applicant's position, the Corps has a responsibility to ensure that activities and work that are authorized do not result in unacceptable interferences with navigation or create obstructions to navigation. Accordingly, the Corps permit will include a special condition that identifies that the applicant will be responsible, in the future, if upon notification by Corps that the authorized work is causing an unreasonable obstruction to the free navigation of navigable waters, to remove, relocate, or alter the structural work or obstructions without any expense to the United States, and further no claim shall be made against the United States on account of any such removal or alteration.

A temporary minor detrimental impact to navigation is anticipated to occur during the actual work as boat traffic may be temporarily impacted due to the presence of work boats/barges in the area. The Coast Guard requires a 250 foot buffer zone around all federal aid to navigation and a 150 foot buffer of designated channels.

(12) Shore erosion and accretion. No detrimental or beneficial impacts to shore erosion or accretion are anticipated as a result of the proposed project. Normal shoreline processes would influence erosion and accretion much more than the minimal depth changes proposed for this project; any minimal impacts the proposed project may have on shore erosion or accretion may not be discernable from normal waterway evolution.

(13) Recreation. No impact on recreation is anticipated to occur.

(14) Water supply (33 CFR 320.4(m)). No detrimental or beneficial impacts to water supply and conservation are expected as a result of the project as the project site is within a marine water system that is not a source of potable water.

(15) Water quality (33 CFR 320.4(d)). A temporary minor detrimental impact to water quality is anticipated as a result of the proposed project. A temporary increase in turbidity within the water column is expected during placement of alternate material. However, oysters have a positive impact of water quality due to their ability to filter water at a rate of about two gallons per hour per oyster. In abundance, oysters help clarify the water, which allows bay grasses to receive more sunlight. Then in turn, plentiful grasses increase oxygen levels, reduce wave energy and shoreline loss, and habitat for aquatic life.

(16) Energy needs (33 CFR 320.4(n)). No detrimental or beneficial impacts are anticipated on energy needs as a result of the proposed project.

(17) Safety. No detrimental or beneficial impacts are anticipated on safety as a result of the proposed project.

(18) Food and fiber production. Beneficial impacts are anticipated on food production, especially for oysters, as a result of the proposed project since the purpose is to increase oyster populations. The proposed project would not effect fiber production as the area is not used for fiber production.

(19) Mineral needs. No detrimental or beneficial impacts are anticipated on mineral needs as a result of the proposed project.

(20) Considerations of property ownership. No impact is anticipated on public rights to navigation, riprarian rights or ownership rights as a result of the proposed project.

(21) Needs and welfare of the people . The project is unlikely to be contrary to the public's interest in environmental protection as the purpose of the project is to rehabilitate the oyster fisheries. The project would not hinder the public's use of waterway or use (e.g. boat ingress/egress) of private property located adjacent to the project area.

b. Endangered Species Act. ☒ NA

The proposed project:

1. Will not affect these threatened or endangered species:
   ☐Any/☐ . *Explain.*

2. May affect, but is not likely to adversely affect:
   Species: . *Explain.*
3. ☐Will/☐Will not adversely modify designated critical habitat for the . *Explain.*

4. ☐Is/☐Is not likely to jeopardize the continued existence of the . *Explain.*

5. The Services ☐concurred/☐provided a Biological Opinion(s). *Explain.*

c. Essential Fish Habitat. Adverse impacts to Essential Fish Habitat ☐will/☒will not result from the proposed project.

d. Historic Properties. The proposed project ☐will/☒will not have any affect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state, or local significance based on a letter from MHT.

e. Cumulative & Secondary Impacts. The geographic area for this assessment is the tidal waters of Harris Creek, which is 7.6 square miles. The proposed project is not likely to have more than minimal secondary, long-term impacts to the aquatic environment due to the fact that the proposed oyster restoration project is only 744 acres in an area of 7.6 square miles. In fact, the project should have a beneficial impact to the aquatic ecosystem.

f. Corps Wetland Policy. The project will have no impact on tidal or nontidal wetlands. Based on the public interest review herein, the beneficial effects of the project outweigh the detrimental impacts of the project.

g. (☐NA) Water Quality Certification under Section 401 of the Clean Water Act ☒has/☐ has not yet been issued by ☐ /☒State/☐Commonwealth.

h. Coastal Zone Management (CZM) consistency/permit: Issuance of a State permit certifies that the project is consistent with the CZM plan. ☒ There is no evidence or indication from the State of Maryland that the project is inconsistent with their CZM plan.

i. Other authorizations.

j. (☒NA) Significant Issues of Overriding National Importance. *Explain.*

8. Compensation and other mitigation actions.

a. Compensatory Mitigation

1. Is compensatory mitigation required? ☐ yes ☒ no [If "no," do not complete the rest of this section]

2. Is the impact in the service area of an approved mitigation bank? ☐ yes ☐ no

    (i) Does the mitigation bank have appropriate number and resource type of credits available? ☐ yes ☐ no

3. Is the impact in the service area of an approved in-lieu fee program? ☐ yes ☐no

    (i) Does the in-lieu fee program have appropriate number and resource type of credits available? ☐ yes ☐ no

4. Check the selected compensatory mitigation option(s):

☐ mitigation bank credits
☐ in-lieu fee program credits
☐ permittee-responsible mitigation under a watershed approach
☐ permittee-responsible mitigation, on-site and in-kind
☐ permittee-responsible mitigation, off-site and out-of-kind

5. If a selected compensatory mitigation option deviates from the order of the options presented in §332.3(b)(2)-(6), explain why the selected compensatory mitigation option is environmentally preferable. Address the criteria provided in

§332.3(a)(1) (i.e., the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project):

6. Other Mitigative Actions

9. General evaluation criteria under the public interest review. We considered the following within this document:

   a. The relative extent of the public and private need for the proposed project: Achieving a natural, self-sustaining, oyster population in Harris Creek will provide water filtration, habitat and critical structure for shellfish and other organisms. Oysters provide a number of ecological, economical and recreational benefits to the environment.

   b. ☒There are no unresolved conflicts as to resource use.

   c. The extent and permanence of the beneficial and/or detrimental effects, which the proposed work is likely to have on the public, and private uses to which the area is suited. ☒Detrimental impacts are expected to be minimal and temporary. The beneficial effects associated with utilization of the property would be permanent. *Explain.*

10. Determinations.

   a. Public Hearing Request: ☒NA There were no requests for a federal public hearing; therefore, a federal public hearing was not held for the project. However, a joint MDE public hearing/Corps public meeting was held in Easton on February 12, 2013.

   ☐ I have reviewed and evaluated the requests for a public hearing. There is sufficient information available to evaluate the proposed project; therefore, the requests for a public hearing are denied.

   b. Section 176(c) of the Clean Air Act General Conformity Rule Review: The proposed permit action has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities proposed under this permit will not exceed de minimis levels of direct or indirect emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps' continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons a conformity determination is not required for this permit action.

   c. Relevant Presidential Executive Orders.

(1) EO 13175, Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians. ☒This action has no substantial direct effect on one or more Indian tribes. On September 24, 2012,

a weekly listing of these pending permit actions involving "ground disturbing activities", including the proposed project, was sent to the Delaware Nation for coordination in accordance with the Delaware Nation Tribal review preferences derived through government-to-government consultation. The weekly listing was the agreed upon format by which the Baltimore District communicates our permit actions to the Delaware Nation. The Delaware Nation did not provide a response informing the Baltimore District of any interest in further consultation on the proposed project within the 30-day timeframe. This timeframe was agreed to by the Delaware Nation during government-to-government consultation. Since the Delaware Nation did not respond within the applicable time period, the Baltimore District has determined that the proposed project does not have the potential to adversely affect traditional cultural properties, burials, and lands with significance to the Tribes, pursuant to Section 106 of the National Historic Preservation Act of 1966 (NHPA). No further government-to-government consultation with Federally-recognized Tribes is required for this proposed project.

(2) EO 11988, Floodplain Management. ☒Not in a floodplain. (☐Alternatives to location within the floodplain, minimization, and compensation of the effects were considered above.)

(3) EO 12898, Environmental Justice. In accordance with Title III of the Civil Right Act of 1964 and Executive Order 12898, it has been determined that the project would not directly or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin nor would it have a disproportionate effect on minority or low-income communities.

(4) EO 13112, Invasive Species.

☒There were no invasive species issues involved.

☐The evaluation above included invasive species concerns in the analysis of impacts at the project site and associated compensatory mitigation projects.

☐Through special conditions, the permittee will be required to control the introduction and spread of exotic species.

EO 13212 and 13302, Energy Supply and Availability. ☒The project was not one that will increase the production, transmission, or conservation of energy, or strengthen pipeline safety. (☐The review was expedited and/or other actions were taken to the extent permitted by law and regulation to accelerate completion of this energy-related (including pipeline safety) project while maintaining safety, public health, and environmental protections.)

a. Finding of No Significant Impact (FONSI). Having reviewed the information provided by the applicant and all interested parties and an assessment of the environmental impacts, I find that this permit action will not have a significant impact on the quality of the human environment. Therefore, an Environmental Impact Statement will not be required.

b. Compliance with 404(b)(1) guidelines. ☐NA

Having completed the evaluation in paragraph 5, I have determined that the proposed discharge ☒complies/☐does not comply with the 404(b)(1) guidelines.

c. Public Interest Determination: I find that issuance of a Department of the Army permit ☒is not/☐is contrary to the public interest.

PREPARED BY:

Mary A. Frazier
Mary A. Frazier
Regulatory Project Manager

Date: June 10, 2013

APPROVED BY:

Joseph P. DaVia
Joseph P. DaVia
Chief, Maryland Section Northern

Date: 6/10/13

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State of Maryland
# Board of Public Works
Wetlands Administration
Post Office Box 1510
Annapolis, Maryland 21404
410-260-7791
Fax: 410-974-5240
Toll Free: 1-877-591-7320

Doldon W. Moore, Jr.
*Wetlands Administrator*

Martin O'Malley
*Governor*

Nancy K. Kopp
*Treasurer*

Peter Franchot
*Comptroller*

Sheila C. McDonald
*Executive Secretary*

June 14, 2013

DNR – Fisheries Service
Attn: Mike Naylor
580 Taylor Avenue – B-2
Annapolis MD 21401

Dear Applicant(s):

RE: Wetlands License No. 12-1231, Harris Creek, Talbot Co. MD

Enclosed please find the original and one copy of the above-mentioned wetlands license issued to you on April 3, 2013.

After you have read all the conditions of the license, please ensure that the license is signed by the named licensee and **the entire original (including plans) is returned to this office within 15** days in the enclosed envelope. Please retain the copy of the license for your records. This license is valid for a period of three years, as indicated on page three.

Please note that you must notify the MD Department of the Environment, Inspections and Compliance Program, by calling (410) 537-3510 in Baltimore, or (410) 901-4020 in Cambridge, prior to commencing work.

This does not constitute your federal authorization. Please contact the U.S. Army Corps of Engineers, Baltimore District, at (410) 962-4500 (Maryland Section Southern) or (410) 962-4252 (MD Section Northern) regarding the status of the federal permit.

If you have any questions concerning any of the terms and conditions of the attached license, please contact me at the address or telephone number shown above.

Sincerely,

D. W. Moore

Doldon W. Moore, Jr.
Wetlands Administrator

Enclosure
cc: MDE, Tidal Wetlands Division

State of Maryland
Board of Public Works
Wetlands Administration
Post Office Box 1510
Annapolis, Maryland 21404
410-260-7791
Fax: 410-974-5240
Toll Free: 1-877-591-7320

Doldon W. Moore, Jr.
*Wetlands Administrator*



# WETLANDS LICENSE NO. 12-1231

## MARYLAND DEPARTMENT OF NATURAL RESOURCES

In response to an application dated September 4, 2012, for a Wetlands License and upon the Wetlands Administrator's recommendation, the Maryland Board of Public Works authorizes you to:

> Restore approximately 184 acres of existing Maryland State designated Natural Oyster Bars (NOBs) having water depths of approximately minus 6 to minus 9 feet at mean low water (MLW). The proposed restoration will be accomplished by depositing approximately 307,798 cubic yards of various materials/alternative substrates, including oyster shell, clam shell, concrete rubble, stone, marl, brick and/or crushed cinderblock, to an approximate depth of 13 inches. The substrate will then be planted with oyster spat on shell seeded with eastern oyster, Crassostrea virginica at a density of 5 million spat per acre and a thickness of approximately 1 inch. The overall depth of deposited materials, including the oyster spat on shell, will total 13 inches and result in final post construction vertical clearances of approximately 5-8 feet MLW, above the elevation of restored bottom habitat, as depicted on the attached revised plans dated January 15, 2013.
> *Harris Creek, Talbot County, MD*

THIS LICENSE AUTHORIZES YOU TO PERFORM THE WORK ONLY IF YOU COMPLY WITH THE FOLLOWING SPECIAL CONDITIONS:

A. The licensee shall maintain a minimum of a 5-foot clearance above the final post construction elevation at mean low water.

B. The licensee shall leave a 250-foot buffer zone around all federal aids to navigation, and a 150-foot buffer near designated channels in accordance with United States Coast Guard requirements.

C. Only acceptable materials shall be emplaced. Acceptable materials are: clean clam shell, marl, concrete, stone, brick and crushed cinderblock with a maximum size limit of six inches. No asphalt rubble shall be emplaced. If concrete is used prior to emplacement, all rebar is to be cut off flush with the concrete. Any rebar exposed as a result of the concrete breaking during the emplacement is to be cut flush with the concrete.

D. The licensee shall survey planting areas for SAV prior to emplacing materials. No materials shall be emplaced with 300 feet of documented SAV beds.

E. The licensee shall give 48 hours notice to the Maryland Watermen's Association prior to performing work within the proposed alternative substrate sites.

THIS LICENSE AUTHORIZES YOU TO PERFORM THE WORK ONLY IF YOU COMPLY WITH THE FOLLOWING STANDARD CONDITIONS:

1. Work must be in accordance with the plans and drawings attached to this License and incorporated herein, dated January 15, 2013.

2. A copy of this License, including the approved plans or drawings, must be available at the site until the authorized work is complete.

3. (a) At least 10 days before starting the authorized work, Licensee shall notify in writing the Inspections and Compliance Program within the Maryland Department of the Environment of the start date.
(b) Within 30 days of completing the authorized work, Licensee shall notify in writing the Inspections and Compliance Program within the Maryland Department of the Environment of the completion.
Note: The Inspections and Compliance Program may be contacted at 410-537-3510.

4. Licensee shall maintain the authorized structure in good condition or perform the authorized activity in accordance with the approved plans or drawings and otherwise comply with all License conditions until the structure is removed or the activity permanently ceases.

5. Licensee shall perform the authorized work in a workmanlike manner so as to eliminate or minimize adverse effects on fish, wildlife and natural environmental values.

6. Work must be in accordance with the Water Quality Certification issued by the Maryland Department of the Environment.

7. Work must be in accordance with the Maryland State Programmatic General Permit (MDSPGP-4) or the U.S. Army Corps of Engineers Individual Authorization.

8. Work must be permitted under, and performed in accordance with, the Critical Area requirements of the local jurisdiction where the project is located. This authorization does not authorize disturbance in the 100-foot Critical Area Buffer. Disturbance in the buffer means clearing, grading, construction activities, or removing any size tree or vegetation. Any anticipated buffer disturbance requires prior written approval from the local jurisdiction in the form of a Buffer Management Plan.

9. The Maryland Department of the Environment as determined that the proposed activities comply with, and will be conducted in a manner consistent with, the State's Coastal Zone Management Program, as required by Section 307 of the Federal Coastal Zone Management Act of 1972, as amended.

10. If the authorized work affects more than 5,000 square feet or involves 100 cubic yards or more of fill, work must be performed in accordance with a Soil Erosion and Sediment Control Plan approved by the Talbot County Soil Conservation District.

11. Work must be conducted by the property owner or by a marine contractor who is registered with the Maryland Department of the Environment in accordance with Section 17-301 of the Environment Article, Annotated Code of Maryland.
Note: A list of registered marine contractors may be obtained by contacting MDE at 410-537-3837 or by visiting: http://www.mde.state.md.us/registeredMarineContractors.

12. All federal, State, and local government requirements must be met.

13. Licensee may not fill, dredge, or otherwise alter or destroy marsh.

14. This License does not authorize Licensee to trespass or infringe upon private or public property.

15. This License does not transfer a property interest of the State unless expressly stated by the Board of Public Works (usually in a separate document).

16. Licensee shall allow full unfettered public use of State wetlands and navigable waters.

17. Licensee shall allow representatives of the Board of Public Works and the Maryland Department of the Environment to make inspections at reasonable times so that the State may ensure Licensee is complying with this license.

18. Licensee shall comply promptly with Maryland Department of the Environment enforcement orders related to this License.

19. The Board of Public Works or its Wetlands Administrator may modify, suspend, or revoke this License in its reasonable discretion.

20. This License is binding on any approved assignee or successor in interest of the Licensee.

21. Licensee shall indemnify, defend and save harmless the State of Maryland, its officials, officers, and employees from and against any and all liability, suits, claims and actions of whatever kind, caused by or arising from the placement of fill or piles or construction of structures in State waters authorized by this License.

22. This License expires May 29, 2016. If the structure or activity is not completed by the expiration date, work must stop as it is not longer authorized.

Note: Generally, a three-year license may be renewed for one additional three-year period if Licensee requests an extension before the expiration date. Six-year licenses may not be renewed; those Licensees must apply to the Maryland Department of the Environment for a new License.

By the authority of the Board of Public Works:

Sheila C. McDonald
Executive Secretary

Effective Date: May 29, 2013
Approved as: Secretary's Agenda Item 4
Board of Public Works Meeting Date: May 29, 2013

I accept this License and all its conditions.

Date

Licensee (Signature)

Name (Printed)

MDE
# MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Robert M. Summers, Ph.D.
Secretary

Anthony G. Brown
Lieutenant Governor

## WATER QUALITY CERTIFICATION
for
## WETLAND LICENSE 12-WL-1231

MD Department of Natural Resources, Fisheries Service
Attn: Mike Naylor 580 Taylor Avenue, B-2
Annapolis, Maryland 21401

Description of Certified Project: To restore approximately 184 acres of existing Maryland State designated Natural Oyster Bars (NOBs) having water depths of approximately minus 6 to minus 9 feet at mean low water (MLW). The overall depth of deposited materials, including the oyster spat on shell, will total 13 inches and result in final post construction vertical clearances of approximately 5 - 8 feet MLW, above the elevation of restored bottom habitat as depicted on the attached revised plans dated January 15, 2013.

This water quality certification is issued under authority of Section 401 of the Federal Water Pollution Control Act and its Amendments and the Environment Article, Sections 9-313 - 9-323, inclusive, Annotated Code of Maryland. A copy of this required certification has been sent to the Corps of Engineers. This certification does not relieve the applicant of responsibility for obtaining any other approvals, licenses or permits in accordance with federal, State, or local requirements and does not authorize commencement of the proposed project. The Maryland Department of the Environment has determined from a review of the plans that the project described above will not violate Maryland's water quality standards, provided that the following conditions are satisfied.

The certification holder shall comply with the conditions listed below.

### GENERAL CONDITIONS

A. The proposed project shall be constructed in a manner which will not violate Maryland's Water Quality Standards as set forth in COMAR 26.08.02. The applicant is to notify this department ten (10) days prior to commencing work. Verbal notification is to be followed by written notice within ten (10) days.

B. The proposed project shall be constructed in accordance with the plan and its revisions.

C. All fill and construction materials not used in the project shall be removed and disposed of in a manner which will prevent their entry into waters of this State.

D. The certification holder shall notify the Water Management Administration, Tidal Wetlands Division, in writing, upon transferring property ownership or responsibility for compliance with these conditions to another person. The new owner/operator shall request, in writing, transfer of this water quality certification to his/her name.

E. The certification holder shall allow the Maryland Department of the Environment or its representative to inspect the project area at reasonable times and to inspect records regarding this project.

## SPECIAL CONDITIONS

A. All work shall be permitted under, and performed in accordance with, the Critical Area requirements of the local jurisdiction where the project is located. This authorization does not constitute authorization for disturbance in the 100-foot Critical Area Buffer. "Disturbance" in the Buffer means clearing, grading, construction activities, or removal of any size of tree or vegetation. Any anticipated Buffer disturbance requires prior written approval, before commencement of land-disturbing activity, from the local jurisdiction in the form of a Buffer Management Plan.

B. The licensee shall maintain a minimum of a 5-foot clearance above the final post construction elevation at mean low water.

C. The Maryland Department of the Environment has determined that the proposed activity complies with, and will be conducted in a manner consistent with, the State's Coastal Zone Management Program, as required by Section 307 of the Federal Coastal Zone Management Act of 1972, as amended.

D. The licensee shall leave a 250 foot buffer zone around all federal aids to navigation, and a 150 foot buffer near designated channels in accordance with United States Coast Guard requirements.

E. Only acceptable materials shall be emplaced. Acceptable materials are: clean clam shell, marl, concrete, stone, brick and crushed cinderblock with a maximum size limit of 6 inches. No asphalt rubble shall be emplaced. If concrete is used prior to emplacement, all rebar is to be cut off flush with the concrete. Any rebar exposed as a result of the concrete breaking during the emplacement is to be cut flush with the concrete.

F. No marsh vegetation shall be filled, dredged, or otherwise altered or destroyed.

G. The licensee shall survey planting areas for SAV prior to emplacing materials. No materials shall be emplaced within 300 feet of documented SAV bed.

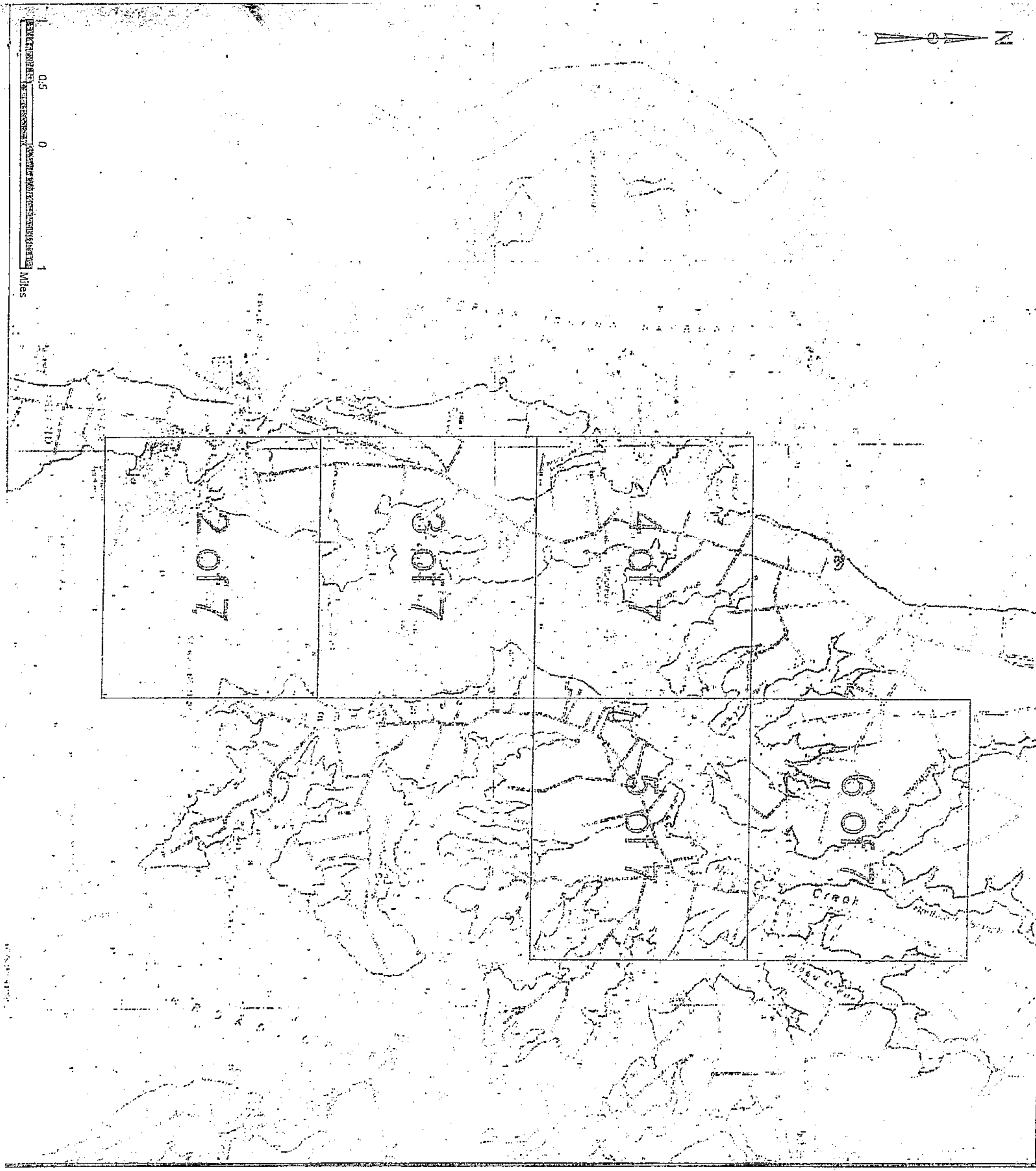
H. The applicant shall give 48 hours notice to the Maryland Watermen's Association prior to performing work within the proposed alternative substrate sites.

Failure to comply with these conditions shall constitute reason for suspension or revocation of the Water Quality Certification and legal proceedings may be instituted against the certification holder in accordance with the Annotated Code of Maryland. In granting this certification, the Department reserves the right to inspect the operations and records regarding this project at anytime.

CERTIFICATION APPROVED

Richard Ayella, Chief
Tidal Wetlands Division

5/1/16
Expiration Date




Sheet 1 of 7

# NAB-2007-03659

DNR Harris Creek Oyster Restoration

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12-WL-1231
1/15/13 Revised

Jan 2013

No adjacent sheet

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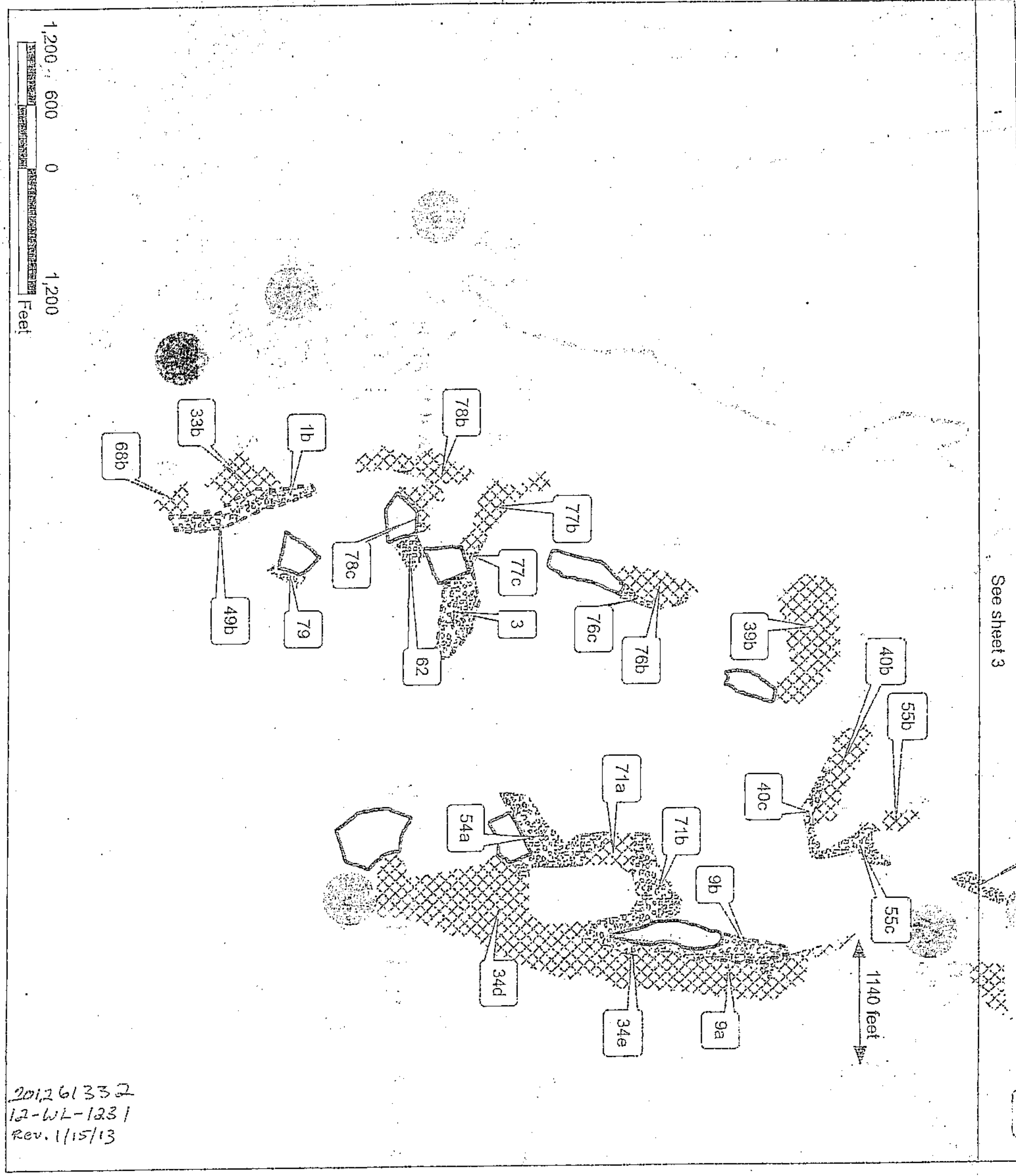


2012 61332
12-WL-1231
Rev. 1/15/13

Sheet 2 of 7

No adjacent sheet

# NAB-2007-03659

DNR Harris Creek Oyster Restoration

250' buffer for navigational aids

USACE Proposed (2013) Reefs

USACE Built (2012) Reefs

Corps-permitted DNR Alternate Substrate

DNR Proposed Alternate Substrate

99a site id

Jan 2013

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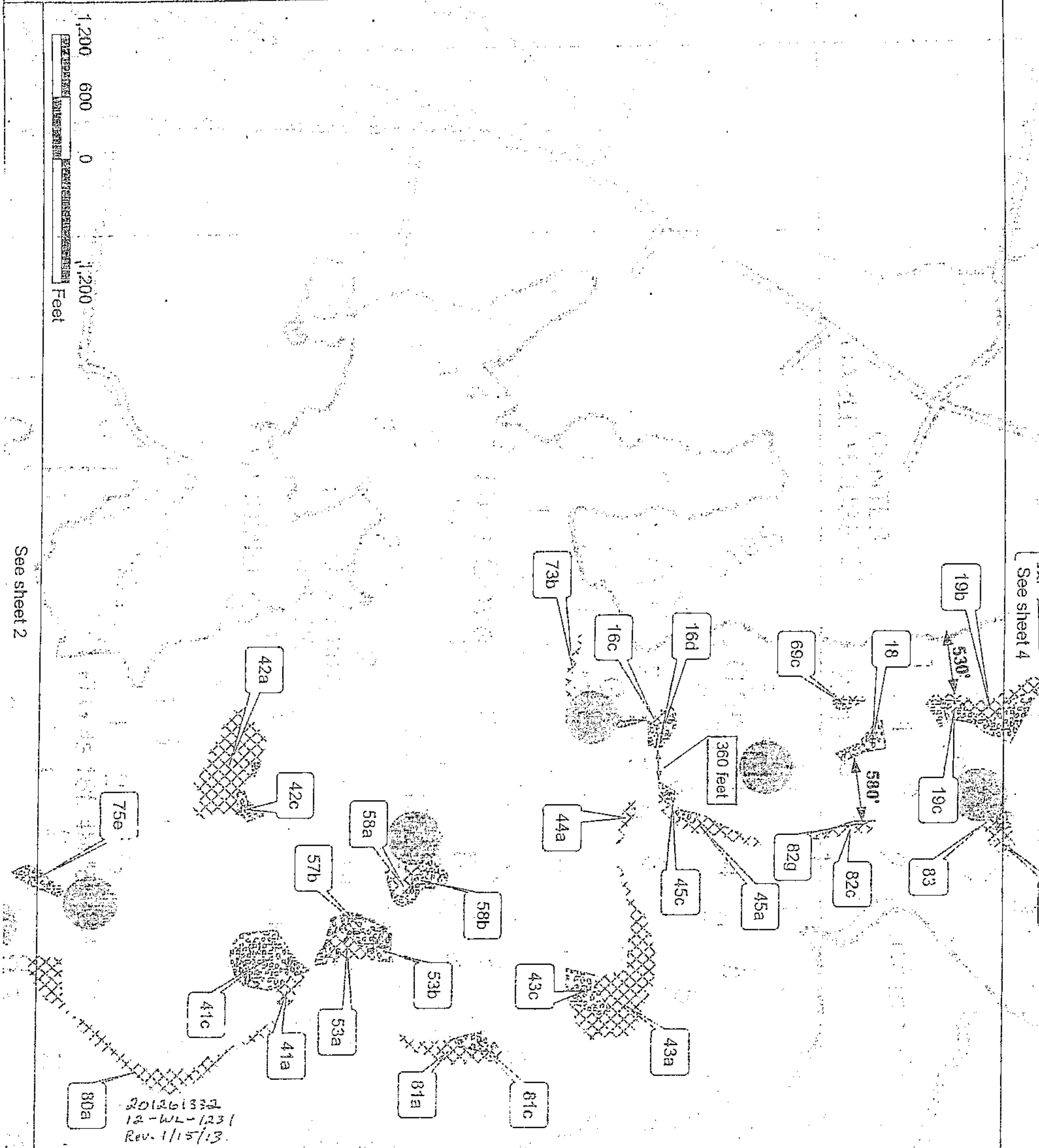


Sheet 3 of 7

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# NAB-2007-03659

DNR Harris Creek Oyster Restoration

250' buffer for navigational aids

USACE Proposed (2013) Reefs

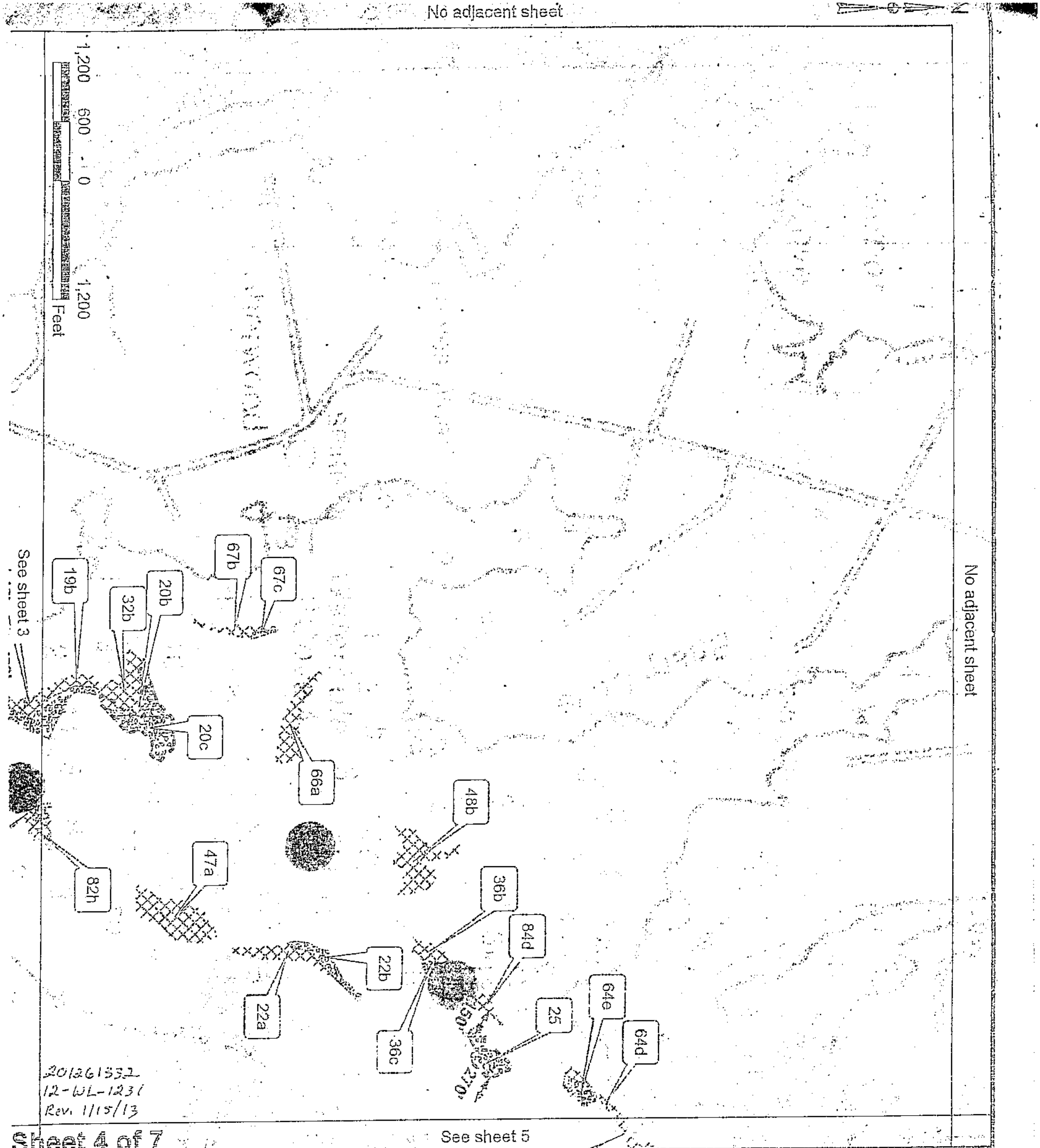
USACE Built (2012) Reefs

Corps-permitted DNR Alternate Substrate

DNR Proposed Alternate Substrate

99a site id

Jan 2013

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DNR Harris Creek Oyster Restoration

250' buffer for navigational aids

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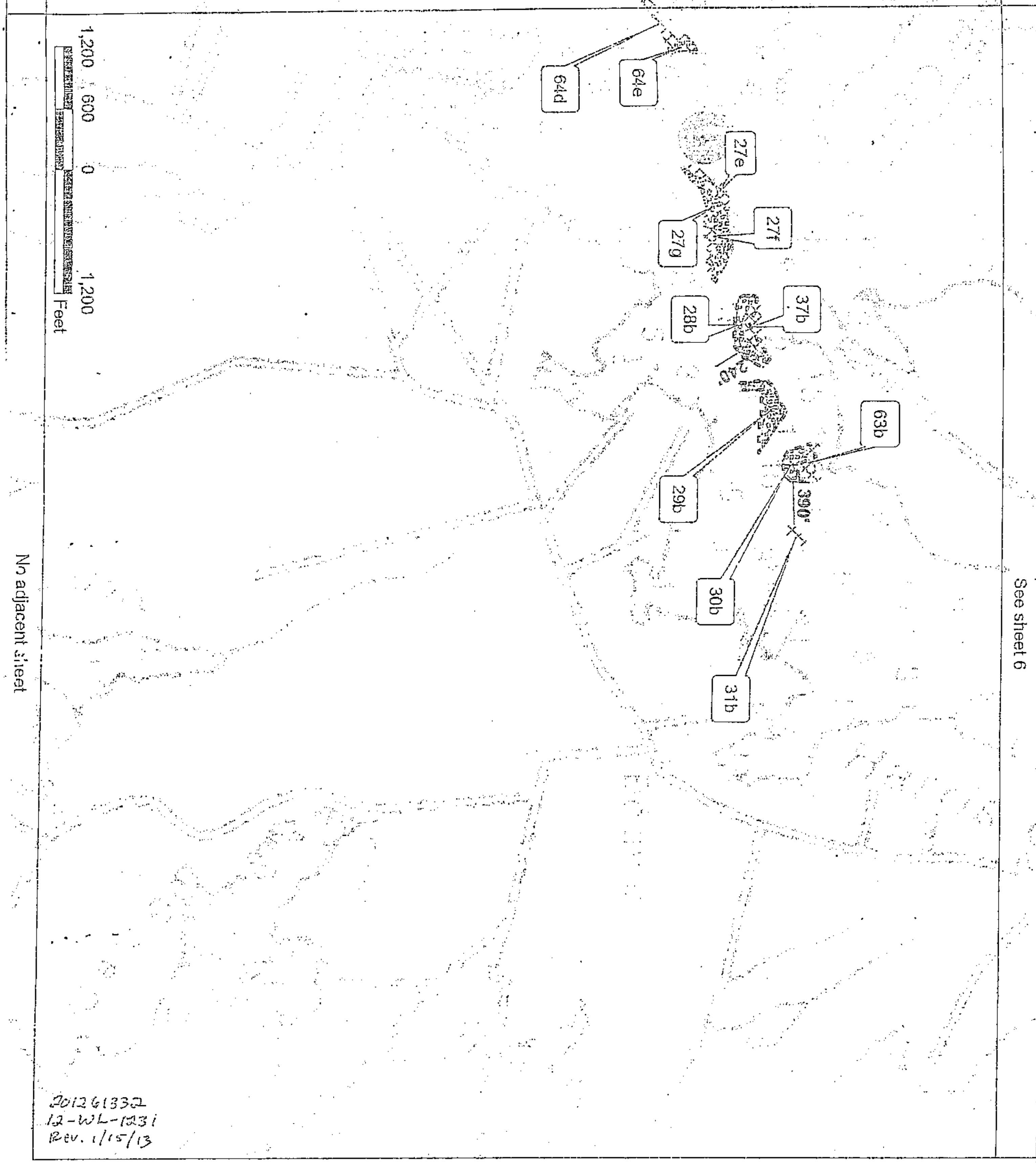
DNR Proposed Alternate Substrate

99a site id

Jan 2013

See sheet 4

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12-WL-1231
Rev. 1/15/13



No adjacent sheet

# NAB-2007-03659

DNR Harris Creek Oyster Restoration

250' buffer for navigational aids
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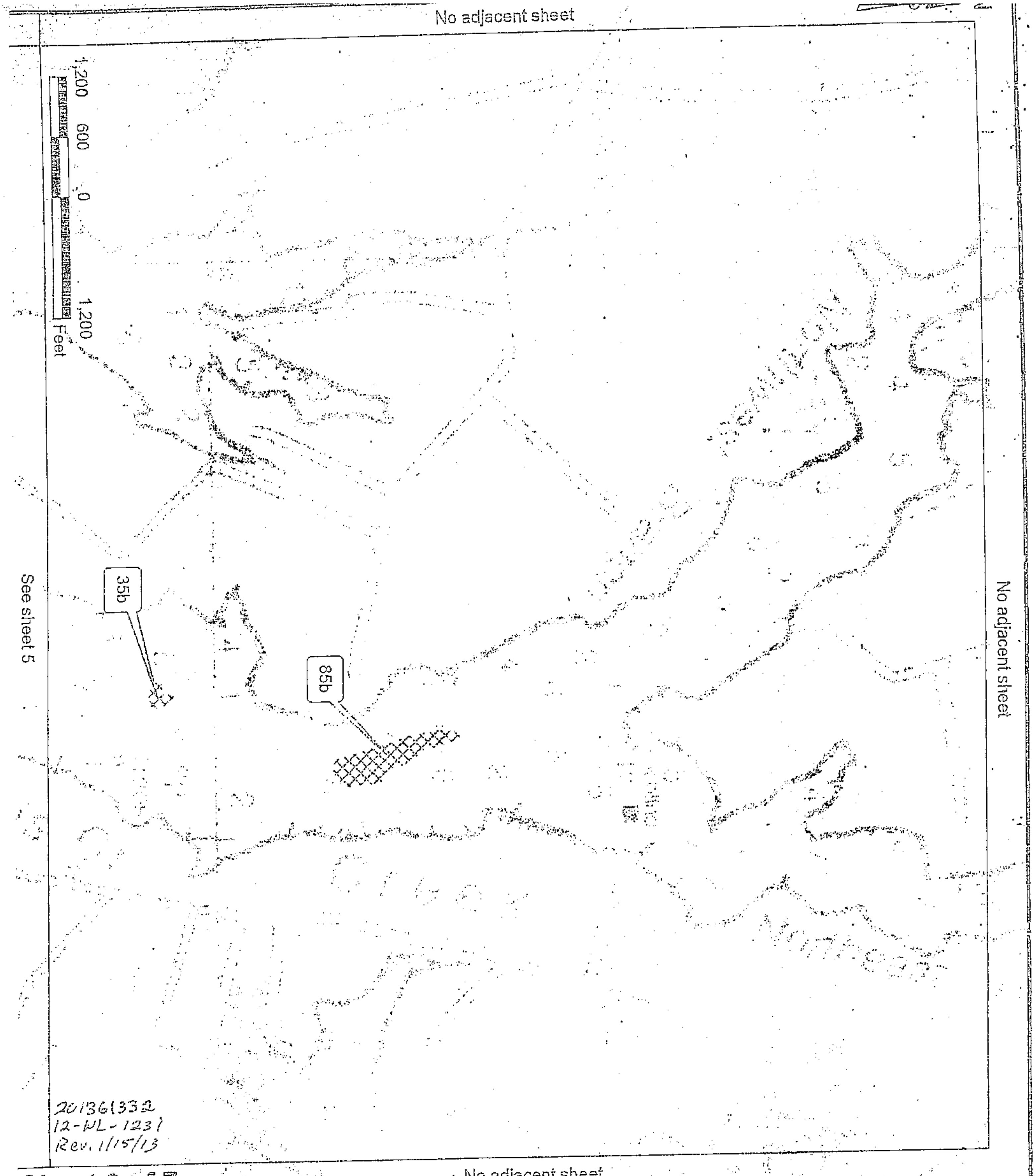
USACE Built (2012) Reefs
Corps-permitted DNR Alternate Substrate
DNR Proposed Alternate Substrate
99a site id

Jan 2013




Sheet 6 of 7

# NAB-2007-03659

DNR Harris Creek Oyster Restoration

250' buffer for navigational aids

USACE Proposed (2013) Reefs

USACE Built (2012) Reefs

Corps-permitted DNR Alternate Substrate

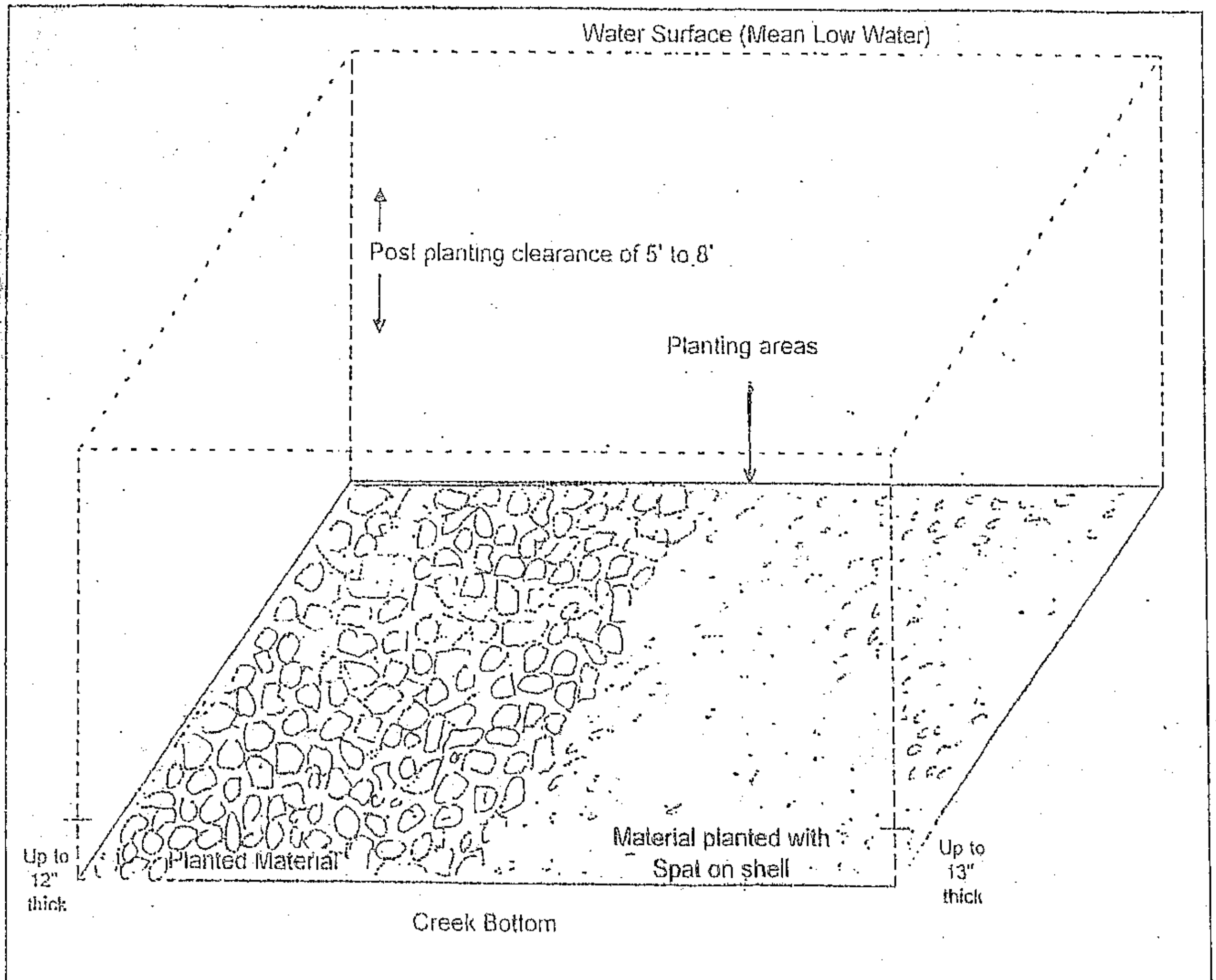
DNR Proposed Alternate Substrate

99a site id

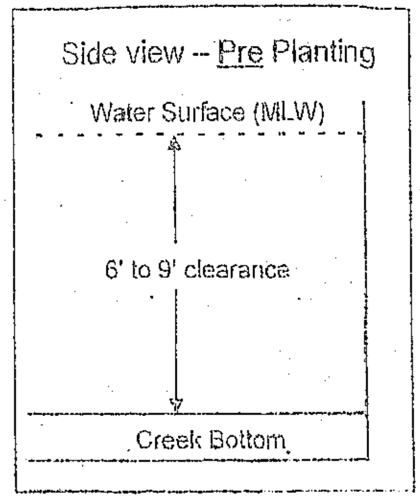
Jan 2013

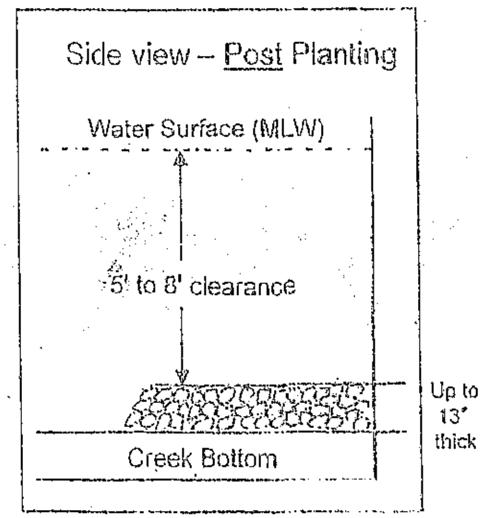
Application By:

Maryland Department of Natural Resources
Fisheries Service
580 Taylor Avenue, B-2
Annapolis, MD 21401




Typical Section

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12-WL-1231
Rev. 1/15/13

January 2013

**Appendix D – MDNR Boating Service- Waterway Assessment Survey and Hydrographic Analysis for Harris Creek**

# MARYLAND DNR – BOATING SERVICE

## WATERWAY ASSESSMENT SURVEYS & HYDROGRAPHIC ANALYSIS

## HARRIS CREEK


Written by: Ann Williams, Hydrographic Support Administrator

Reviewed by: John Gallagher, Director Hydrographic Operations

Approved by: Mark O'Malley, MD DNR Director Boating Services

March 2013

# Table of Contents

**Section:**

Summary of Restoration Project

In 2009, President Obama signed an executive order that called on the federal government to lead a renewed Chesapeake Bay restoration effort. The strategy developed by federal partners in response set a clear goal for oysters:

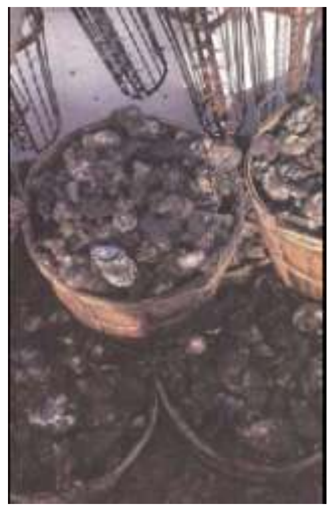
**Restore oyster populations in 20 tributaries by 2025.**

Maryland DNR, US ARMY Corps and NOAA are the multi-agency work group leading the restoration effort in the State of Maryland. Maryland has an Army Corp Permit to plant seed and shell on existing Natural Oyster Bars, maintaining an eight foot depth and has taken the lead for planting shell in the shallow waters of Harris Creek. The scope of the Harris Creek project is a multi-agency effort, spanning several years, with restoration goals throughout the waterway and water column. This waterway assessment, surveys and hydrographic analysis will summarize the restoration goals and address the boating public's navigational needs for Harris Creek.

# MARYLAND'S 10-POINT

## OYSTER RESTORATION PLAN

1 Focus on targeted restoration strategies to achieve ecological and economic goals
2 Expand the sanctuary program
3 Support a more focused and scientifically managed wild oyster fishery
4 Shift commercial production to aquaculture
5 Rehabilitate oyster bar habitat
6 Manage against oyster disease
7 Increase hatchery production
8 Enhance law enforcement
9 Increase citizen involvement
10 Integrate inmate labor



### Why Was Harris Creek Chosen?

✓ Salinity (salt) level in the creek is moderate. This allows for good oyster reproduction (not found in less saline waters), yet still shows low disease levels (saltier waters tend to have higher disease levels). So Harris is somewhat of a "sweet spot," where moderate salinities favor both good reproduction and relatively low disease.

✓ Has some of the Bay's most productive oyster reefs, which can produce oyster larvae to help seed existing and newly-built reefs.

✓ Has relatively good water quality.

✓ Achievable scale – Analysis of Harris Creek shows there is 600 acres of restorable bottom (hard bottom, with water quality that will support live oysters, in less than 20 feet of water). Our goal is to restore at least 300 acres in Harris.

- ✓ Is already an oyster sanctuary, meaning it is closed to oyster harvesting.
- ✓ Modeling shows that larvae produced in the creek by existing or planted oysters tend to stay within the Choptank River system, either in Harris Creek itself or nearby creeks (particularly Broad Creek, Little Choptank, and the main stem Choptank).

### Timeline for Restoration

- ❖ Oyster goal = 300 to 600 acres of restored reefs.
- ❖ Right now, we have 19 acres with the goal density.
- ❖ We need to seed/substrate 281 acres at a minimum.
- ❖ 22 acres are being done this year, leaving us with at least 259 acres more to do.
- ❖ About 500 acres are under consideration for substrate
- ❖ and/or seeding.
- ❖ We have funding to create substrate on 175 acres (DNR + Corps) this year and expect 25 acres/year (Corps).
- ❖ We can seed 60 acres/year.
- ❖ We expect the restoration to take 2 to 5 years at current funding levels.
- ❖ **Restoration is contingent upon continued state and federal funding.**

## Current Project:

On September 19, 2008, the Baltimore District approved a Department of the Army (DA) authorization, CENAB-OP-RMN (MD DNR/Alternate Materials) 2007-03659, to place alternate materials (non-oyster shell), within Maryland charted oyster bars for the purpose of rehabilitating oyster bar habitats and re-establishing self-sustaining oyster populations. This authorization restricted work to within areas of natural, historic oyster bars and required that the project provide for an 8 foot minimum vertical clearance at mean low water (MLW). This permit stipulation, to provide for an 8 ft. vertical clearance at MLW requires that the approved work be located within waters at least 9 feet deep. The areas currently authorized in Harris Creek (90 acres) by the Department of the Army authorization, are shown on the enclosed drawings. Please be aware that some work has already occurred in this 90 acre area, with additional work planned in the near future.

According to MD DNR, a large portion of the restorable bottom in Harris Creek is located within areas that are shallower than 9 feet MLW. However, these areas are not currently authorized by the Department of the Army under the existing Corps permit. Therefore, MD DNR has requested a permit modification, as described below under Proposed Work, to add 184 acres of shallower water in Harris Creek for the placement of alternate materials for oyster restoration. The proposed 184 acres of oyster restoration work, when combined with the previously permitted oyster restoration work, results in a total of 274 acres of charted oyster bars in Harris Creek that are proposed to be restored (90 acres under the existing Corps permit; 184 acres proposed by this permit modification). The major goal of this effort is to restore oyster bars to their historic extent where possible.

## Existing Permit:

**Permit: Alternate Material Placement (2008)**
**Corps Permit #: CENAB-OP-RMN (MD DNR/Alternate Material) 2007-03659-M24**
**Permit Ending Date: December 31, 2018 COE / October 1, 2018 BPW**
**Project Description:**

**Plant up to 1.5 Million cubic yards of alternate materials (non-oyster shell) materials within Maryland charted oyster bars in the Chesapeake Bay for the purpose of rehabilitation oyster bar habitat to work towards the re-establishment of an abundant and self-sustaining oyster population. The types of material to be planted include: clam shell, marl, concrete, stone brick, and cinderblock all materials will be free of building debris and protruding rebar. The height of the proposed reefs will maintain a minimum**

**depth of 8 feet mean low water. All work is to be completed in accordance with the attached plan(s).**

**General Conditions:**

1. **The time for completing the work authorized ends on December 31, 2018. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.**
2. **See Attachment 1 –Permit 2007-03659-M24**

**Special Conditions:**

1. **The USCG will require 250 ft buffer zone around all federal aids to navigation and 75 ft buffer of designated channels. As proposed reef coordinates including minimum depth information must be forwarded to USCG three weeks in advance of the proposed placement date.**
2. **The applicant shall survey for SAV prior to placing material and restrict planting with 300' of documented SAV.**

## PROPOSED WORK:

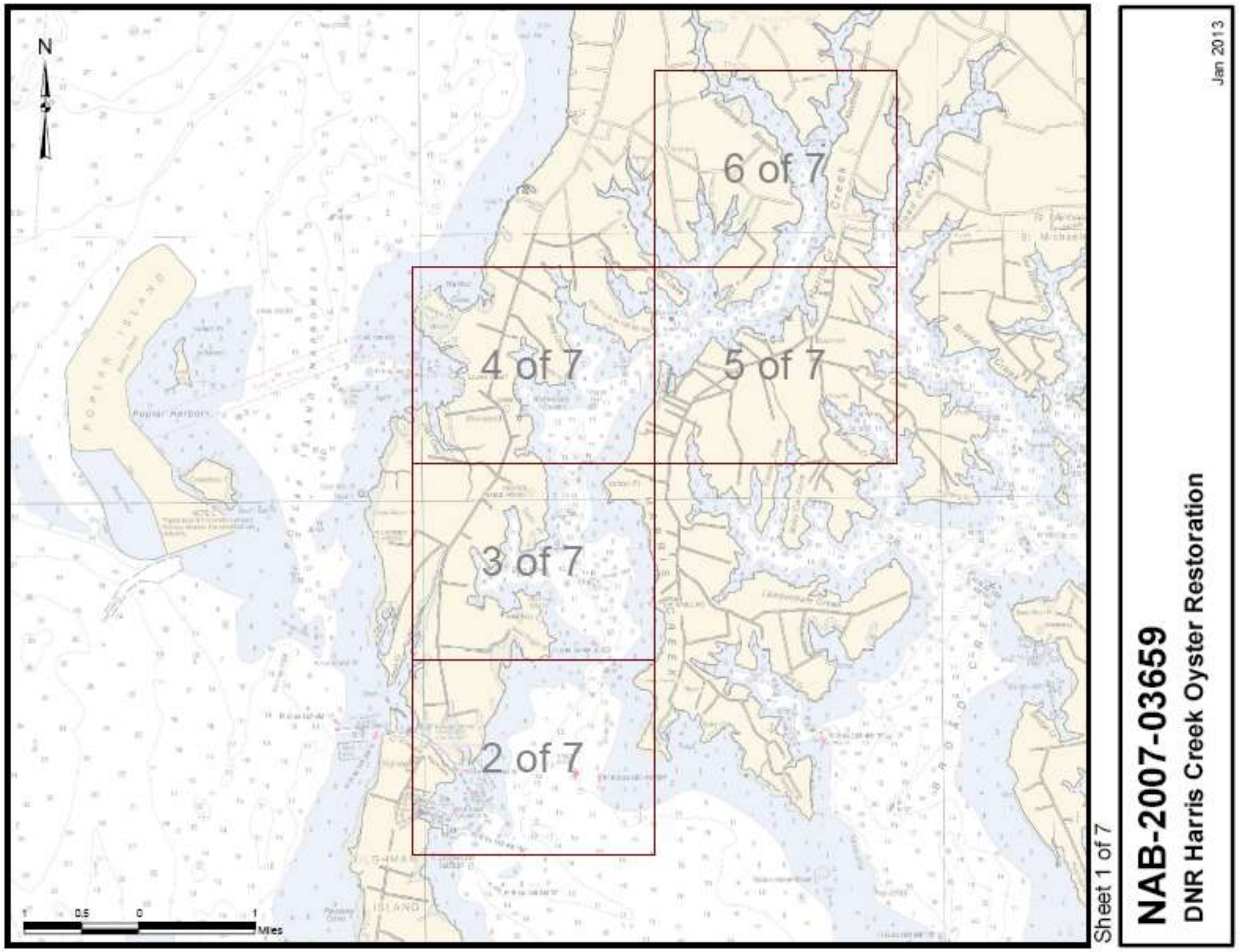
The applicant proposes, in accordance with the attached plans, to deposit, in various locations within Harris Creek, totaling approximately 184 acres within areas comprised wholly of existing Maryland State designated Natural Oyster Bars (NOBs), approximately 307,798 cubic yards oyster shell, clam shell, or stone to a maximum depth of 12 with additional 1 inch of oyster spat on shell (seeded with eastern oyster, *Crassostrea virginica)* Maryland grown spat, at a density of 5 million spat per acre. Therefore, in total, 13 inches is proposed as the overall depth of deposited materials, including the oyster spat on shell. Post construction, final vertical clearances of no less then 5 feet MLLW (Mean Lower Low Water) will exist in the project areas.

Special conditions:

- Establishment of plantings to remain a minimum of 250 feet from established Federal Aids to Navigation to allow for safe navigation and accessibility of servicing units.
- Plantings remain a minimum of 150 feet outside / shoreward of Federal Project Channels as listed on the USAC web site.
- Where no Federal Project Channel exists plantings shall remain outside/shoreward of the agreed navigational path.
- Stone sub-straight should be small manageable pieces as to not snag trot lines.

Shell and/or stone plantings shall be done before April 1 or after Dec 1, any plantings during crabbing season shall be placed on Sundays, Mondays or nine hours after sunrise as to not interfere with commercial crabbing.

**Charts of Harris Creek:**




See Enclosures A - F

**Information Collected:**

**Navigational Issues:**

## Harris Creek Seafloor Survey, March 2010

### Summary

Acoustic surveys of Harris Creek were conducted to identify seafloor bottom types. The seafloor surface sediments tend to be muddy within the main channel, sandier toward the shore and numerous surface shell deposits scattered throughout the creek. Of the approximately 4,380 acres surveyed, the following bottom deposits were identified: 568 acres of oyster bars or surface shell deposit; 856 acres of sediment potentially covering shell deposits; 753 acres of hard bottom suitable for artificial reef material. Oyster bars, shell deposits and hard bottom tend to be concentrated along the channel edges or within the narrowest, deepest channels.

### Geologic Setting

Harris Creek occupies a drowned drainage basin developed in the Kent Island Formation, the primary source for sediment filling the creek. The Kent Island Formation consists of layered silt, sand and clay, often rich in organic material. It is interpreted as ancestral Chesapeake Bay estuarine sediments. These fine-grained sediments are eroded and redeposit in the channel, accounting in part for the abundance of muddy sediment on the Harris Creek seafloor.

Numerous small paleochannels, generally associated with Harris Creek tributaries, dissect the subsurface. The paleochannels are often filled with highly organic sediments which produce methane gas. The gas creates a characteristic dark, featureless echo in the seismic record. Gassy sediments can pose a risk to benthic organisms because anoxic conditions can rapidly develop at the sediment surface. Also, these sediments tend to be soft mud, a poor substrate for reef material placement.

The deepest channels in the creek occur where opposing shorelines are close together and constrict channel flow. The deep, narrow channels often contain shell deposits and oyster bars. Figure 1 shows the acoustic survey boundary for Harris Creek.

### Methodology

Acoustic surveys were performed on January 28 and February 1, 2010 onboard the DNR R/V Kerhin. Primary instrumentation included:

Side scan sonar - EdgeTech 4200 FS @ 120 and 410 kHz
Seismic profiler – EdgeTech SB 424 @ 4 – 24 kHz, 10ms
Seabed Classification System - QuesterTangent QTC 5.5 VIEW @ 200 kHz

Survey parameters were:

Vessel speed – 5-6 knots
Track line spacing – 100 meters
Side scan sonar range – 75 meters
Side scan fish depth – 1.5 meters
Seismic profiler fish depth – 2 meters
Seismic profiler depth range – 25 meters

Side scan sonar data were collected with EdgeTech Discover software and analyzed with Chesapeake Technologies SonarWiz.Map 4 software. Seismic data were collected and analyzed with EdgeTech Discover software. Seabed classification data was processed with QuesterTangent QTC IMPACT 3.4 software.

GIS data was compiled with ESRI ArcGIS Desktop 9.3.1. In ArcGIS, side scan sonar mosaic images were overlaid with a contour data set developed from NOS bathymetric data for the Harris Creek area. The seabed classification data were layered over the mosaics and bathymetry. These data sets were used to correlate side scan reflectivity with acoustic seabed classes and detect any influences that sudden changes in seafloor slope may have on the acoustic data. Steep slopes tend to scatter the acoustic signals and produce anomalous data.

The seismic profiles give an indication of subsurface structures, and where these structures meet the surface. Seismic data is useful in determining where the seafloor is firm or soft, where subsurface gas may be released to the water column, and where buried shell may be located. The profiles are correlated with the side scan mosaic to provide a 3-dimensional model of the seafloor.

**Acoustic Survey Data Analysis**

Seabed classification data indicated the presence of 6 acoustically distinct seafloor bottom types. These bottom types are highly variable and only 3 types are particularly distinct: mud, shell and sand. The 3 less distinct types are probably gradational sediments containing varying amounts of mud, sand and shell.

The overall low acoustic reflectivity in the side scan mosaic and variable seabed class distribution suggests the Harris Creek bottom is mostly muddy with intermixed, patchy sand and shell deposits scattered across the channel. In the side scan mosaic, lighter shades represent softer mud, and darker colors indicate sand and harder bottom. The darkest shades are oyster bars, and surface shell deposits.

Oyster bars are readily visible on sonar imagery. Their geometry takes several distinct forms. The most prominent form is an oval, “racetrack”, or semi-circular dark patch. The shape is produced by oyster shell planting methods and, if the bar is dredged, the dredging method. A number of these oyster beds are visible in the side scan image in Figure 3, particularly in the southern region. Older bars which are no longer planted or worked have a similar shape but appear less distinct and partially sedimented over, producing a lighter, less pronounced shape.

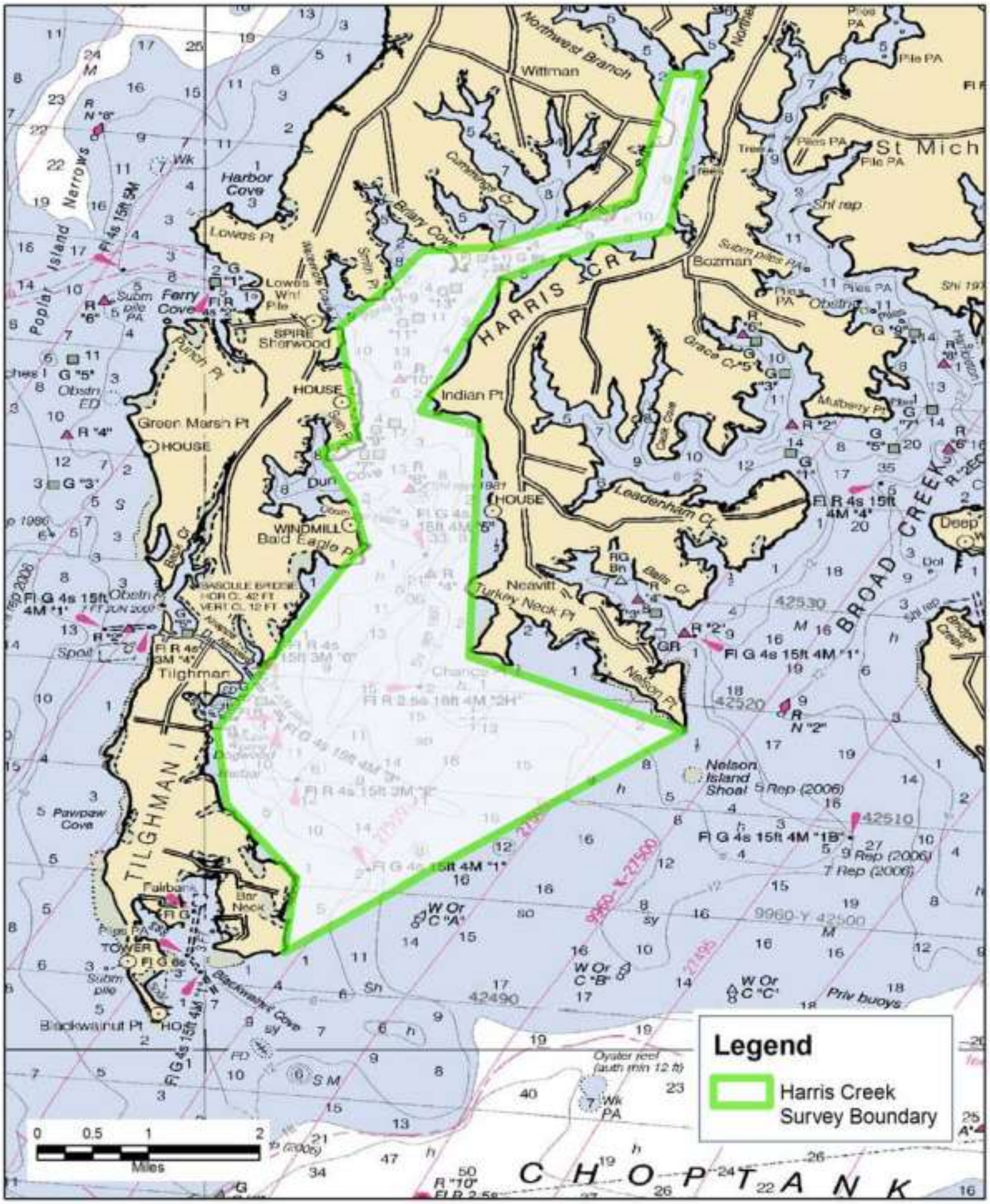



**Figure 1: Harris Creek survey boundary**

Another distinct bar geometry is the triangular or wedge-shaped bar often found near the shoreline or in shallow water. These bars developed on what were once points of land jutting out into the ancestral waterway, but have become submerged as sea level rose after the last ice age. Other bar shapes include irregular, oval mounds, and linear, "zebra-striped" patches. Figure 2 displays sonar imagery of these diverse bar forms. Figure 3 is the complete side scan sonar image mosaic for the Harris Creek survey.

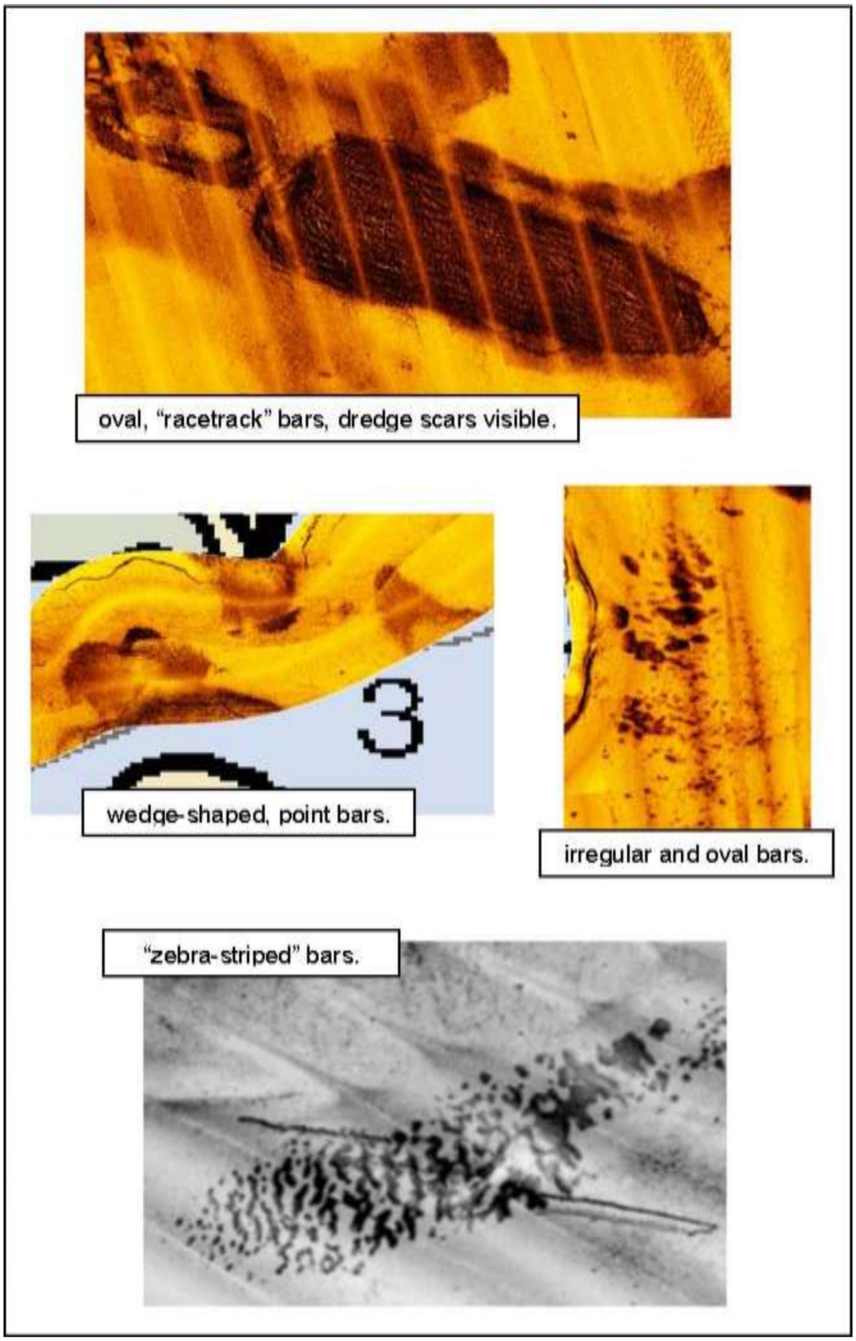
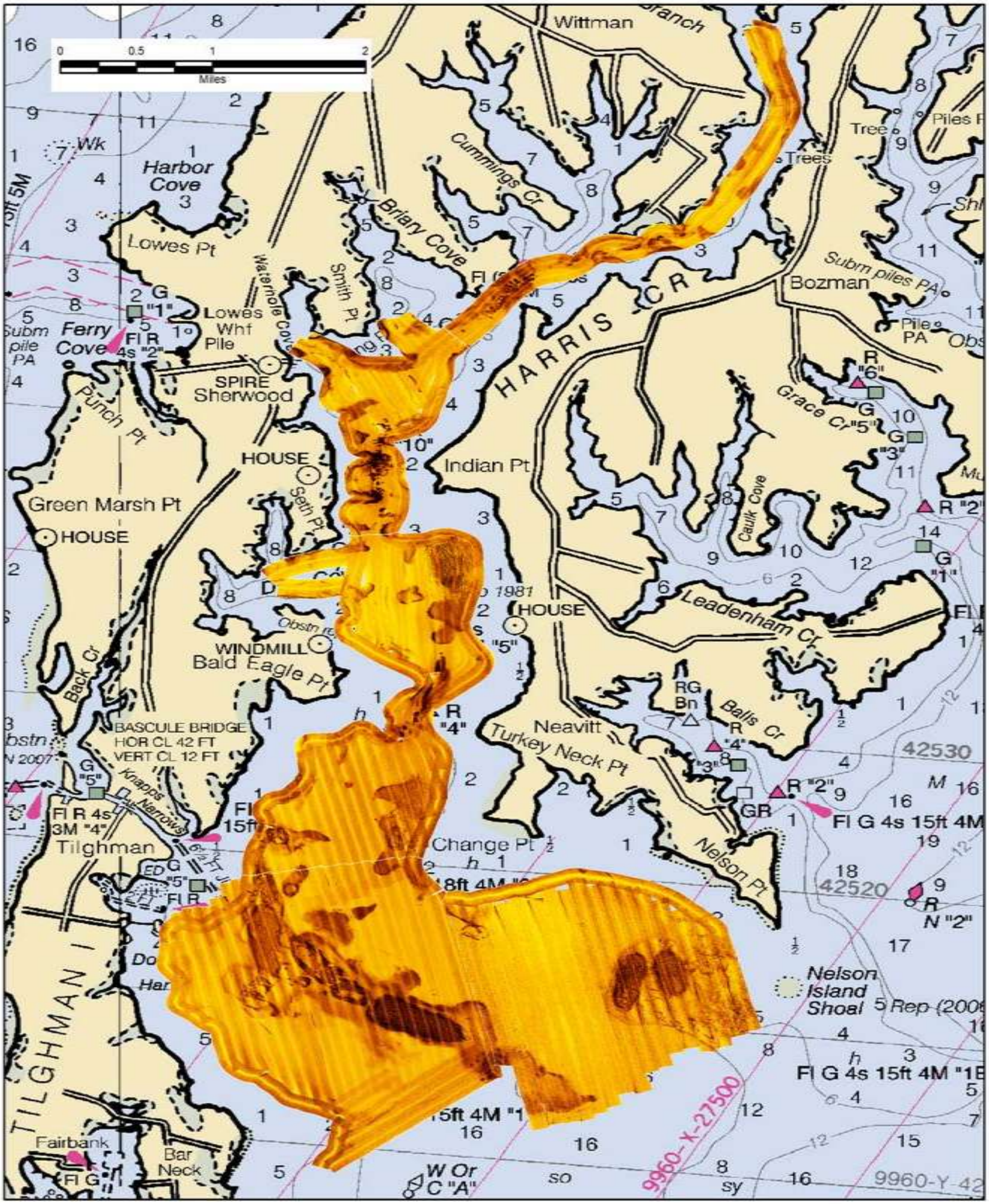



**Figure 2: Sonar images of oyster bar forms. Figure 3: Side scan sonar mosaic of Harris Creek**




The relationship between side scan imagery and seismic imagery is shown in Figure 4. This diagram is a close-up view of the two bars seen in the lower right corner of Figure 3. These bars have been artificially planted with oyster shell and spat, and have been power dredged. The bars developed on a drowned point of land that was exposed during low sea level stand. The grayscale seismic profile overlaid on the sonar image represents a cross section of the bar along the purple line drawn on the sonar image.

The center of the seismic profile shows the submerged land emerging from the mud-filled, gassy paleochannels on the left and right (north and south, respectively). The surface shell is perched on top of this hard-bottom platform. The platform rises steeply up from the southern channel. The northern edge gradually slopes below the muddy bottom and eventually dips into the northern paleochannel. At the point where the surface shell ends, there is a stretch of about 150 meters of buried hard bottom that potentially could contain buried shell within 1 meter of the seafloor. Figure 4 is an example of how acoustic data is used to locate potential buried shell deposits.

## Results

The following bottom types were mapped based on acoustic data analysis.

- Surface shell
- Buried shell
- Hard bottom
- Unclassified

Surface shell is defined as whole shell, shell fragments and shell hash with a sufficient surface density to produce a distinct acoustic signal. The nature of the shell is not necessarily determined. Some areas are clearly oyster bars, either currently harvested or relict. Because a comprehensive bottom sampling program was not included in this project, existing surface data from the Bay Bottom Survey [1], DNR's Patent Tong Survey, and acoustic seabed classification data were used to estimate the presence of shell on the surface. Surface shell can be mixed with sand, mud or a range of sediment, referred to as "cultch" in the Bay Bottom Survey database.

The buried shell bottom type is defined to be areas where shell-bearing sediments may occur within 1 meter below the seafloor. This definition takes into account the limited dredging depth available to watermen participating in the shell reclamation program.

Hard bottom refers to areas which appear acoustically dense, but are not definitively shell-bearing. Hard sand, clay outcrops, and gravel beds will appear as hard bottom in acoustic signals. While this bottom type may be well-suited for reef materials, there was no definitive evidence that shell was present in this bottom type.

Unclassified bottom in Harris Creek is assumed to be muddy bottom. Most of the creek seafloor appears to be acoustically translucent, producing an overall lightly shaded side scan image. This is indicative of soft, muddy sediment.

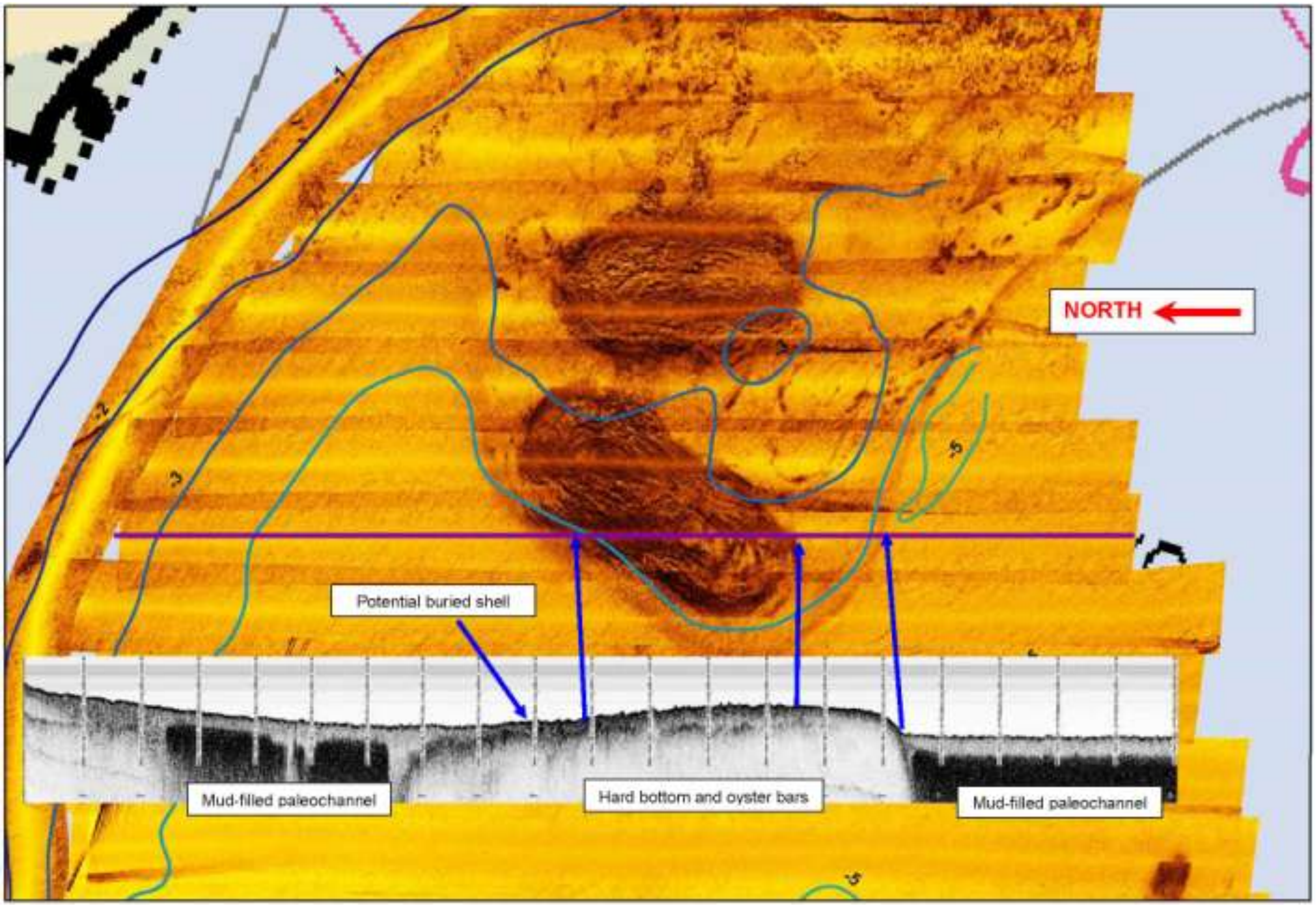



**Figure 4: Seismic profile through an oyster bar**

The following figures show outlines of surface and buried shell regions superimposed on side scan imagery.

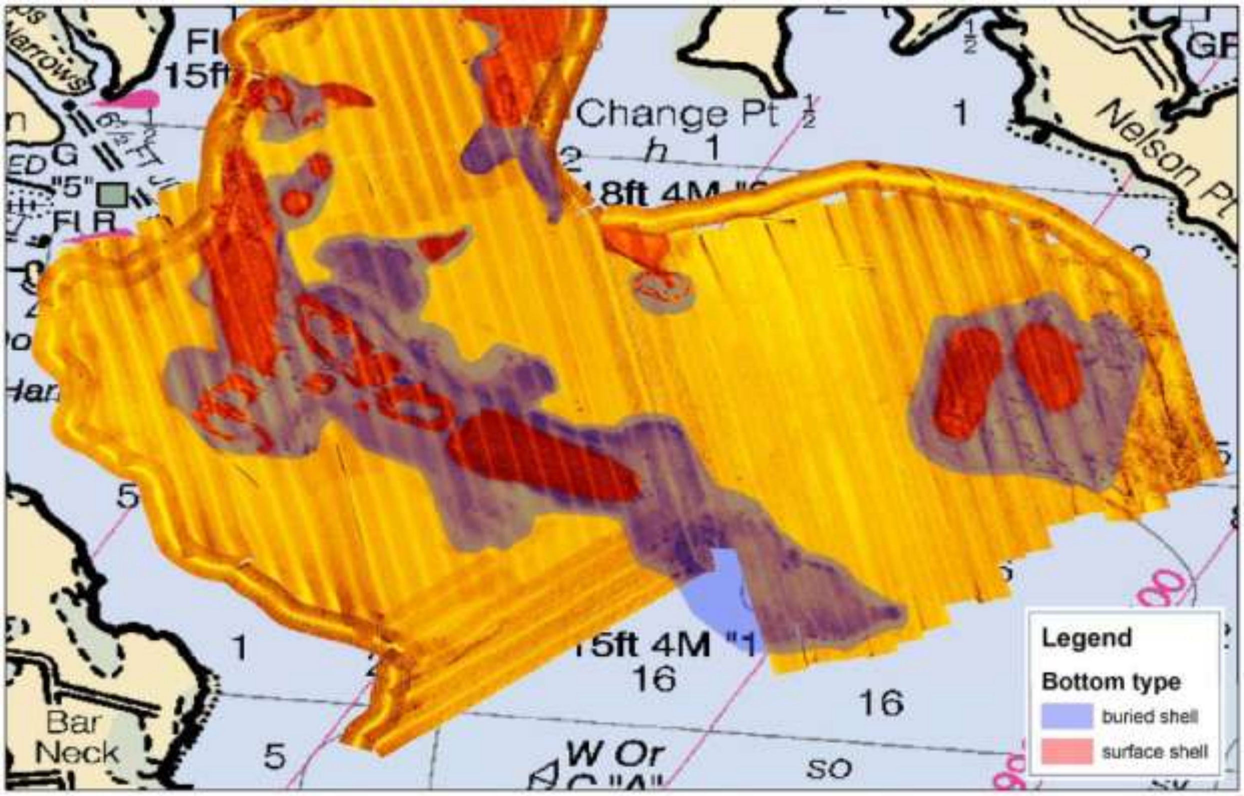
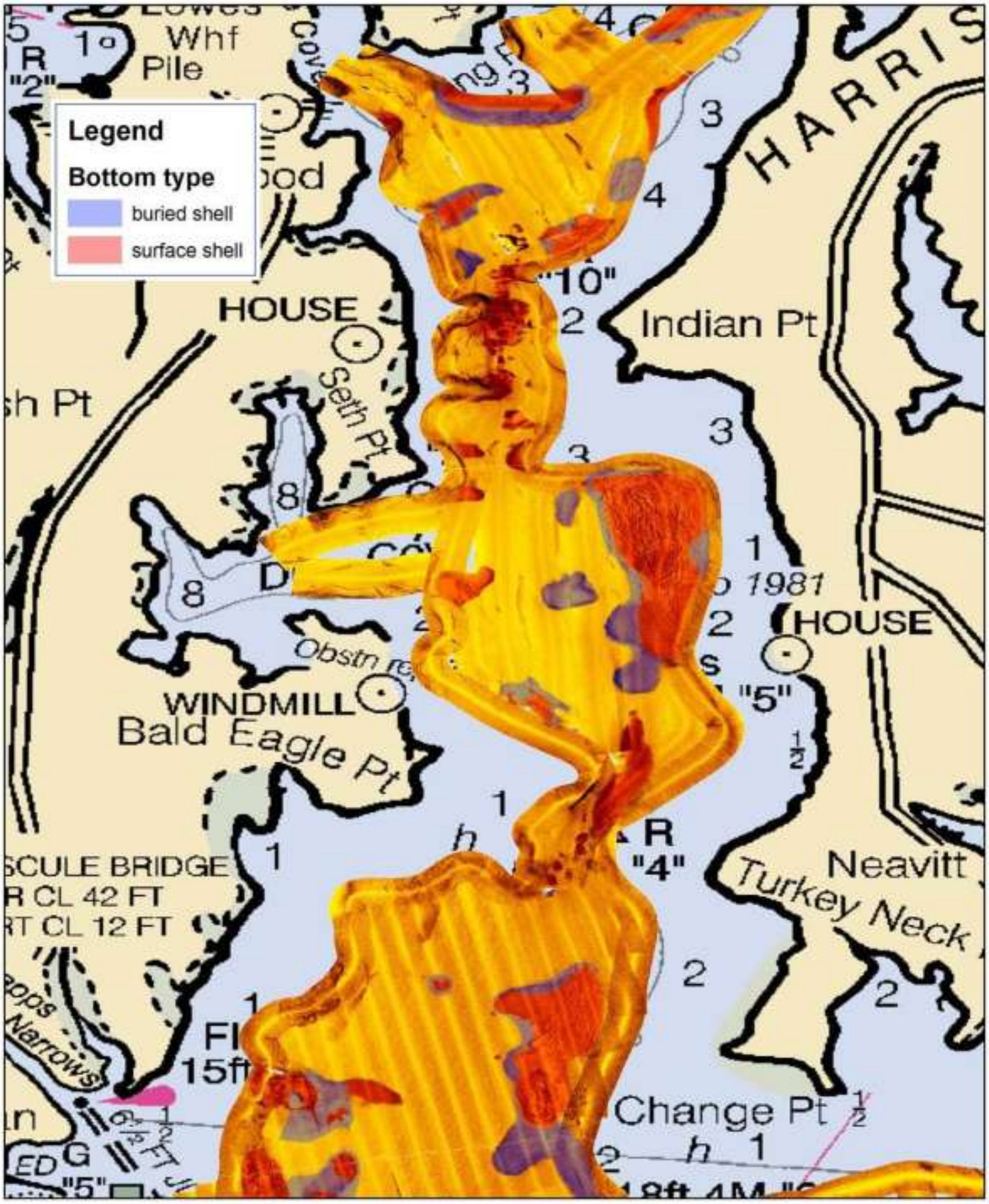



**Figure 5: Lower Harris Creek bottom types Figure 6: Middle Harris Creek bottom types Figure 7: Upper Harris Creek bottom types**


Legend
Bottom type
buried shell
surface shell
HOUSE
Indian Pt
HARRIS
Seth Pt
WINDMILL
Bald Eagle Pt
HOUSE
Neavitt
Turkey Neck
SCULE BRIDGE
R CL 42 FT
RT CL 12 FT
Narrows
Change Pt
Whf
Pile
Obstn rep 1981

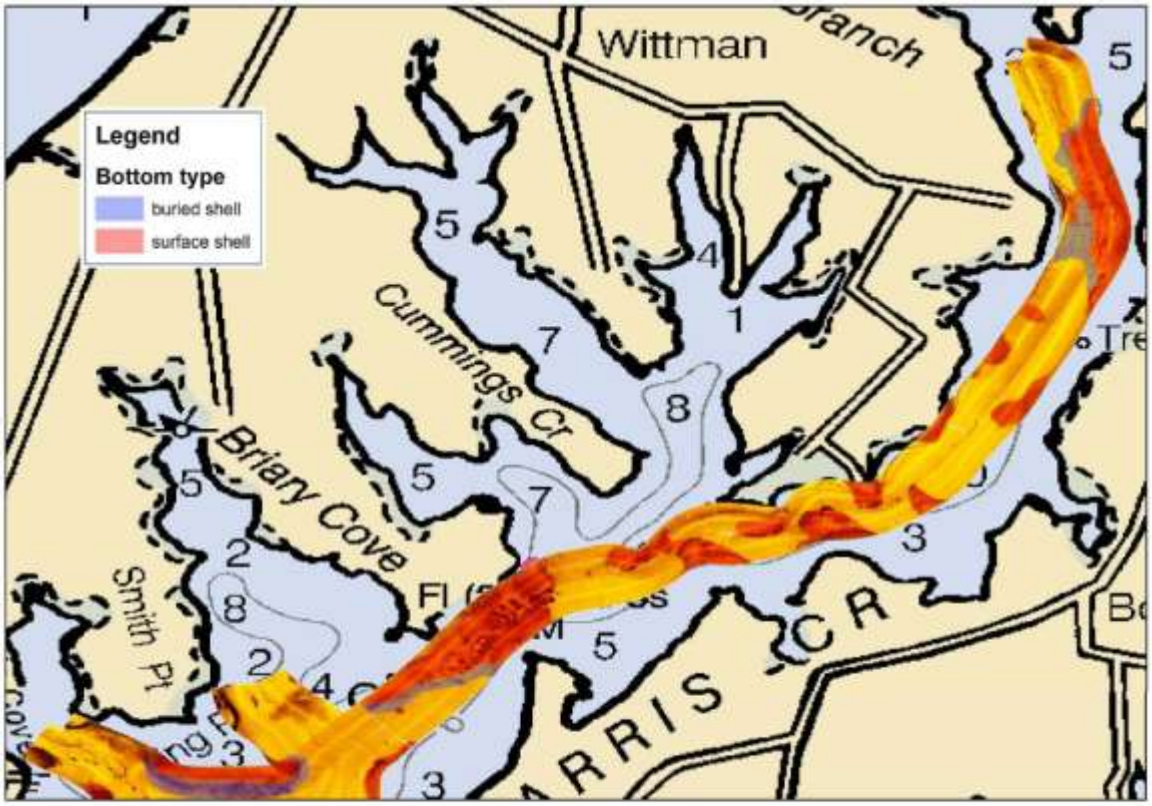



Figure 8 is a summary of Harris Creek bottom types, superimposed on a shaded bathymetric map. This figure suggests that oyster bars are often associated with either channel edges or deep, narrow channels. Most hard bottom tends to occur near the shoreline or on shallow platforms.

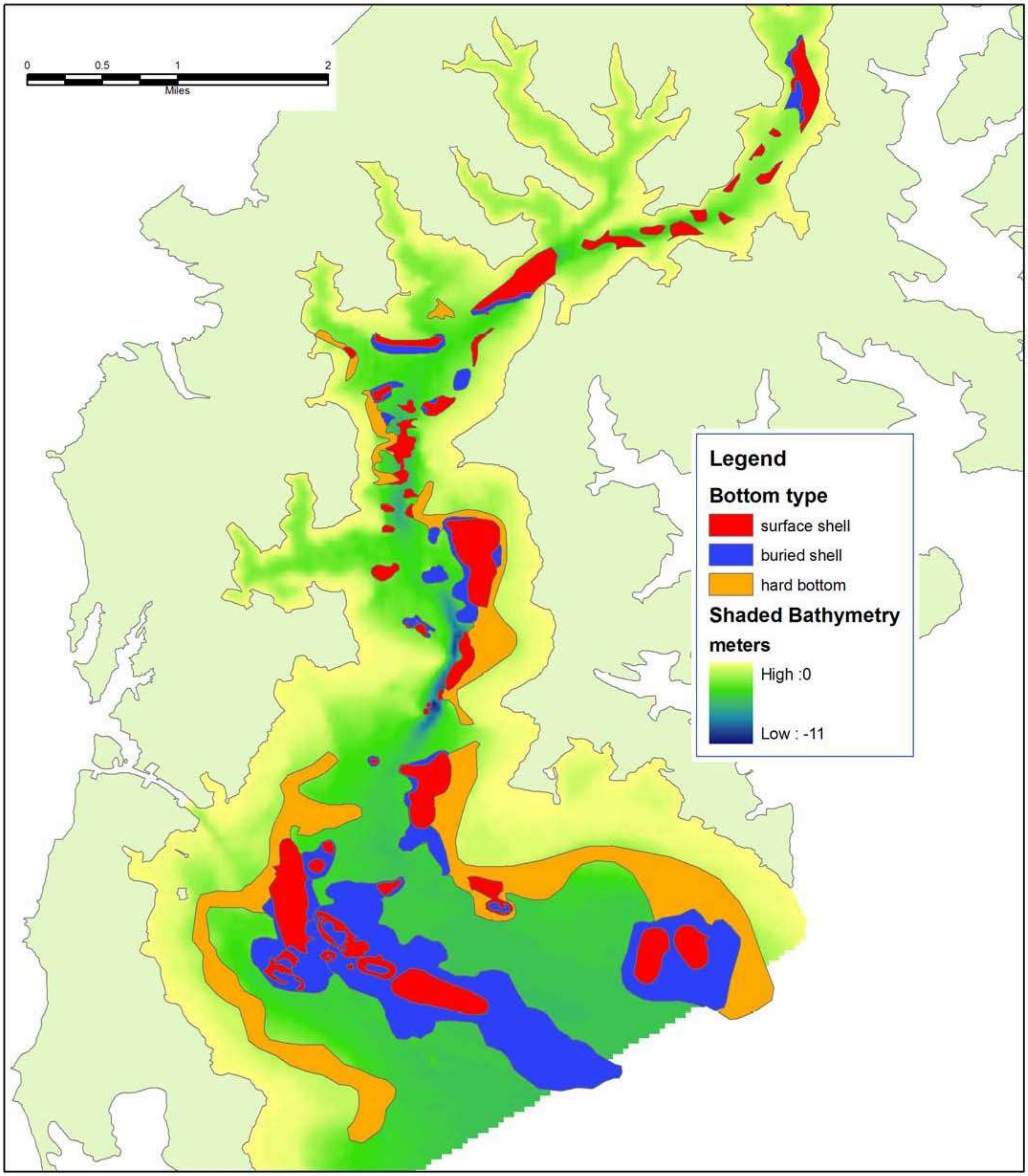



**Figure 8: Summary of Harris Creek bottom types superimposed on a shaded bathymetric map.**

## Conclusion

Acoustic surveys of Harris Creek indicate significant surface and buried shell deposits. Active oyster bars were located and mapped. Approximately 4,380 acres were surveyed. The following bottom deposits were identified:

568 acres of oyster bars or surface shell deposit
856 acres of potential buried shell deposits
753 acres of hard bottom suitable for artificial reef material.

Oyster bars tend to be distributed along channel edges and in deep, narrow channels. Many bars and shell deposits are located on submerged land areas which were once points of land along the ancestral watershed.

GIS data for this project are available from Maryland Geological Survey.

## APPENDIX

Table 1: Bottom type areas associated with historic Yates Bars

| Surface type | Associated Yates Bar | Area (sq meters) |
|---|---|---|
| buried shell | Change | 131715.0653 |
| buried shell | Eagle point | 19219.42341 |
| buried shell | Green Marsh | 577093.5482 |
| buried shell | Lodges | 8724.715273 |
| buried shell | Lodges | 19138.63342 |
| buried shell | Mill Point | 13048.42978 |
| buried shell | Mill Point | 88800.10327 |
| buried shell | Mill Point | 30514.12925 |
| buried shell | Mill Point | 12984.64753 |
| buried shell | Smith Point | 25723.4324 |
| buried shell | Tilghman Wharf | 282416.1835 |
| buried shell | Tilghman Wharf | 8991.180686 |
| buried shell | Tilghman Wharf | 54193.13181 |
| buried shell | Tilghman Wharf | 3577.162574 |
| buried shell | Tilghman Wharf | 52593.81562 |
| buried shell | Tilghman Wharf | 29924.73779 |
| buried shell | Turnrow | 25129.55808 |
| buried shell | Turnrow | 12322.78323 |
| buried shell | Upper Harris Creek | 32167.69196 |
| buried shell | Upper Harris Creek | 13442.65215 |
| buried shell | Walnut | 2592.885909 |
| buried shell | Walnut | 2981.179291 |
| buried shell | Walnut | 52083.56785 |
| buried shell | Walnut | 25523.19338 |
| buried shell | Wild Cherry Tree | 1888200.165 |
| buried shell | Wild Cherry Tree | 12886.65102 |
| buried shell | Wild Cherry Tree | 1136.540442 |
| buried shell | Wild Cherry Tree | 30063.7861 |
| buried shell | [none] | 5521.610438 |
| surface shell | Change | 189419.5849 |
| surface shell | Change | 2763.405732 |
| surface shell | Change | 1756.011841 |
| surface shell | Eagle point | 11175.41044 |
| surface shell | Green Marsh | 124956.6371 |
| surface shell | Green Marsh | 99871.13661 |
| surface shell | Hunts | 6919.570823 |
| surface shell | Hunts | 7038.831888 |
| surface shell | Hunts | 6965.174294 |
| surface shell | Hunts | 29287.6804 |
| surface shell | Little Neck | 160220.8412 |
| surface shell | Lodges | 14969.21094 |
| surface shell | Mill Point | 259640.3201 |
| surface shell | Rabbit Island | 47229.60744 |
| surface shell | Rabbit Island | 16134.44818 |
| surface shell | Seths Point | 8658.088599 |
| surface shell | Seths Point - Lodges | 76021.03684 |
| surface shell | Tilghman Wharf | 274405.5444 |
| surface shell | Tilghman Wharf | 49813.68982 |
| surface shell | Tilghman Wharf | 15808.35583 |
| surface shell | Tilghman Wharf | 10340.49825 |
| surface shell | Tilghman Wharf | 3834.854822 |

| | | |
|---|---|---|
| surface shell | Tilghman Wharf | 28105.96009 |
| surface shell | Tilghman Wharf | 6599.550147 |
| surface shell | Tilghman Wharf | 18902.7348 |
| surface shell | Turkey Neck | 4309.431585 |
| surface shell | Turkey Neck | 779.711615 |
| surface shell | Turkey Neck | 65992.71464 |
| surface shell | Turnrow | 62185.70196 |
| surface shell | Upper Harris Creek | 29732.92125 |
| surface shell | Upper Harris Creek | 14546.77585 |
| surface shell | Upper Harris Creek | 9151.952991 |
| surface shell | Upper Harris Creek | 9636.200519 |
| surface shell | Upper Harris Creek | 18370.99638 |
| surface shell | Upper Harris Creek | 8909.618089 |
| surface shell | Upper Harris Creek | 5862.505753 |
| surface shell | Upper Harris Creek | 112838.2078 |
| surface shell | Walnut | 7690.436587 |
| surface shell | Walnut | 32554.96437 |
| surface shell | Walnut | 41692.67709 |
| surface shell | Walnut | 774.319313 |
| surface shell | Walnut | 17999.29368 |
| surface shell | Wild Cherry Tree | 222744.0299 |
| surface shell | Wild Cherry Tree | 46659.22009 |
| surface shell | Wild Cherry Tree | 10990.93418 |
| surface shell | Wild Cherry Tree | 2852.299931 |
| surface shell | Wild Cherry Tree | 78603.32894 |
| surface shell | Wild Cherry Tree | 18479.25761 |
| surface shell | [none] | 3246.608628 |

| Bottom Type | total sq. meters | total sq. km | total acres |
|---|---|---|---|
| surface shell | 2297442.3 | 2.3 | 567.7 |
| buried shell | 3462710.6 | 3.5 | 855.7 |
| hard bottom | 3045102.0 | 3.0 | 753.0 |
| | | | |
| surveyed area | 17724411.0 | 17.7 | 4380.0 |

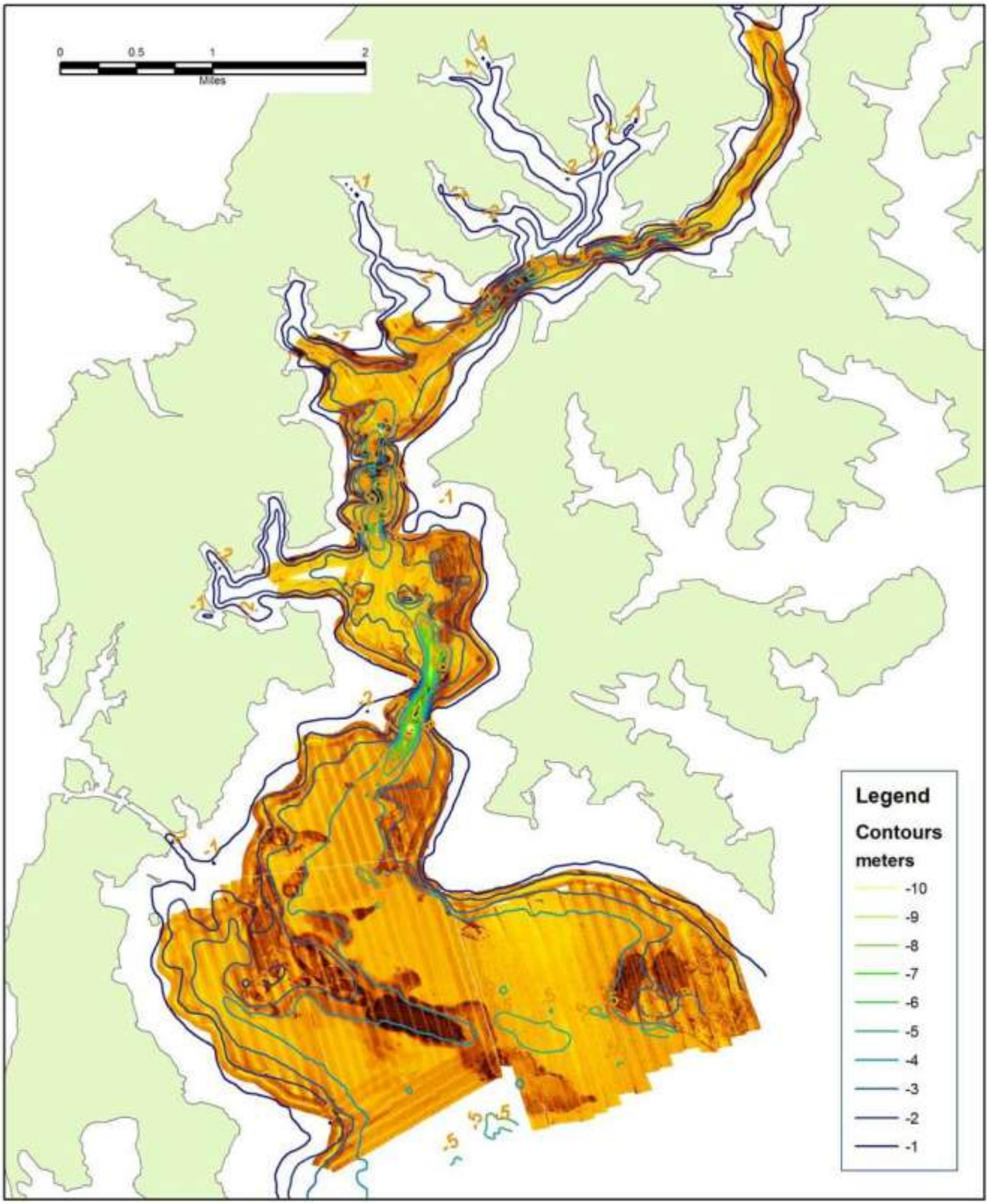



**Figure 9: Bathymetric contours over side scan mosaic. (1 meter interval)**

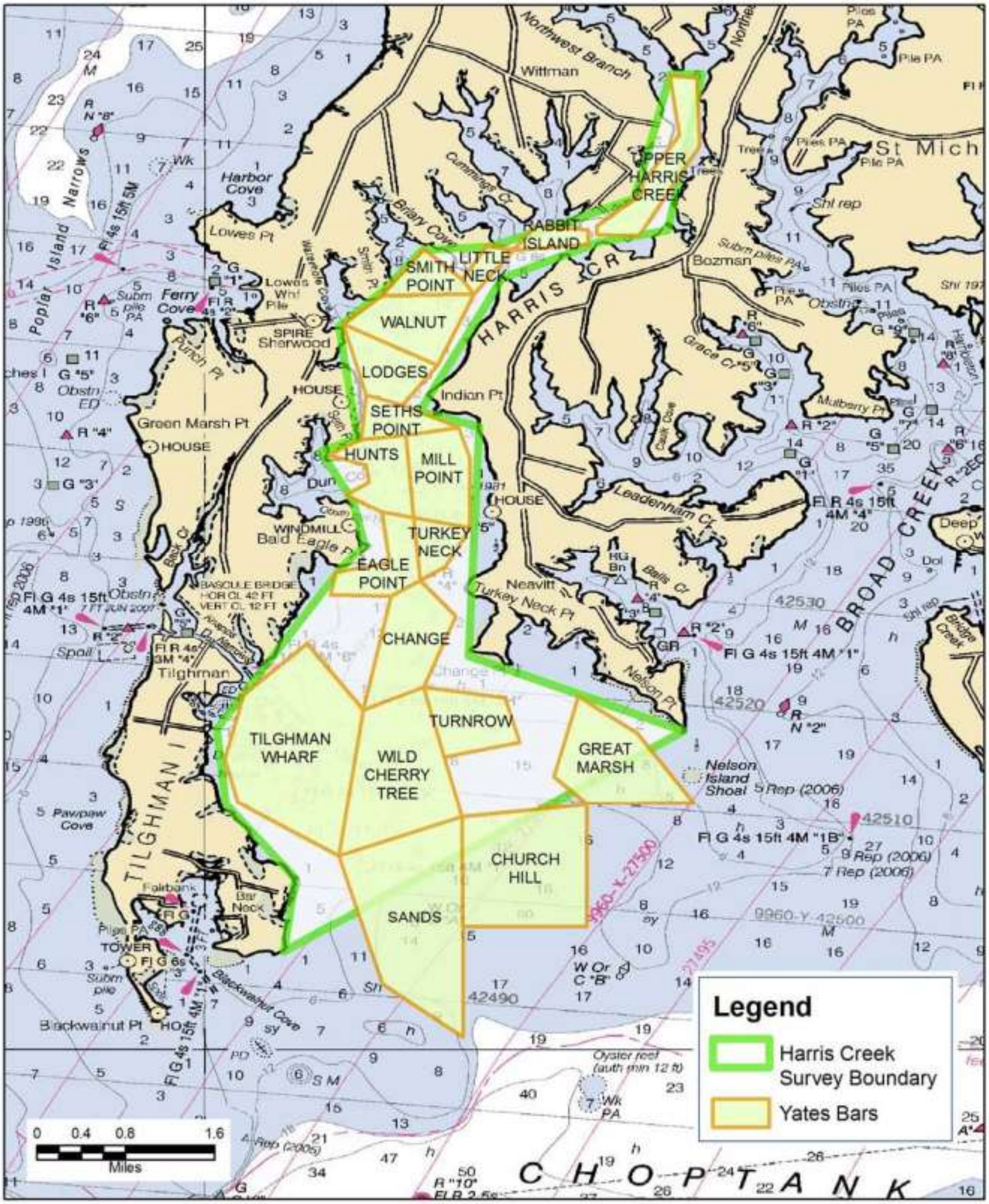



**Figure 10: Location of historic Yates Bars in Harris Creek**

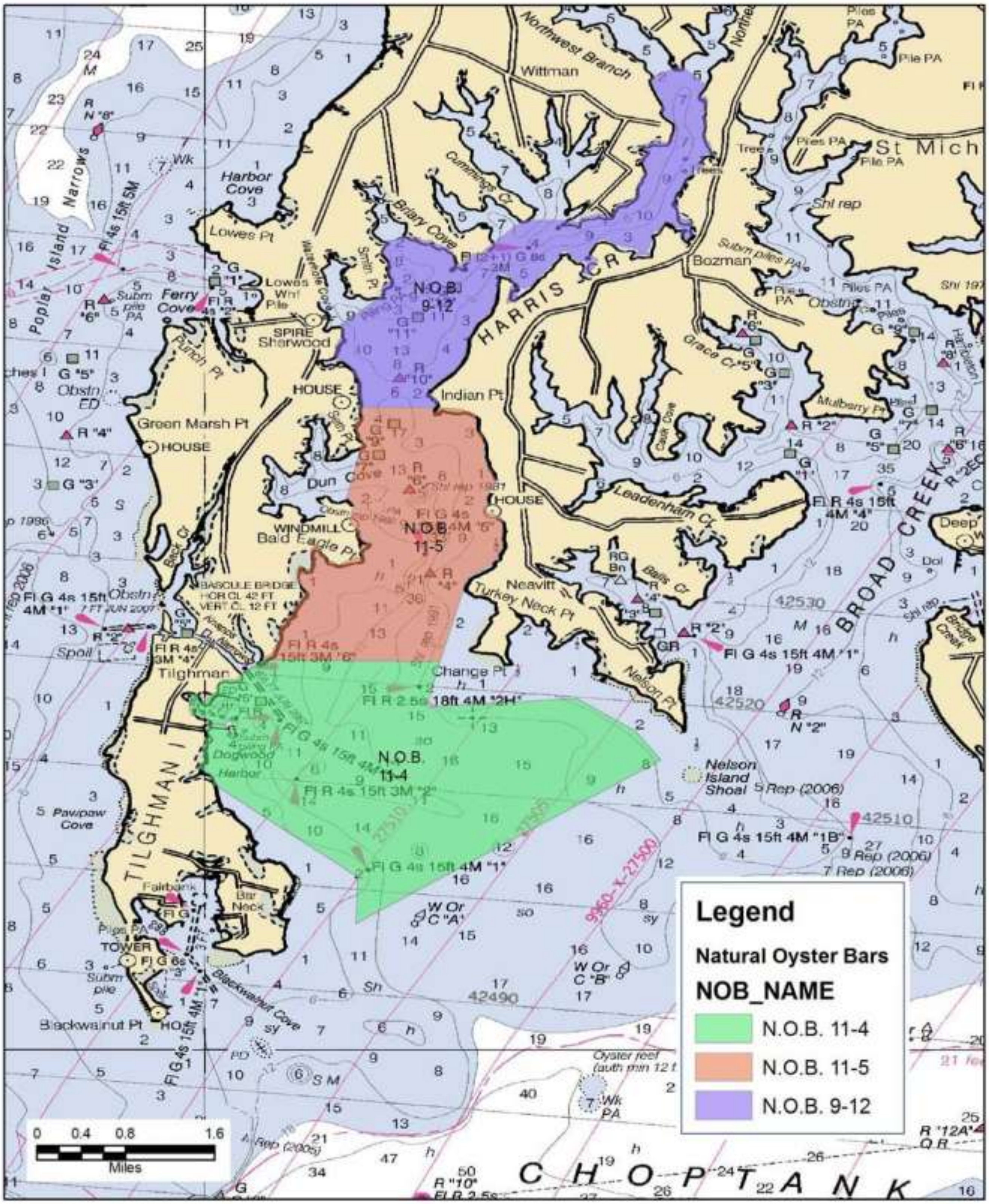



**Figure 11: Natural Oyster Bars in Harris Creek**

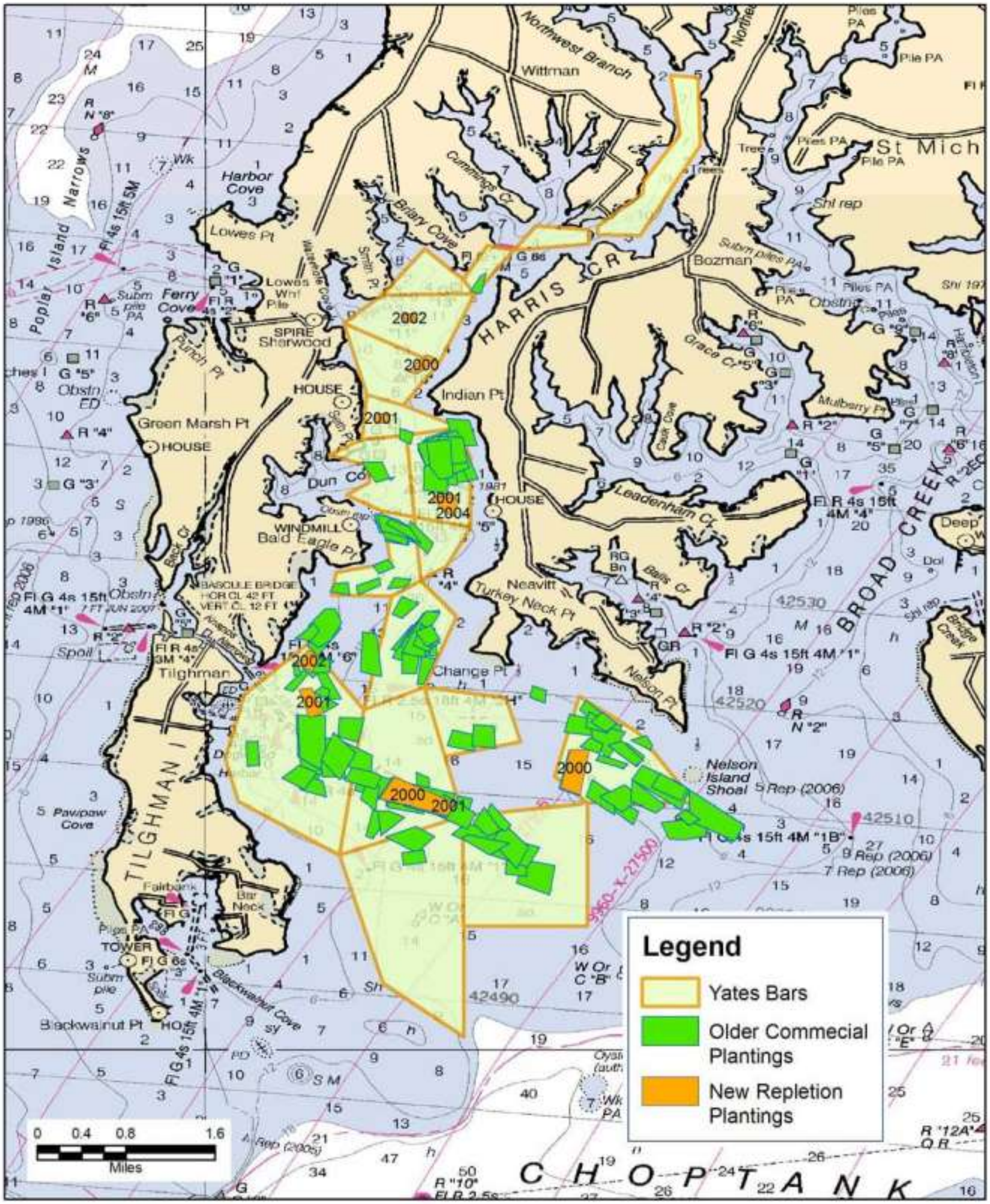



**Figure 12: Oyster repletion plantings in Harris Creek**

## Reference

[1] SMITH, G.F., K.N. GREENHAWK, D.G. BRUCE, E.B. ROACH AND S.J. JORDAN. 2001 A DIGITAL PRESENTATION OF THE MARYLAND OYSTER HABITAT AND ASSOCIATED BOTTOM TYPES IN THE CHESAPEAKE BAY (1974-1983). JOURNAL OF SHELLFISH RESEARCH 20:197-206.

**PREPARED BY:**

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http://www.mgs.md.gov/

**Waterway Users:**
**Registered Boats for Harris Creek**

| hull_id | manufacturer | year | feet | fuel | propulsion_type | motor_type | motor_hp |
|---|---|---|---|---|---|---|---|
| 525836 | IRWIN | 1969 | 31 | DI | IA | OTHER | 30 |
| BWCL7113A888 | BOSTON WHALER | 1988 | 17 | GA | OB | MERCURY | 90 |
| CCUAU002M74 | CHRISCRAFT | 1974 | 22 | GA | IB | OTHER | 260 |
| CCVAU1120474 | CHRISCRAFT | 1974 | 22 | GA | IB | CHEVY | 250 |
| CRSADA93B505 | CRUISERS | 2005 | 27 | GA | IO | VOLVO | 450 |
| CRSADA93B505 | CRUISERS | 2005 | 27 | GA | IO | VOLVO | 450 |
| CSR20102F797 | CORSAIR | 1997 | 24 | GA | OA | TOHATSU | 6 |
| FGBR0466L102 | CHAPARRAL | 2002 | 26 | GA | IO | VOLVO | 320 |
| HQZ00401E212 | COOKS BROTHERS | 2012 | 20 | EL | OT | MINNKOTA | 4 |
| KMEJ2006E303 | C-HAWK | 2003 | 22 | GA | OB | HONDA | 115 |
| MDZ47578H770 | DOWBOAT | 1970 | 12 | GA | OB | JOHNSON | 9.9 |
| MDZ51725E176 | MAKO | 1976 | 20 | GA | OB | YAMAHA | 150 |
| MHP18507M83H | MEL-HART | 1983 | 19 | GA | IO | OTHER | 140 |
| PEA58255M80G | PEARSON | 1980 | 32 | DI | IA |  | 22 |
| PIOGP648I405 | SEAPRO | 2005 | 21 | GA | OB | YAMAHA | 150 |
| PLF86774H586 | PLAYCRAFT | 1986 | 24 | GA | OB | EVINRUDE | 90 |
| PXMKG240I394 | PARKER | 1994 | 25 | GA | OB |  | 225 |
| PXMKH428F102 | PARKERMARN | 2002 | 25 | GA | OB | YAMAHA | 225 |
| SSUL6107G203 | PURSUIT | 2003 | 26 | GA | OB | YAMAHA | 400 |
| STA31403J203 | STAMAS YACHTS | 2003 | 31 | GA | OB | YAMAHA -T/225 | 450 |
| TRBX1403D303 | TRIUMPH | 2003 | 20 | GA | OB | HONDA | 130 |
| YDV12347B010 | BOMBARDIER | 2010 | 11 | GA | IB | ROTAX | 260 |
| YDV15981D010 | BOMBARDIER | 2010 | 11 | GA | IB | ROTAX | 260 |
| 010318 | OUACHITA | 1970 | 10 | GA | OB |  | 6 |
| 0503M73F | AQUASPORT | 1973 | 22 | GA | OB |  | 115 |
| 113-4 | MUSTANG | 1969 | 17 | GA | OA |  | 3 |
| 123825 | OWENS | 1961 | 27 | GA | IB | CHEVY | 220 |
| 26A06538 | OWENS | 1968 | 26 | GA | IB |  | 200 |
| ASPE4522F787 | AQUASPORT | 1987 | 20 | GA | OB |  | 150 |
| BTY261980473 | BRISTOL | 1973 | 26 | GA | OA |  | 9.9 |
| BWCAD303J899 | BOSTON WHALER | 1999 | 23 | GA | OB | MERCURY | 225 |
| BWCN8336B797 | BOSWHALER | 1997 | 17 | GA | OB | HONDA | 90 |
| CAB462060277 | CAL | 1977 | 46 | DI | IA | PERKINS | 85 |
| CNPW4235B888 | COLEMAN | 1988 | 11 | GA | OB | JOHNSON | 4 |
| FGBL6226K889 | CHAPARRAL | 1989 | 19 | GA | IO | MERC | 200 |
| FGBY0401B606 | CHAPARRAL | 2006 | 25 | GA | IO | VOLVO | 280 |
| HGZ09312E999 |  | 1999 | 15 | GA | OB | EVINRUDE | 4.5 |
| JBL32378J899 | ALUMA WELD | 1999 | 14 | GA | OB | HONDA | 15 |
| KME02231F686 | C-HAWK | 1986 | 25 | GA | OB | EVINRUDE | 225 |
| MCK45511A292 | MCKEECRAFT | 1992 | 14 | GA | OB | HONDA | 35 |
| MD6475N | MFG | 1959 | 17 | GA | OB |  | 15 |
| MDZ32391B393 | CUSTOM | 1993 | 36 | GA | IB | CHEVY | 350 |
| MDZ44027E129 | CUSTOM | 1929 | 40 | GA | IB |  | 8 |
| PCW15867C606 | PRECISION | 2006 | 15 | OT | SO |  | 7.5 |
| SERT6025B505 | SEARAY | 2005 | 30 | GA | IO | MERCRUISER | 600 |
| SLPGC157G203 | SCOUT BOATS INC | 2003 | 20 | GA | OB | YAMAHA | 150 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SUG240124D | CHRISCRAFT | 1964 | 24 | GA | IB | CHEVY | 260 |
| TRJKJ033B787 | TROJAN | 1987 | 37 | DI | IB | CRUSADER | 700 |
| UAQRK22704G203 | BRIG INFLATIBLE | 2003 | 10 | GA | OB | MERCURY | 6 |
| XDCC5514K001 | ZODIAC. | 2001 | 7 | GA | OT | | 1 |
| XDYB27320373 | O'DAY | 1973 | 14 | GA | OA | | 2 |
| 1382368 | KENNER | 1969 | 23 | GA | OA | MERCURY | 6 |
| AVB061BZJ506 | AVON | 2006 | 10 | GA | OB | | 5 |
| AVB77289B989 | AVON | 1989 | 9 | GA | OB | NISSAN | 5 |
| B025169 | BEETLE | 1969 | 11 | GA | OB | EVINRUDE | 2 |
| BL2A56MLB191 | MAXUM | 1991 | 25 | GA | IO | MERCRUISER | 212 |
| BWCH6800M84B | BOS WHALER | 1984 | 17 | GA | OB | | 75 |
| BWCJ1154M82G | BOS WHALER | 1982 | 13 | GA | OB | | 40 |
| CLC12316G192 | CELEBRITY | 1992 | 23 | GA | OB | JOHNSON | 200 |
| CROAM311D797 | ROBALO | 1987 | 21 | GA | OB | MERCURY | 200 |
| CXA280276T | CHRISCRAFT | 1961 | 28 | GA | IB | | 190 |
| DMA01997A000 | EDGEWATER | 2000 | 19 | GA | OB | HONDA | 90 |
| FGE92003F001 | COLBALT | 2001 | 29 | GA | IO | VOLVO | 500 |
| GLKG0747H900 | GLACIER | 2000 | 26 | GA | OB | SUZUKI | 300 |
| HWSL6052G394 | SABREYACHT | 1993 | 36 | DI | IB | CATERPILLAR | 600 |
| HWSX6129J001 | SABRE YACHT | 2001 | 36 | DI | IB | | 700 |
| JBC31377G899 | MERCURY | 1999 | 16 | GA | OB | | 25 |
| JON23132C101 | KINNAMON | 2001 | 32 | DI | IB | JOHN DEERE | 225 |
| JON23336E101 | KINNAMON | 2001 | 36 | GA | IB | CHEVY | 180 |
| JON29132F707 | KINNAMON | 2007 | 32 | DI | IB | VOLVO | 165 |
| KWECA151D797 | KEY WEST | 1997 | 20 | GA | OB | MARINER | 115 |
| KWECA151D797 | KEY WEST | 1997 | 20 | GA | OB | MARINER | 115 |
| LAR15750B888 | LARSON | 1988 | 21 | GA | IO | | 165 |
| LHRPC109E405 | LUHRS | 2005 | 42 | DI | IO | CUMMINS | 1160 |
| LHRT3069A595 | LUHRS | 1995 | 32 | GA | IB | MARINE POWER | 680 |
| MDZ31980F090 | CUSTOM | 1990 | 26 | GA | IB | CHEVROLET | 150 |
| MDZ48039E075 | SKIPTON | 1975 | 16 | GA | OB | TOHATSU | 9.8 |
| MDZ50560D808 | CUSTOM | 2008 | 16 | GA | OB | HONDA | 5 |
| MIX90003H203 | MARITIME | 2003 | 23 | GA | OB | SUZUKI | 140 |
| MMC22255G000 | MARSHALL M | 2000 | 22 | DI | IA | YANMAR | 18 |
| MRK0250GH596 | MAKO | 1996 | 24 | GA | OB | YAMAHA | 225 |
| MRKA0708F990 | MAKO | 1990 | 17 | GA | OB | MERCURY | 85 |
| NTLBC265H687 | GRADYWHITE | 1987 | 19 | GA | OB | YAMAHA | 150 |
| NTLSC420A111 | GRADY WHITE | 2011 | 20 | GA | OB | YAMAHA | 200 |
| NTLSC420A111 | GRADY WHITE | 2011 | 20 | GA | OB | YAMAHA | 200 |
| PLC00160D686 | PRO-LINE | 1986 | 20 | GA | OB | SUZUKI | 140 |
| SCB15912M81H | SKEE CRAFT | 1981 | 15 | GA | OB | | 9 |
| SDB00012H404 | STUR DEE BOAT CO | 2004 | 14 | GA | OA | HONDA | 2 |
| SDB00012H404 | STUR DEE BOAT CO | 2004 | 14 | GA | OA | HONDA | 2 |
| SERR1454G900 | SEARAY | 2000 | 18 | GA | IO | MERCRUISER | 135 |
| SERT9093G607 | SEARAY | 2007 | 38 | GA | OB | MERCRUISER | 740 |
| SSUS1668H001 | S2 YACHTS | 2001 | 32 | GA | IB | CRUSADER - T/320 | 640 |
| TPP001450476 | TOPAZ | 1976 | 28 | GA | IB | MARINE POWER | 350 |
| XDYD8225M76K | O DAY | 1976 | 17 | GA | OA | | 4 |
| YSIH0647J708 | SAILFISH | 2008 | 21 | GA | OB | YAMAHA | 150 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ZZN35272E000 | SEA DOO | 2000 | 10 | GA | IB | ROTAX | 130 |
| ZZN35296D404 | SEA DOO | 2004 | 11 | GA | IB | SEA DOO | 155 |
| 299761 | CUSTOM | 1964 | 37 | GA | IB | OLDSMOBILE | 200 |
| 3A3809 | FISHPIERCE | 1971 | 16 | GA | OB | EVINRUDE | 70 |
| 3A3809 | FISHPIERCE | 1971 | 16 | GA | OB | EVINRUDE | 70 |
| ALC2F985B787 | MARIMETTE | 1987 | 32 | GA | IB | | 20 |
| ALC811320774 | MARINETTE | 1974 | 28 | GA | IB | CHRYSLER | 275 |
| AQABGA08G102 | AQUASPORT | 2002 | 28 | GA | OB | YAMAHA | 400 |
| AUL28663C202 | ALBIN MARINE | 2002 | 28 | DI | IB | CUMMINS | 370 |
| AVB90078B090 | AVON INFL | 1990 | 9 | GA | OB | EVINRUDE | 7 |
| BLBA15ESI697-1 | BAYLINER | 1997 | 33 | GA | IB | | 520 |
| BRD00022G411 | BROAD CREEK MARINE | 2011 | 32 | GA | IB | MARINE POWER | 350 |
| BWCM6103K889 | BOS WHALER | 1989 | 17 | GA | OB | MERCURY | 90 |
| BXL360031080-1 | P&M WORLD WIDE | 1982 | 36 | DI | IA | YANMAR | 30 |
| EHRTF002H797 | HORIZON BO | 1997 | 23 | DI | IB | YANMAR | 9 |
| EVR38302G702 | EVANS | 2002 | 38 | GA | OB | | 0.01 |
| GBX22103A195 | GENERAL BT | 1995 | 22 | GA | OA | | 8 |
| HAMP3760I001 | HARRIS/KAYOT | 2001 | 24 | GA | OB | JOHNSON | 70 |
| IMDMB222J000 | MATHEWS BROS | 2000 | 23 | DI | IB | YANMAR | 100 |
| JON21332H999 | KINNAMON | 1999 | 32 | DI | IB | JOHN DEERE | 225 |
| LWN7758DM84B | LOWE IND | 1984 | 18 | GA | OB | EVINRUDE | 15 |
| M38010 | MORGAN YCHTS | 1969 | 38 | DI | IB | WESTERBEKE | 37 |
| MD2137BB | CUSTOM | 1960 | 35 | GA | IB | | 250 |
| MD4150F | FISHPIERCE | 1961 | 13 | GA | OB | | 18 |
| MDZ46637E1UK | CUSTOM | 9999 | 16 | GA | OB | JOHNSON | 15 |
| MDZ46643G466 | UNKNOWN | 1966 | 16 | GA | OB | JOHNSON | 6 |
| MRKC4236A686 | MAKO | 1986 | 17 | GA | OB | JOHNSON | 70 |
| MRKE2651K788 | MAKO | 1988 | 21 | GA | OB | YAMAHA | 150 |
| MXYA17YBI900 | MAXUM | 2000 | 39 | GA | IB | MERCRUISERS | 760 |
| NTLD0496M78J | GRADYWHITE | 1978 | 18 | GA | OB | UNKNOWN | 115 |
| NTLFR414E011 | GRADYWHITE | 2011 | 25 | GA | OB | YAMAHA | 350 |
| OMCE2731E595 | OUTBOARD MARINE | 1995 | 20 | GA | OB | JOHNSON | 70 |
| PIOFS366B101 | SEAPRO | 2001 | 20 | GA | OB | YAMAHA | 150 |
| PXM34525K011 | PARKERMARN | 2011 | 23 | GA | OB | YAMAHA | 250 |
| SERR5022C696 | SEA RAY | 1996 | 18 | GA | IO | | 135 |
| SERV5653E303 | SEA RAY | 2003 | 24 | GA | IO | SEARAY | 260 |
| SHA27124I001 | SHAMROCK | 2001 | 27 | DI | IB | YANMAR | 300 |
| SHA29159F102 | SHAMROCK | 2001 | 29 | GA | IB | PCM - T/320 | 640 |
| STNAN146C404 | SILVERTON | 2004 | 40 | GA | IB | CRUSADER | 750 |
| STRB98TEE696 | STARCRAFT | 1996 | 16 | GA | OB | MARINER | 25 |
| WEN05121A686 | WENZEL | 1986 | 14 | GA | OB | | 15 |
| WEN05121A686 | WENZEL | 1986 | 14 | GA | OB | | 15 |
| WH006846I495 | WAHOO | 1995 | 20 | GA | OB | MERCURY | 200 |
| WMPZ9554K708 | WST MARINE | 2008 | 9 | GA | OB | HONDA | 5 |
| XKX24028C808 | SEAWAY BOATS | 2008 | 24 | GA | OB | HONDA | 135 |
| YDV10909A505 | BOMBARDIER | 2005 | 11 | GA | OT | ROTAX | 155 |

**Total 142 registered boats**

**Public Comments:**

**Public Meeting March 2012:**

**Attendance 37 people 10 comments**

## Oyster Open House – St. Michaels, MD March 21, 2012
## Please Sign in

| Name | Address | Phone number | Email address |
|---|---|---|---|
| Bill Wolinski | 215 Bay St. Suite 6 Easton 21601 | 410 770 - 8169 | [illegible] |
| ERIK ZLOKOVITZ | MDDNR | 410-26-2324 | |
| Hillary Lane | UMD | 301 - 405 - 9201 | hlane12@umd.edu |
| Adriane Michaelis | UMD | 301 - 405 - 9701 | amichael@umd.edu |
| S. Allen | ORP | 443 994 5164 | sallen@oysterrecovery.org |
| Drew Koslow | 23 N Harrison St Easton, MD | 443-385-0511 | [illegible] |
| R AMDUR | P.O. Box 149 BOZMAN | | |
| S. Chaneson | 22500 Indian Pt. Rd BOZMAN MD 21612 | | |
| C. Judy | dnr. . . . . | 410 260 8257 | |
| [illegible] | [illegible] | [illegible] | |
| [illegible] | New Smyrna Beach Florida | 305-304-0500 | |
| Norm Franck | [illegible] | 410-745-9521 | |
| ERIC APPLEGARTH | CBMM | | |

# Oyster Open House – St. Michaels, MD March 21, 2012
## Please Sign in

| Name | Address | Phone number | Email address |
|---|---|---|---|
| Joe Fahrer | P.O. Box 68 Snow Hill | 410 632 3741 | jfahrer@ [illegible] |
| Jeff Harrison | 21404 Wharf Rd | 410 886-2413 | harrison2413@verizon.net |
| Robin Harrison | 21404 Wharf Rd | 410-886-2413 | harrison2413@verizon.net |
| Heather Epkins | Annapolis MD | 4438717131 | hepkins@oysterrecovery.org |
| Andrew Naumann | 2712 Old Ocean City RD Salisbury MD | 443 357 7883 | anaumann01@gmail.com |
| Megan Fletcher | 111 Linda Dr. C3 Fruitland MD 21826 | 3018349776 | independent_woman_84@yahoo.com |
| Frank DiGialleonardo | 309 QUAIL RUN DR CENTREVILLE MD 21617 | 4107584806 | franardo@gmail.com |
| M/M WARREN MARTON | 9816 Martingham Circle St. Michaels | 410-745-9509 | billiejane@atlanticbb.net |
| Carol McCollough | PO Box 122 Tilghman, MD 21671 | 410-886-9200 | oysters@pwee.org |
| Lynn Fegley | ANNAPOLIS Md | 410-260-8285 | lfegley@dnr.state.md.us |
| Kathy Bosin | PO Box 778 St Michaels | 443-205-2828 | kathy@fishingcreek.com |
| Steve Droter | 1525 Corsica Neck Rd Centreville | 202-413-4703 | sdroter@chesapeakebay.net |
| DouG Legum | 8207 MAPLE RIDGE RD | | Douglegum@AOL.com |

## Oyster Open House – St. Michaels, MD March 21, 2012
## Please Sign in

| Name | Address | Phone number | Email address |
|---|---|---|---|
| Larry Jennings | Silver Spring 507 Apple Grove Rd | 301-754-2654 | larryjennings@comcast.net |
| Margarette Jennings | | 301-754-0441 | |
| [illegible] | Tilghman | 410 886-2276 | dlmcquay@Gmail |
| Elizabeth North | Easton, MD | 410-221-8497 | enorth@umces.edu |
| Steve Schneider | Easton, MD | 410-310-0574 | sschneider@dnr.state.md.us |
| [illegible] | Bozman | 4 — | — |
| David [illegible] | Cambridge | — | — |
| Sam Webster | St Michaels | 410-745-2414 | |
| Kristin Buter | Tilghman | 410-886-9200 | phillipswharfec@gmail.com |
| Rob Bowen | Tilghman | 410-310-9064 | wrbowen@verizon.net |
| Arnold Peterson | Bozman | 410 745-3466 | apeterson@atlanticbb.net |
| | | | |
| | | | |

**The general public comment was positive and supportive of oyster restoration. One comment of concern on concrete or rock size being too large and crab trot lines might be caught on the rock, another concern for a community pier having access. MD DNR Fisheries, Mike Naylor will guarantee all of the rock to be in small pieces and the community pier is not near any project area.**

**Harris Creek Waterway User Meeting:**

Meet concerning the navigation issues involving the Harris Creek aquaculture restoration project. I believe we can narrow the true issues and hopefully have solutions to the navigation concerns raised. If you are able to attend please let me know.

Meeting Place: Boating Services Conference Room,
E-4, Tawes Building
580 Taylor Ave, Annapolis, MD
21401

Date and Time: 12:30, 18 December, 2012

Thank You,

John Gallagher
Director
Hydrographic Operations
Boating Services
MD DNR
(410) 643-1179
(443) 543-9610

In attendance: MD DNR Boating Services - Mark O'Malley, John Gallagher, Louis Wright, Ann Williams MD DNR Fisheries – Mike Naylor; USCG Baltimore - Paul Curtis, Stephanie Morrison; Army Corp of Engineers Baltimore – Steve Brown.

Thanks everyone for attending our meeting on the Harris Creek's Restoration Project.
Action Items:

- Tally Comments and concerns for the 45 proposed areas (Stephanie Morrison)
- Research the possibility of transferring all navigational aids in Harris Creek except #2 to the State of Maryland. (Stephanie Morrison)
- Compile information from the public user group meetings that have been done to date, tabulating any concerns or issues and methods to address them. (Mike Naylor)
- Request detailed information from states registered boat database for Harris Creek to determine average draft of waterway users (Ann Williams)
- Develop a shape of a designated channel for Harris Creek by connecting between navigational aids and using best navigational practices in the other areas. (Ann Williams will work with Albert Grimes)
- Buffer the designated channel by 150 feet. Clip all proposed project areas by the buffered designated channel. (Ann Williams)
- Develop a new list of proposed restoration sites modify the site spreadsheet provided to address areas that propose exceeding the 6 foot MLW height restriction and include new calculations for all changed sites. (Mike Naylor)
- Present this new package and associated GIS files to USCG for final approval. (Mike Naylor)

Recommendations:

- Permit should not include request for reef balls.
- Modification to existing navigational marking #2 if transferring waterway to the state is not possible. (Either adding 2A or moving 2 out to accommodate significant reef area #34.)

- As this is one of many proposed restoration areas in Maryland develop a waterway user analysis review process that would include but not be limited to;
    - Number of waterway users (registered and transient).
    - Average draft of waterway users.
    - Develop a database of public comments and concerns for future waterway usage.
    - GIS layer of designated channel

Ann, good afternoon,
Just tried giving you a call. I wanted to follow up with you regarding the deliverables requested. I just got off the phone with our bosses down in D5 to find out what the status was on the requested chart, etc. They said that they were planning to meet with you next week and that would be part of the discussion. Here are my comments regarding the Sites, (which I also previously forwarded to the D5 folks). I haven't heard feedback from them--they (D5) may disagree and their opinion supersedes the below:

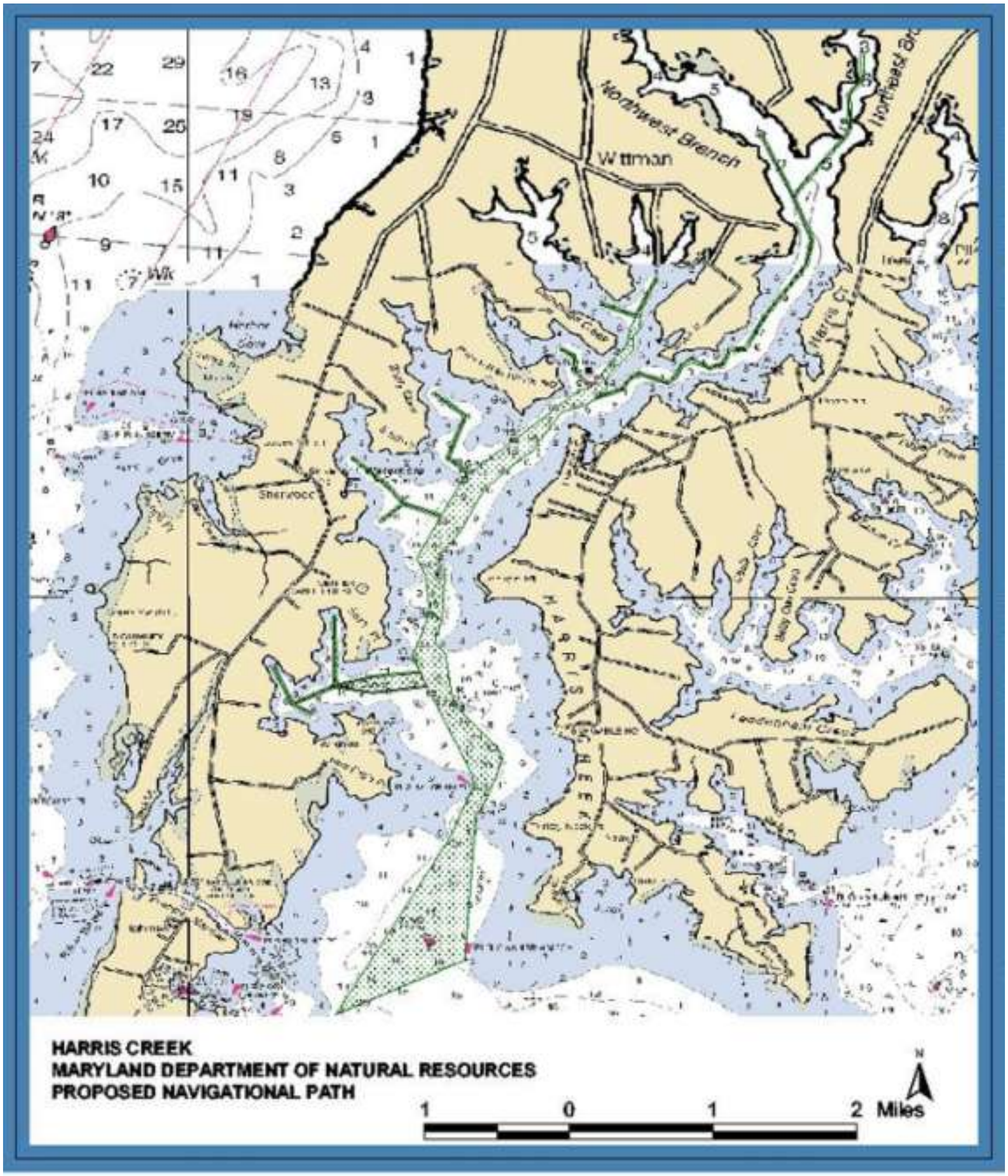
Site 83 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 19 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 32 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 20 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 67 - Location appears to meet Coast Guard requirements.
Site 66 - Location appears to meet Coast Guard requirements.
Site 47 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 22 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye. Reef nearest channel has already been constructed to depth of 8'.
Site 48 - Location appears to meet Coast Guard requirements.
Site 36 - Location appears to meet Coast Guard requirements.
Site 84 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 64 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 27 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" - 12".
Site 37 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" - 12".
Site 63 - Appears to be within 150' of the channel but beyond Northern most aids to navigation.
Site 31 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" to 12".
Site 38 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" to 12".
Site 35 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" to 12".
Site 86 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" to 12".
Site 85 - Within channel limits but beyond Northern most aids to navigation. Will decrease channel depth 6" to 12".
Site 69 - Location appears to meet Coast Guard requirements. MD DNR has already placed spat in the channel in the vicinity of the 6' spot as per the 8' ACOE permit which allowed them to do so.
Site 82 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 45 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 16 - Location appears to meet Coast Guard requirements.
Site 44 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 73 - Location appears to meet Coast Guard requirements.
Site 42 - Appear to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 43 - Location appears to meet Coast Guard requirements.

Site 81 - Location appears to meet Coast Guard requirements.
Site 53 - Unable to accurately determine distance by eye.
Site 58 - Location appears to meet Coast Guard requirements.
Site 41 - Location appears to meet Coast Guard requirements. Close to 150'.
Site 80 - Location appears to meet Coast Guard requirements with the exception of the Southern-most portion.
Site 55 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 9 - Appears to be within 150' of the channel. Unable to accurately determine distance by eye.
Site 40 - Location appears to meet Coast Guard requirements with exception of eastern-most tip which appears to be within 150' to channel.
Site 39 - Location appears to meet Coast Guard requirements.
Site 77 - Location appears to meet Coast Guard requirements, however, mariners cutting into Knapps Narrows may encounter reef.
Site 76 - Location appears to meet Coast Guard requirements, however, mariners cutting into Knapps Narrows may encounter reef.
Site 78 - Location appears to meet Coast Guard requirements, however, mariners cutting into Knapps Narrows may encounter reef.
Site 33 - Location appears to meet Coast Guard requirements, however, mariners cutting into Knapps Narrows may encounter reef.
Site 68 - Location appears to meet Coast Guard requirements, however, mariners cutting into Knapps Narrows may encounter reef.
Site 34 - Looks to be largest site. MD DNR request to move aid #2 or add a #2a to shift the channel to the West. If aid is moved, site will meet Coast Guard requirements.
Site 71 - Inside channel unless aid #2 is moved.

Thanks and hope you enjoyed the holidays!

Respectfully,
-Steph

LCDR Stephanie Morrison
U.S. Coast Guard Sector Baltimore
Chief, Waterways Management Division
(410) 576-2519



Northwest Branch
Wittman
Sherwood
Leadenham Creek
HARRIS CREEK
MARYLAND DEPARTMENT OF NATURAL RESOURCES
PROPOSED NAVIGATIONAL PATH
1 0 1 2 Miles

**Public Meeting Feb 2013:**
**Comment period will close on March 21, 2013 as of March 6 2013, 60 people attended the public meeting about 10 comments have been entered to the record. There are no direct navigational issues with the project.**

# Joint Public Notice

MDE

U.S. Army Corps of Engineers
Baltimore District

In Reply to Application Number
CENAB-OP-RMN (MD DNR Fisheries - Harris Creek Oyster Restoration) 2007-03659
Maryland Tidal Wetlands License # 12-WL-1231

PN 13-03

Comment Period: January 15, 2013 to March 21, 2013

THE PURPOSE OF THIS PUBLIC NOTICE IS TO SOLICIT COMMENTS FROM THE PUBLIC ABOUT THE WORK DESCRIBED BELOW AND TO ANNOUNCE THE DATE OF A CORPS PUBLIC INFORMATION MEETING/MARYLAND DEPARTMENT OF THE ENVIRONMENT PUBLIC INFORMATION HEARING ON THE SUBJECT APPLICATION. AT THIS TIME, NO DECISION HAS BEEN MADE AS TO WHETHER OR NOT AUTHORIZATIONS WILL BE ISSUED. THE CORPS PUBLIC INFORMATION MEETING/MDE PUBLIC INFORMATION HEARING WILL BE HELD:

**Tuesday, February 12, 2013**
**Inclement Weather Date: Tuesday, February 19, 2013**
**6:00 pm to 9:00 pm**
**Easton High School**
**723 Mecklenburg Avenue**
**Easton, Maryland 21601**

The Corps public information meeting/MDE public information hearing provides members of the public the opportunity to present views, opinions, and information which will be considered by the U.S. Army Corps of Engineers, Baltimore District (Corps) and the Maryland Department of the Environment (MDE) in evaluating the permit application. A poster session/display will be available from 6:00 PM to 7:00 PM where project drawings can be reviewed. Agency representatives will also be available to answer questions. From 7:00 PM to 9:00 PM, a project presentation will be given followed by public testimony. A time limit of three minutes per speaker may be set, depending on the number of speakers, to ensure that all interested parties have an opportunity to voice their views.

Anyone who is hearing impaired and/or is non-English speaking; who wishes to attend this public meeting/hearing should notify Mrs. Mary Frazier at the address/telephone number listed near the end of this public notice. All requests for an oral, sign language, or non-English language interpreter must be received by February 1, 2013. To the extent possible and feasible, an interpreter will be provided.

The Corps has received an application for a Department of the Army Permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (33 U.S.C. 1344), to restore natural, self-sustaining, oyster populations and oyster bottom habitat in Harris Creek, Talbot County, Maryland. MDE has also received an application for a Tidal Wetlands License from the Maryland Board of Public Works pursuant to Title 16 of the Environment Article, Annotated Code of Maryland.

## Harris Creek Waterway Phone Survey Results

All **139** boat owners that claim "primary use" of Harris Creek as reported by Maryland Department of Natural Resources - Licensing and Registration were attempted to be reached by phone through the numbers provided on their registration forms. Of these 139, **48** (or **35**%) of the boat owners were contacted and ask a series of questions related to the Harris Creek Waterway and its oyster restoration. The questions and results are as follows:

1. *Project Questions*

a. Are you aware of the Harris Creek Oyster restoration project? Yes/No

**No – 22 boat owners (46%)**
**Yes – 26 boat owners (54%)**

b. Do you have any concerns about this project?

**No – 37 boat owners (77%)**
**Yes – 11 boat owners (23%)**

The following are the responses from the boat owners that said yes:

- yes - covering up oysters and the type of substrate used/ need to bring shell back to MD/ no clams - unusable waters when clam shell is added
- yes - don't think there's a need for that bottom type - they should dredge it
- yes - no concrete - crabber! - no problem with oyster shell - no clam shell - creates unfishable waters
- yes - no large concrete and no clam shells
- yes - thinks the return is not worth the investment
- yes - this person worked at oxford doing seeding (in the 60's) - concerned about substrate being used - reduced depth - save what shell is already there and turn it over - more outreach is needed from DNR to waterman when these types of projects are initiated
- yes - type of substrate - no large concrete - crabber
- yes - type of substrate - nothing large that will affect waterman
- yes - type of substrate (no clams) - unfishable water
- yes - type of substrate and as long as it doesn't affect areas that are already too swallow
- yes - type of substrate being used - no clam shell or concrete - it will impact crabbing

2. *General Questions:*

a. How long have you transited this waterway?

**The average boat owner response for using Harris Creek was 23 years.**

b. In general, do you have any problems safely navigating this waterway? Yes/No

If not, why?

**No – 48 boat owners (100%)**
**Yes – 0 boat owners (0%)**

3. Are there any unnecessary Aids?

**No – 48 boat owners (100%)**
**Yes – 0 boat owners (0%)**

4. In your opinion, are modifications to aids in this navigation system needed to enhance marine safety?

**No – 48 boat owners (100%)**
**Yes – 0 boat owners (0%)**

Vessel Draft?

**The vessel draft was also calculated. Of the 139 boat owners, 30 boat drafts were unable to be determined (draft was either reported by owner or researched and recorded by MD DNR).**

**Average – 2 ft**
**Minimum – .5 ft**
**Maximum – 5 ft**

How often do you transit Harris Creek?

**Daily – 4**
**Weekly – 27**
**Monthly – 16**
**N/A – 1**

Time of transit?

**Daytime – 45**
**Evening (After 5p.m.) - 0**
**Both – 2**
**N/A – 1**

Navigational equipment most used while transiting? (note: there may be more than one answer from each boat owner)

**Compass – 15**
**GPS – 33**
**Depth Finder – 32**
**RADAR – 1**
**None/N/A – 8**

**Recommendations and Analysis:**

Harris Creek main stem is less than 8 miles long. The channel depth ranges from 3 meter to 7 meters deep. There are no major shipping concerns in the creek; it is primarily used for recreational boaters and commercial watermen. The average draft of the registered vessels on the creek is 4 foot. There are two Federally maintained channels in the area Dogwood Harbor and Knapp's Narrows. Knapp's Narrows has the largest amount of commercial activity in the area and has a reported depth of five feet. Dogwood Harbor is the furthest away from the project areas and has a reported depth of 7 feet.

Oyster restoration adds a significant value to the environment from water quality improvements to habitat restoration for all the aquatic life. The improved habitat will attract fishermen, crabbers, water enthusiasts and the general boat community.

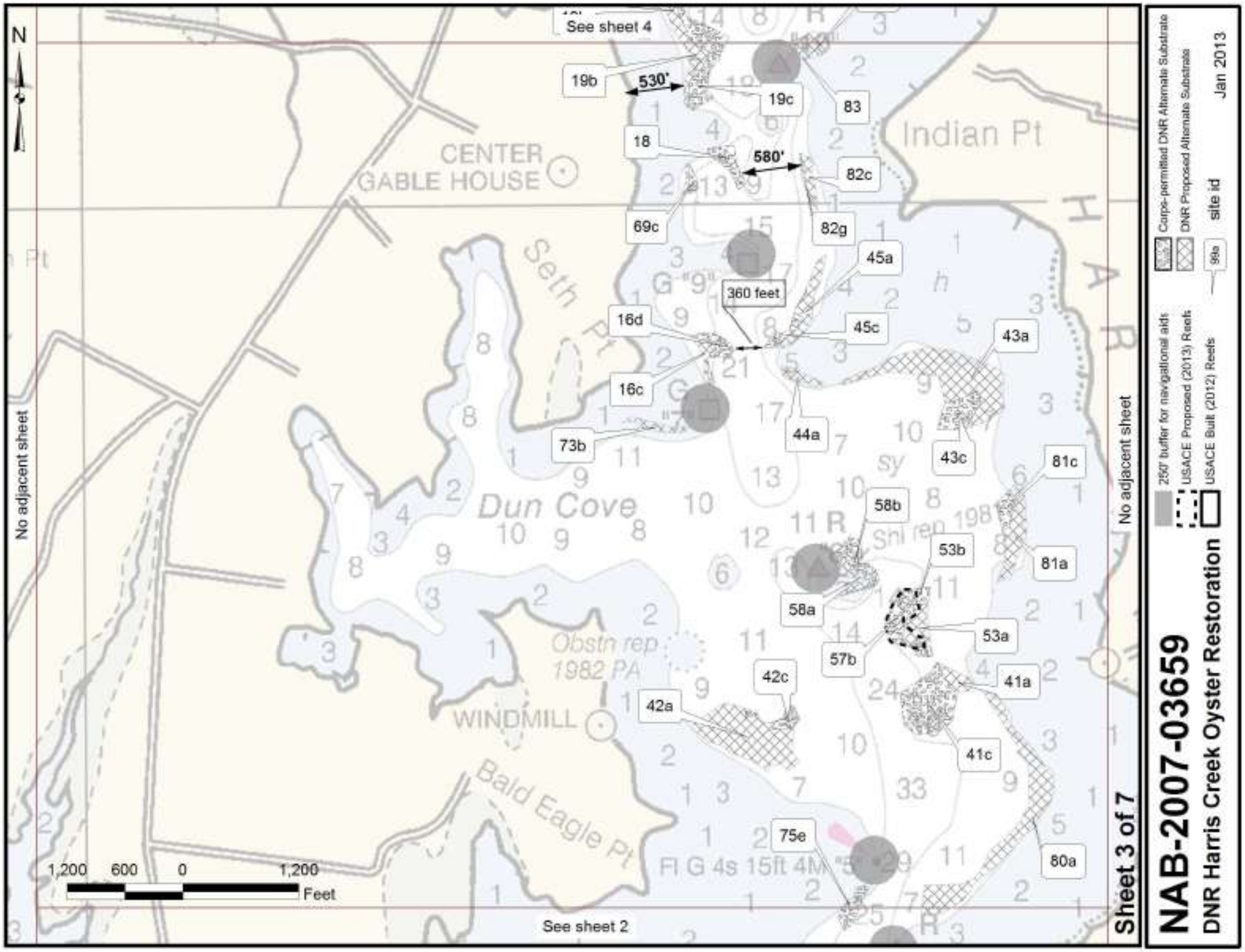
**The recommendations for the oyster restoration projects in Harris Creek are:**

The applicant proposes, in accordance with the attached plans, to deposit, in various locations within Harris Creek, totaling approximately 184 acres within areas comprised wholly of existing Maryland State designated Natural Oyster Bars (NOBs), approximately 307,798 cubic yards oyster shell, clam shell, or stone to a maximum depth of 12 inches with additional 1 inch of oyster spat on shell (seeded with eastern oyster, *Crassostrea virginica)* Maryland grown spat, at a density of 5 million spat per acre. Therefore, in total, 13 inches is proposed as the overall depth of deposited materials, including the oyster spat on shell. Post construction, final vertical clearances of no less than 5 feet MLLW (Mean Lower Low Water) will exist in the project areas.

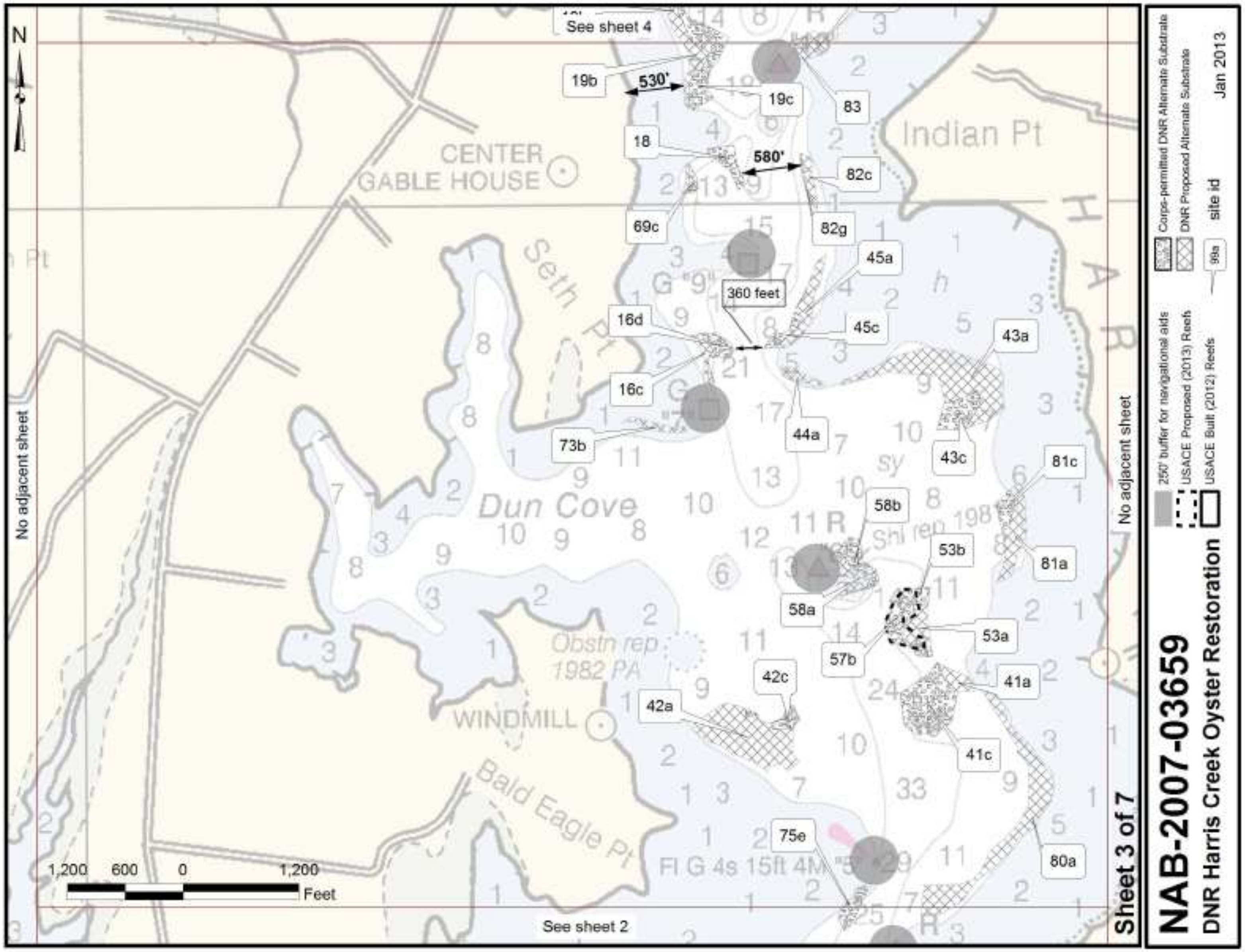
Special conditions:

- Establishment of plantings to remain a minimum of 250 feet from established Federal Aids to Navigation to allow for safe navigation and accessibility of servicing units.
- Plantings remain a minimum of 150 feet outside / shoreward of Federal Project Channels as listed on the USACE web site.
- Where no Federal Project Channel exists plantings shall remain outside/shoreward of the agreed navigational path.

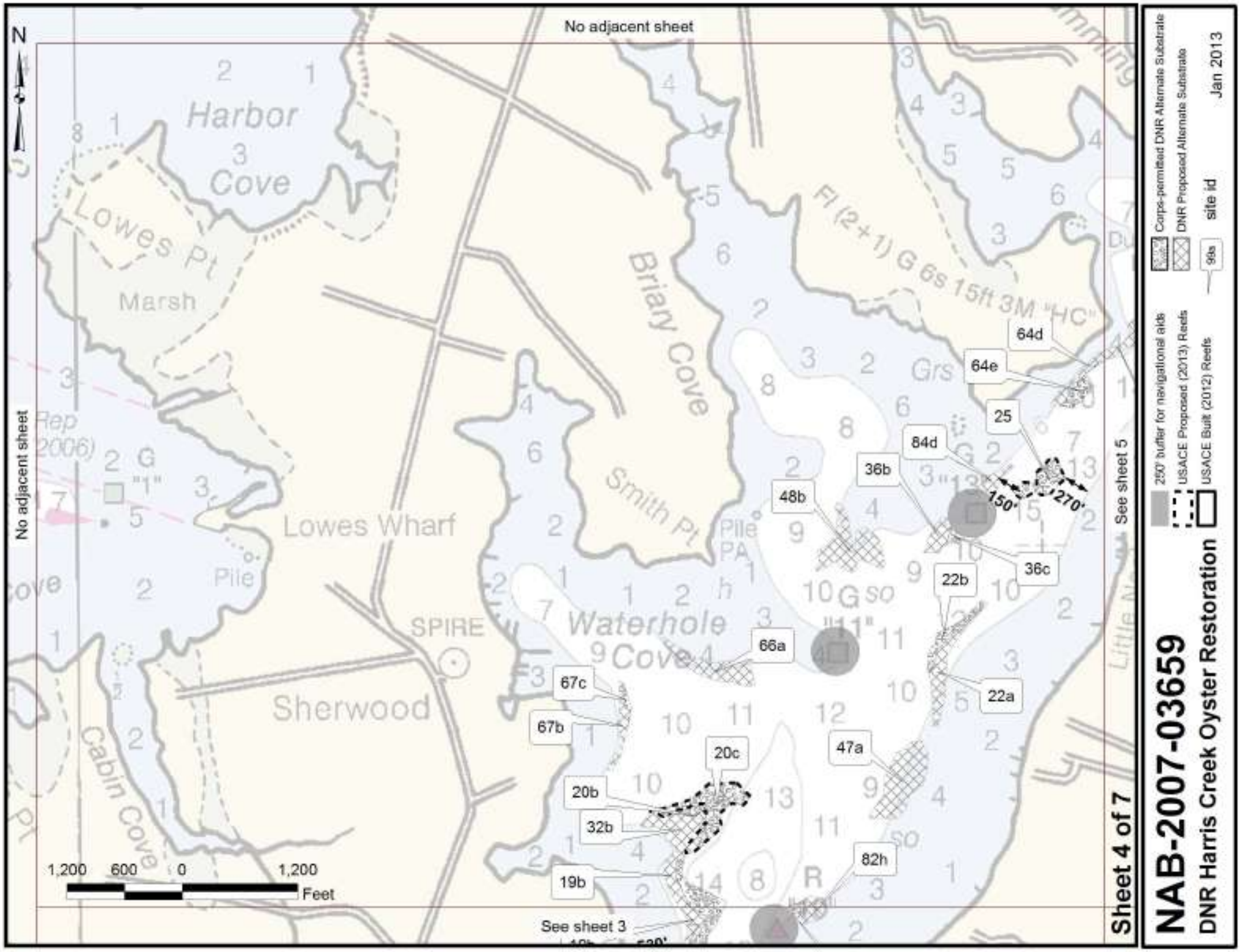
Enclosures A:



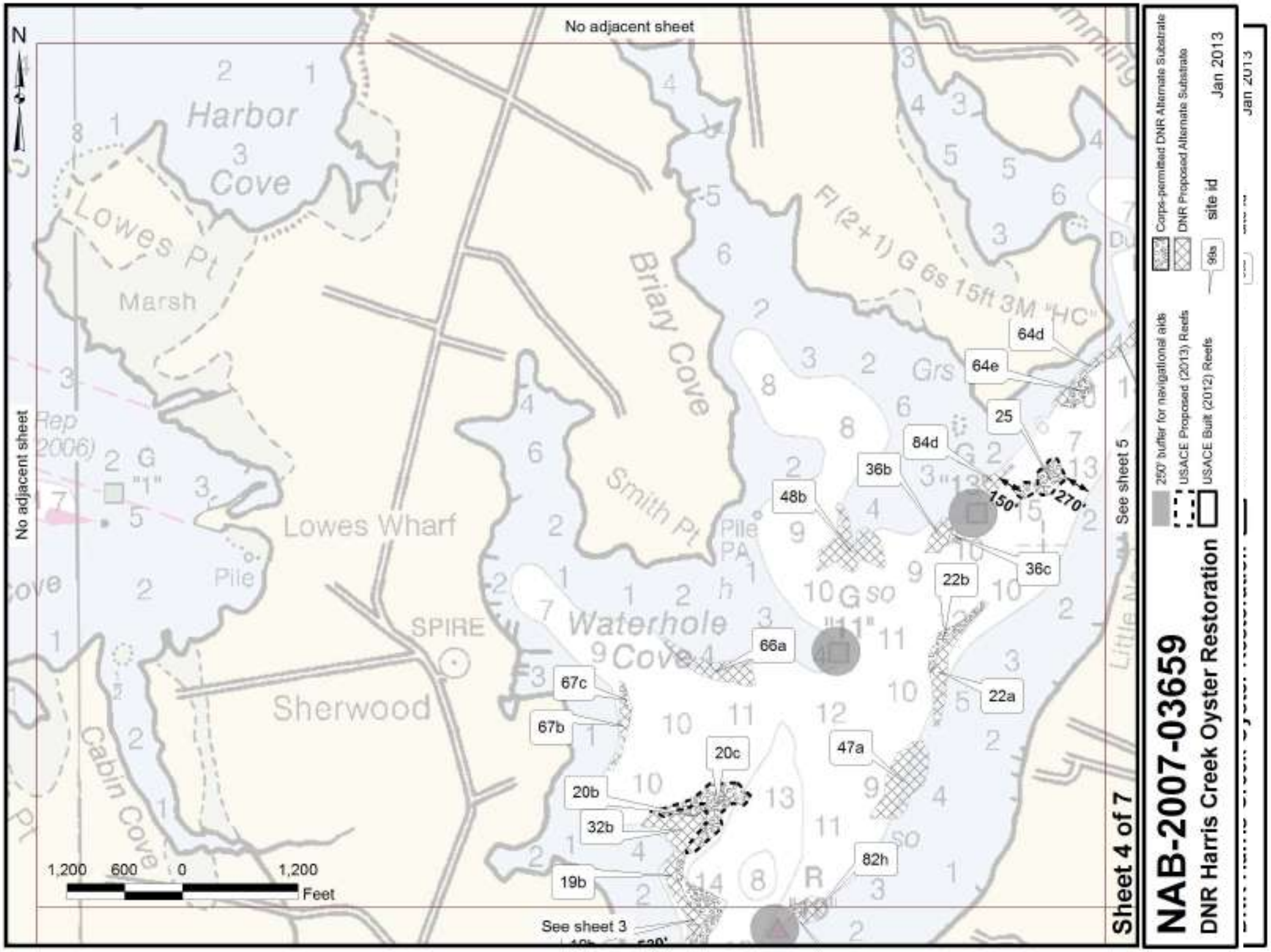
Enclosures B:



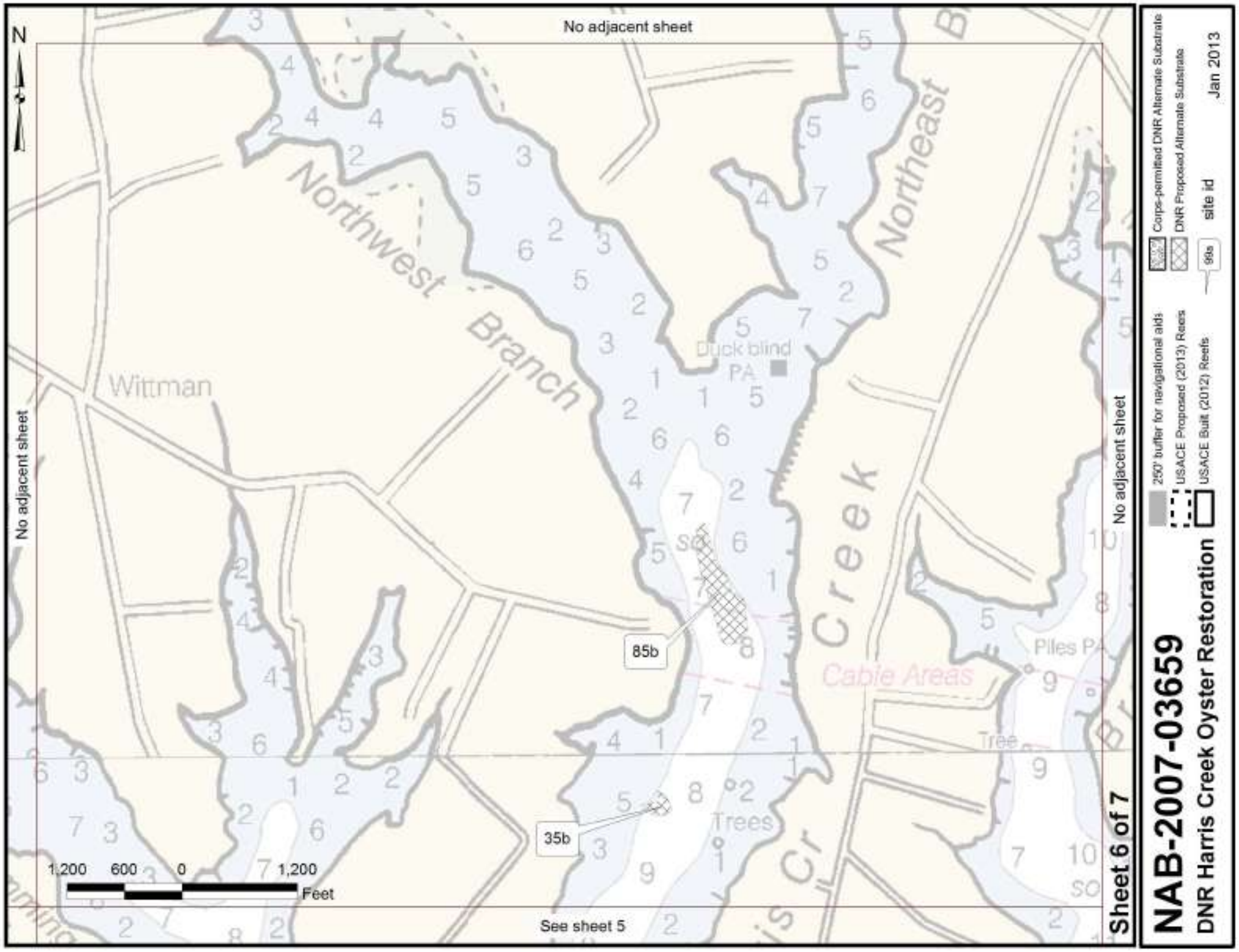
Enclosures C:



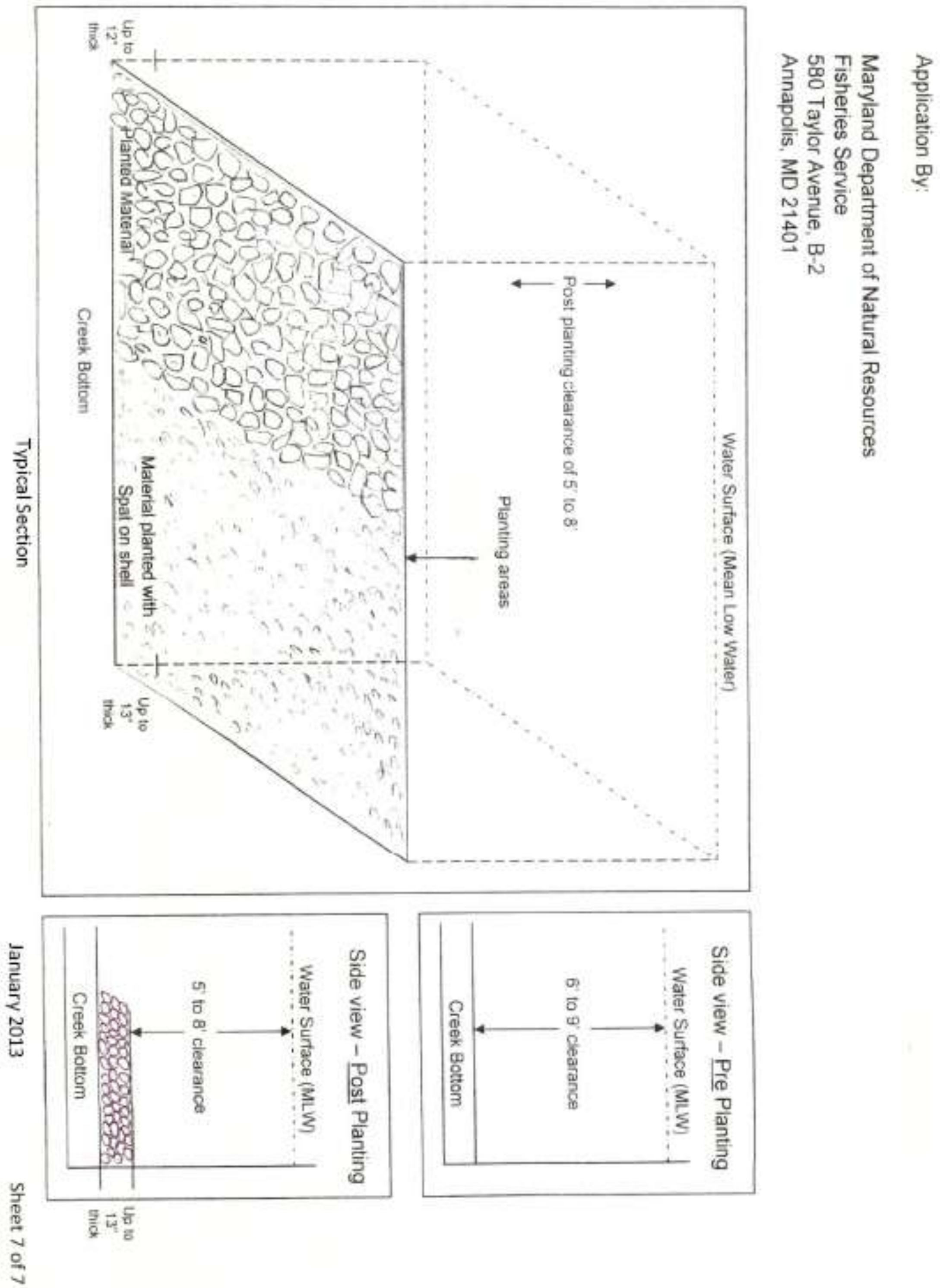
Enclosures D:



Enclosures E:



Enclosures F:



Enclosures G:

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Joseph P. Gill, Deputy Secretary

March 14, 2013

TO: Ann Williams

THRU: Lt. Art Windemuth

FROM: Sgt. John Buchanan

SUBJECT: Harris Creek

Over the past 10 years or so Harris Creek in Talbot County has been a busy waterway, both recreationally and commercially, year round up until the creek became an oyster sanctuary. Once the sanctuary was put in place then the commercial activity decreased from Oct. 1 thru March 31st for the obvious reason that no commercial oyster harvest could take place in the majority of the creek. The area known as middle ground, located between Change Point and the area of water in front of Dogwood Harbor, is open to oystering by power dredge. This area of water is busy during the oyster season.

It is also my understanding that Harris Creek also encompasses Dogwood Harbor and Knapps Narrows. Keeping that in mind as you navigate out of Knapps Narrows into Harris Creek the channel is very narrow for a fair distance. We have had vessels aground on both sides in the past mainly at low tides. Dogwood Harbor has a county wharf, boat launch and a private harbor located within its boundary's. There are large power boats 30 plus feet to include charter fishing vessels that utilize the channel and harbors in this area. There is also a water side restaurant and motel that draws vessels of all sizes during the boating season. Power boats from 30 feet and larger typically draw 3 to 5 feet depending on haul type and design. That channel is also narrow and we have had vessels aground in that area as well, mainly during the boating season.

Harris Creek has a few coves that draw larger vessels, both power boats and sail boats. These vessels travel to these coves from around the Chesapeake Bay region to stay the weekend and /or get away from storms. Dunns Cove is a location in Harris Creek that is considered a safe harbor. A safe harbor is one that allows protection to transient vessels from storms and other adverse weather conditions. It has also been my experience that the vessels that utilize this cove the most are larger sailing vessels. That is not to say that larger power vessels don't use the cove because they do it's just that a majority of the vessels tend to be of the sailing type. These types of sailing vessels have keels ranging in size and depth depending on size, make and haul design. Waterhole cove also has transient vessels that overnight or spend the weekend as well.

Other things that play a factor with boating and navigation issues concerning Harris Creek is the crabbing season. There has typically been a lot of commercial and recreational crabbing in this entire creek. Recreational vessels typically give way and navigate around this activity. If you take the deep water away you are sure to have more vessels run aground during this season. One more factor worth noting is that a lot of recreational vessel owner and operators don't have a lot of navigational knowledge and experience in general with regard to buoy orientation and which side to navigate too. A majority of the boating accidents I am familiar with stem from navigational rules of the road violations and changing the navigable depth of the creek isn't going to help to folks out especially during night time operations.

It is my understanding that the department wants to add a maximum of 12 inches of substrate, shell and concrete matter, to the bottom of Harris Creek in various locations. It is also my understanding that this permit allows the department to add this substrate to the bottom in areas deeper then 8 feet as long as they maintain an 8 foot controlling depth and 12 inches of substrate is the maximum amount of change in depth. Based on the chart that outlines the departments project I noticed that the navigable channel in delineated in what appears to be a protected zone. It also appears that all the planting work takes place outside of this protected area in depths that are generally used by smaller type vessels with shallower drafts.

In conclusion it would appear that the current activity that takes place in the planting area's, fishing and crabbing, would not be impacted with respect to water depth based on the size and type of vessels generally utilizing those area's of the creek.

# Appendix E – Section 404(b)(1) Evaluation

**CLEAN WATER ACT**
**SECTION 404(b)(1) EVALUATION**

**SHALLOW WATER OYSTER RESTORATION IN HARRIS CREEK OYSTER SANCTUARY, MARYLAND**
**JANUARY 2014**

## I. Project Description

A. Location

Activities are proposed for Harris Creek, a tidal estuarine system located on Maryland's Eastern Shore in Talbot County. Harris Creek is a tributary on the north shore of the Choptank River, near its confluence with the Chesapeake Bay's mainstem. Harris Creek is one of the main subwatersheds draining the lower Choptank River and historically was a major source of oysters, fish and other aquatic wildlife. Situated in the lower reaches of the Choptank River, Harris Creek is 6.82 miles long and drains approximately 37.5 square miles. Harris Creek comprises an area of $24.4 \times 10^6$ $m^2$ and a volume of $54.3 \times 10^6$ $m^3$ (MLW) (Wazniak et al. 2009).

B. General Description

Existing NEPA documentation covers oyster reef restoration at water depths that maintain at least an 8 foot water column above restored reefs. Currently, 1 foot of material is placed on the bottom to restore reef habitat which limits restoration to water depths greater than 9 ft MLLW. This supplemental EA is being prepared for the Harris Creek River Oyster Sanctuary to expand oyster restoration and rehabilitation activities for reef bar construction and seeding by USACE-Baltimore into 74 acres of shallower water depths in the oyster sanctuary. This supplemental EA will evaluate the impacts of restoring oyster reef habitat in water depths between 6 – 9 ft MLLW to maintain a 5 foot water column above restored reefs. The potential impacts of expanding restoration work into shallower depths have not been evaluated under existing NEPA documentation. As a result of removing an 8-foot minimum navigational depth clearance to allow restoration work to proceed in areas with a 5-foot minimum navigation depth clearance, the procedures imposed by NEPA require USACE-Baltimore to evaluate the affects this action on the quality of the human environment. There was no scientific basis for the existing requirement to maintain an 8-foot depth clearance. Rather, it was a generic approach to avoid navigational issues. However, given the focus on large-scale tributary based restoration, it is necessary and appropriate to consider restoring oyster reef habitat across broader depth contours within the historic oyster habitat footprint. By removing the 8-foot minimum navigation depth clearance, science-based oyster restoration goals for this tributary could be achieved ultimately restoring native oyster populations and improving local habitat conditions throughout the tributary, while evaluating potential navigational issues.

C. Purpose

The basic purpose of this project is to replace the 8-foot minimum navigational depth clearance for previously authorized activities under the 704(b) Program with a 5-foot minimum navigational depth clearance. Removing this depth restriction facilitates oyster restoration activities in shallower areas of the sanctuary beyond the current 9-foot MLLW depth contour. The proposal is to allow oyster restoration and rehabilitation activities to occur in depths of up to a minus 6-foot MLLW depth contour thus achieving the overall tributary target restoration goal of 377 acres of restored oyster habitat. This is the optimal level identified by the 2013 tributary restoration plan for a sustainable oyster population and for improved community resiliency in the Harris Creek system.

D. General Description of Discharge Material

1. Characteristics of Fill Material. The alternate (non-oyster shell) materials suitable for use include, but are not limited to clam shell, marl, concrete, stone, brick, porcelain, and cinderblock. The most likely substrates to be used are stone and mixed shell.Any concrete rubble to be used would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). Only clean material free of contaminants and hazardous materials are suitable for disposal within State waters and would be used. Further, advances in technology and research may identify new substrates that could be used for the construction of oyster habitat once approved by State and Federal resource agencies. The size of individual pieces of material used would vary with the material type and project purpose. The larger the material, the greater the relief provided for the benthic population.

2. Fill Material Quantities. A 1-foot reef height requires 1,613 cubic yards of substrate per acre. Therefore, to restore the proposed 74 acres, a total of 119,362 cubic yards of substrate will be placed in Harris Creek across 34 sites.

3. Source of Material. Sources of alternate materials vary. Stone is acquired from regional quarries. Mixed shell is available from wholesalers. Many of the shell sources are byproducts of commercial harvests including commercial clamming and other shellfish operations in the Mid-Atlantic, typically New Jersey and Delaware. Crushed concrete is generally produced from a demolition project such as the replacement of a bridge or building and is intermittently available. Cinderblock, porcelain, and brick are readily available for purchase or can possibly be obtained intermittently from demolition projects. Marl or marl limestone is a calcium carbonate or lime-rich stone which contains variable amounts of clays and aragonite. Marl is mined and is readily available. All materials used in this project would be clean and free of contaminants and hazardous materials.

E. Description of the Proposed Discharge Sites

New oyster habitat would be constructed in Harris Creek within the boundaries of natural oyster bars (NOBs) within the oyster sanctuary. Specific locations for project activities have been identified in the Harris Creek Tributary Plan based primarily on bottom composition, salinity, water depth, dissolved oxygen, and current oyster populations.

F. Description of Dredging and Placement Method

Project activities would involve the placement of alternate substrates to create oyster reef habitat. Materials will be placed using a crane/excavator or front-end loader to place material on the oyster bar. Restored areas will also be planted with spat on shell. Spat-on-shell is planted by being washed overboard using high pressure water hoses or cannons off of a barge, with the vessel moving continuously through the planting area to control the thickness and acreage of the planting.

## II. Factual Determinations

A. Physical and Substrate Determinations

1. Substrate elevation and slope. Restoration activities are proposed to place 12 inches of substrate. All elevations would maintain 5 feet of open water clearance above them. The minimum water depth in the oyster placement areas would be -6 feet. Once placed, the substrate will have a heterogeneous topography, but will not add significant slopes to the bottom.

2. Sediment Type. Substrate placement would target areas determined to be hard bottom by NOAA bottom analyses including sand, sandy mud, muddy sand, and sand/scattered shell.

3. Dredged Fill Material Movement. It is not expected that the material would move off site once placed on a bar. There would likely be some settling of the material.

4. Other Effects. None expected.

5. Actions Taken to Minimize Impacts. The substrate material would be discharged in a manner that minimizes the disruption of bottom sediments. Environmental protection measures, such as time-of-year restrictions on construction (construction typically occurs between December and March) and proper site selection to avoid sensitive areas, would be employed at project sites to avoid and minimize impacts to the aquatic environment. Construction specification would state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement. Measures to protect SAV: The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by the Virginia Institute of Marine Sciences (VIMS) in coordination with the Maryland Department of Natural Resources (MDNR) Resource Assessment Service. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed.

B. Water Circulation, Fluctuation, and Salinity Determinations

1. Water Quality.

(a) *Salinity* – No Change expected

(b) *Chemistry* - No negative impacts expected

(c) *Clarity* – Minor and temporary changes are possible in the immediate vicinity during construction due to turbidity. There would likely be localized improvements in clarity due to oyster filtration following establishment of an oyster population on the substrate.

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

(e) *Odor* - No change expected.

(f) *Taste* - Not applicable.

(g) *Dissolved Gas Levels* - No negative impacts expected. Dissolved oxygen levels may improve slightly due to oyster filtration.

(h) *Nutrients* – No negative impacts expected to occur. There would likely be localized improvements in nitrogen (N) and phosphorus (P) due to oyster filtration following establishment of an oyster population on the substrate.

(i) *Eutrophication* - No long-term change expected.

(j) *Temperature* - No change expected.

2. <u>Current Patterns and Circulation.</u>

(a) *Current Patterns and Flow* - Minimal effects are expected, but would likely be a positive improvement that benefits the restored oyster habitat. Elevation of an oyster bar or reef may increase flow and turbulence in the vicinity of the bar or reef, resulting in enhanced mixing and food delivery downstream.

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

(c) *Stratification* - No change expected.

(d) *Hydrologic Regime* - No change expected.

3. <u>Normal Water Level Fluctuations.</u> No change expected.

4. <u>Salinity Gradients.</u> No change expected.

5. <u>Actions That Will Be Taken to Minimize Impacts</u>. Not applicable

C. Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site. A minor and temporary increase in suspended sediment and turbidity is expected in the immediate vicinity of the placement sites. Suspended sediment and turbidity in the vicinity of restored oyster habitat is likely to be reduced after habitat is restored due to stabilizing the sediments with the hard substrate and oyster filtering capabilities.

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

   (a) Light Penetration- Minor, temporary, and localized reduction in light penetration due to turbidity would occur in the immediate vicinity of the substrate plantings during placement. Light penetration would depend on placement thickness and the density of the material. Oyster bars and reefs proposed by this action are in 6 to 9 ft. depths and not in the photic zone.
   (b) Dissolved Oxygen- Minor, temporary, and localized reduction in dissolved oxygen in conjunction with elevated turbidity levels may occur in the immediate vicinity of placement operations. However, sites that are typically characterized by low oxygen levels would likely be avoided for oyster habitat restoration.
   (c) Toxic Metals and Organics- Placement operations are not expected to result in the release of any measurable amounts of contaminants into the water column.
   (d) Pathogens- No pathogens are expected to be released into the water column.
   (e) Aesthetics- Transport vehicles, boats, and heavy equipment associated with the proposed project would be a temporary negative impact. Project activities would occur under water, and therefore would not impact visual and aesthetic values.
   (f) Temperature- No change expected.

3. Actions Taken to Minimize Impacts. Construction activities would be limited to the immediate project area except for the barge loading sites which would vary with material type. All sites would be within NOB's and the oyster sanctuary. All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by VIMS in coordination with the MD DNR Resource Assessment Service.

D. Contaminant Determinations

All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. No significant levels of contaminants would be released into the water column.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton. As construction is a very short-term event and plankton are mobile, no effect is expected. The areas restored to oyster bars and reefs from open water would still be available to the plankton community.

2. Effects on Benthos. The placement of alternate substrates would permanently cover the existing substrate and benthos. Non-sessile dwellers may be able to avoid burial, but sessile species could be buried. However, the restored oyster habitat would provide enhanced habitat for recolonization by benthic epifauna. Oyster bars and reefs are three-dimensional structures which provide more surface area for the attachments of oysters and other sessile organisms (mussels, barnacles, hydroids, algae, etc.) than that provided by relatively flat bottom.

(a) Primary Production/Photosynthesis- Any turbidity generated during construction may temporarily reduce photosynthesis within the area of the oyster bar or reef and possibly slightly outside.
(b) Suspension/ Filter Feeders- Minor, temporary, and localized impacts due to turbidity may occur during construction.
(c) Sight Feeders- Minor, temporary, and localized impacts due to turbidity may occur during construction.

3. Effects on Nekton. No long-term negative impacts are expected. Nekton would be temporarily disturbed during construction, but would be able to avoid the area during substrate placement. Following construction, the restored oyster bar or reef would provide an enhanced habitat for species that rely on structure for habitat, protection, and foraging such as fish, amphipods, shrimp, worms, and crabs.

4. Effects on Aquatic Food Web. No adverse, long term effects are expected. The long-term project effects are expected to be positive by providing reef habitat with subsequent oyster populations and associated assemblages. A great diversity of macroinvertebrates, fish, and shellfish have been shown to colonize restored oyster habitats (Rodney and Paynter 2006). Organisms associated with oyster habitat recycle nutrients and organic matter, and are prey for commercially and recreationally important finfish species.

5. Effects on Special Aquatic Sites. Proposed restoration activities would occur in 6 – 9 ft MLLW. Therefore, project activities are not expected to displace or adversely impact SAV. However, appropriate measures such as time-of-year restrictions to minimize impact to NOBs and restrictions on construction near SAV, would be implemented during substrate placement to protect special aquatic sites in adjacent areas from elevated turbidity. There would be no significant negative impacts or effects to other special aquatic sites including marine sanctuaries and refuges, wetlands, or tidal flats.

(a) Sanctuaries and Refuges- Temporary and minor impacts would occur to designated oyster sanctuaries since the material would be placed within existing areas designated as sanctuaries by MDNR. These impacts would include temporary increased turbidity and covering the benthos with the newly placed substrate. There would be no impacts to any other marine sanctuaries or refuges.

(b) Wetlands- There would be no impacts to wetlands as wetlands do not occur in the project area.

(c) Tidal flats- No impacts since tidal flats do not occur in the project area.

(d) SAV – SAV habitat coverage of the Bay bottom is variable from year to year. SAV habitat was screened from the potential restoration sites during site selection. Also, existing restrictions on construction within 300 feet of existing SAV beds would be upheld to prevent negative impacts associated with construction such as increased turbidity.

(e) Riffle and Pool Complexes- None in project area.

6. Threatened and Endangered Species. No adverse effects are anticipated to threatened and endangered species as a result of this project.

7. Other Wildlife. Construction would have expected noise associated with the machinery used to place the material. This noise would temporarily disrupt some species of wildlife during periods of work. Also, the presence of humans and equipment may disturb some species. Species are expected to return when construction is completed and the equipment leaves the area.

8. Actions to Minimize Impacts. Construction activities would be limited to the immediate project area. All sites would be within NOBs. All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by VIMS in coordination with the MD DNR Resource Assessment Service.

## F. Proposed Placement Site Determinations

**(1) Mixing Zone Determinations-** Not applicable.

**(2) Compliance with Applicable Water Quality Standards Determinations-**Alternate substrates used would be clean and would meet all applicable water quality standards. The proposed work would be performed in accordance with all applicable State of Maryland water quality standards. All work would be conducted in compliance with conditions specified in the project's Water Quality Certification.

**(3) Potential Effects on Human Use Characteristics Determinations**

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

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

(c) Water Related Recreation- As an indirect benefit of the proposed work, some increase in recreational fishing may occur following establishment of communities on the restored bars and reefs.

(d) Aesthetics-Minor during construction.

(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 use of alternate substrates would permit oyster restoration to continue on a scale that could address goals of restoring significant oyster habitat acreage. Without the use of alternate substrates it is extremely unlikely that significant acreage could be restored due to the current degraded condition of existing oyster habitat and the limited availability of native oyster shell for habitat restoration. The project is expected to increase the acreage of available oyster habitat as well as enhance recruitment, growth, and survival of oyster populations. The cumulative impact of this project and other oyster restoration projects constructed by MDNR, Federal agencies, and various non-profit and citizens groups 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. Additional benefits from oyster restoration would include water filtration and regulation of water column phytoplankton dynamics; enhanced nitrogen (N) cycling between the benthic and pelagic system components; enhanced phosphorus (P) burial in sediments; nursery and predation refuge habitat for a diverse community of invertebrates and small fishes; and foraging habitat for transient piscivorous and benthivorous fishes.

The mandatory sequence of the Section 404(b)(l) Guidelines has been applied in evaluation of the proposed action. The proposed use of alternate substrates to restore oyster habitat is in compliance with the Section 404(b)(l) Guidelines. Parts II and IV of the analysis show that the proposed use of alternate substrates do not contribute to the significant degradation of waters of the United States and as such, the proposed project and proposed use of the placement sites comply with the requirements of 40 CFR 230.10(c). Appropriate steps to minimize potential impacts of the placement of the alternate substrate in aquatic systems would be followed.

## 3. FINDING OF COMPLIANCE

<u>a. Adaptation of the Section 404(b)(1) Guidelines to This Evaluation</u> - No adaptations of the Guidelines were made relative to this Evaluation.

b. <u>Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem</u>. – None of the alternatives are expected to provide the same benefits with fewer impacts.

c. Compliance with Applicable State Water Quality Standards. – In full compliance. WQC 05-WQ-001.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. – N/A.

e. Compliance With Endangered Species Act of 1973 – In full compliance. No impacts are anticipated to these resources.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 – N/A.

g. Evaluation of Extent of Degradation of Waters of the United States – No adverse impacts, permanent or temporary, to the aquatic ecosystem diversity, productivity, stability, recreation, and aesthetics and economic values would occur as a result of this project.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – Best management practices such as targeted placement of material at bars and reefs would occur.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material - On the basis of the guidelines, the proposed discharge sites for the material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

# Appendix F – Essential Fish Habitat Assessment

**Shallow water Oyster Restoration in the Harris Creek Oyster Sanctuary**

**Chesapeake Bay Oyster Recovery Project, Maryland**

**Essential Fish Habitat Assessment**

**January 2014**

**Prepared By: Baltimore District, U.S. Army Corps Of Engineers**

Pursuant to Section 305 (b)(2) of the Magnuson-Stevens Fishery Conservation & Management Act, the U.S. Army Corps of Engineers (USACE) is required to prepare an Essential Fish Habitat [EFH] Assessment for restoration of oyster reef habitat in shallow water depths (6 to 9 ft mean low low water (MLLW) as part of the Chesapeake Bay Oyster Recovery Project, Maryland that began in 1996.

Based on the prescribed protocol for preparation of an EFH Assessment, the assessment is comprised of the following components:

1. A description of the proposed action;
2. A listing of the life stages of all species with EFH designated in the project area;
3. An analysis of the effects of the proposed action;
4. The Federal agency's opinions regarding the effects of the proposed action; and,
5. Proposed mitigation, if applicable.

## DESCRIPTION OF THE PROPOSED ACTION

The Baltimore District, U.S. Army Corps of Engineers (USACE-Baltimore) proposes to place shell or alternate (non-shell) substrate at 74 acres of existing oyster bars within Harris Creek at water depths between 6 and 9 ft MLLW. Figure 1 provides a map of the project area. The reefs that are the focus of the proposed activity are identified in red on Figure 1.

USACE-Baltimore is proposing to extend oyster reef restoration into shallower water depths than it is currently permitted to be conducted. Existing National Environmental Policy Act (NEPA) documentation covers oyster reef restoration at water depths that maintain at least an 8 foot water column above restored reefs. Currently, 1 foot of material is placed on the bottom to restore reef habitat which limits restoration to water depths greater than 9 ft MLLW. This EFH Assessment will evaluate the impacts to EFH and critical habitat from expanding oyster restoration and rehabilitation activities for reef bar construction and seeding by USACE-Baltimore into shallower depths of the sanctuary. Oyster reef restoration at these shallower water depths would maintain at least a 5 foot water column above restored reefs in Harris Creek.

## SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

Previous consultation with John Nichols, NMFS, (email February 9, 2009) as part of the 2009 *Chesapeake Bay Oyster Restoration Using Alternate Substrate, Maryland* Environmental Assessment determined that some areas of the Chesapeake Bay under consideration for oyster restoration in Maryland lie within the general area that may provide EFH for some of the species managed by NMFS. Species for which EFH is a concern are as follows: summer flounder (*Paralichthys dentatus*), juvenile and adult life stages; bluefish (*Pomatomus saltatrix*), juvenile and adult life stages; windowpane flounder (*Scopthalmus aquosus*), juvenile and adult life stages; cobia (*Rachycentron canadum*), all life stages; red drum (*Sciaenops ocellatus*), all life stages; king mackerel (*Scomberomorus cavalla*), all life stages; and Spanish mackerel (*Scomberomorus maculatus*) (National Marine Fisheries Service, Northeast Region, Habitat Conservation Division EFH web site; *www.nero.nmfs.gov/ro/doc/hcd.htm*).

Due to specific habitat needs, it is unlikely that cobia, king mackerel, or Spanish mackerel would be in the project area (Murdy et al. 1994). Cobia more commonly inhabits areas of higher salinity than would be found at most of the project area. Spanish mackerel are most abundant from the mouth of the Chesapeake Bay region to south Florida. They prefer polyhaline regions (18-30 ppt) of the lower Bay. Finally, none of the life stages of king mackerel are typically found within the project area. As a result, this EFH analysis will focus on bluefish, summer flounder, windowpane flounder, and red drum. Focusing on these four species for the Harris Creek EFH Assessment was confirmed in a phone conversation with David O'Brien, NMFS, on January 6, 2014.

## IMPACTS TO SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

The following section provides a brief overview of pertinent natural history information of: 1) bluefish, 2) summer flounder, 3) windowpane flounder, and 4) red drum. Additionally, an analysis is made of the direct, secondary, and cumulative impacts of the proposed expansion of oyster restoration into shallower water depths on federally managed species, and prey species consumed by managed species that occur in the project vicinity.

### 1. BLUEFISH (*Pomatomus saltatrix*) (juvenile and adult stages)

Bluefish are usually found high in the water column. In some years, large numbers of bluefish penetrate far up the Bay; in other years, bluefish schools are sparse, with larger bluefish concentrating in Virginia waters. For juveniles, all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida are considered EFH.

Juvenile and adult bluefish enter the Chesapeake Bay during spring through summer, leaving the Bay in late fall.

**Adults –** Adults are uncommon north of Annapolis, and generally do not occur above the U.S. 50 bridge, except during years of greater up-Bay salt wedge encroachment. Adults are not typically bottom feeders and are strong swimmers.

**Juveniles** - Juveniles tend to concentrate in shoal waters. In contrast to adults, the young have a wide range of salinity tolerance and penetrate much farther up the Bay and its tributaries, where they can be found in shallow waters of very low salinity (Murdy et al. 1997). Therefore, juveniles are more common in the upper Bay above the U.S. 50 Bridge, occurring as far north as the Susquehanna Flats and the lower Elk River (Lippson 1973).

**Spawning** - Spawning is oceanic and does not occur in the Chesapeake Bay.

**Prey-** Juveniles tend to be opportunistic feeders, foraging on a wide variety of estuarine life in the pelagic zone and over a variety of bottom types (Lippson 1973). Small fish such as Menhaden that bluefish prey upon are widely dispersed across the Bay and do not depend upon the bottom. With respect to prey, there is nothing particularly unique or valuable to bluefish at the project area. Therefore, bluefish prey species should not experience adverse effects on population levels from the proposed project.

**Impact on Bluefish-** The extension of oyster restoration into water depths between 6 and 9 ft MLLW is not expected to have any negative impacts on any life stage of bluefish. Juvenile and adult bluefish are not likely to occur in the project area during alternate reef construction. Spat-on-shell planting occurs in summer when bluefish could be present in the project area. Spat-on-shell plantings target the restored reef and are not anticipated to have any further negative impacts. Those individuals within the project area during spat-on-shell planting would likely be able to avoid direct detrimental impacts because of their mobility. Further, there is sufficient open water habitat outside of the project area to use during spat-on-shell planting and turbidity impacts are expected to be local, minimal, and short-lived.

**Cumulative impacts:** The proposed action would permit oyster restoration to continue on a scale that could address goals of restoring significant oyster habitat acreage to a diversity of water depths. Without the extension of restoration into shallow water depths it is extremely unlikely that significant acreage could be restored and long-term goals achieved. The project is expected to increase the acreage of available oyster bar and reef habitat as well as enhance recruitment, growth, and survival of oyster populations. The cumulative impact of this project and other oyster restoration projects constructed by Maryland Department of Natural Resources (MDNR), the National Oceanic and Atmospheric Administration (NOAA), the Oyster Recovery Partnership (ORP) and various non-profit and citizens groups is expected to be positive, with the creation of more diverse and productive habitat. No adverse negative cumulative impacts are expected.

There would be short-term increases in turbidity and possibly the release of nutrients from bottom sediments during placement of substrate, whether alternate substrates or native shell.  This impact is expected to be direct, but minor and temporary.  Long-term impacts to local water quality as a result of the restoration of oyster habitat are expected to be positive throughout the Bay.

Other restoration activities within the Maryland portion of the Chesapeake Bay include large-scale tributary based oyster restoration within the Tred Avon River by USACE, MDNR, NOAA, and the Oyster Recovery Partnership (ORP).  Additionally, MDNR, NOAA, and ORP are planning large-scale tributary based oyster restoration in the Little Choptank River.  Restoration in Harris Creek, the Tred Avon River, and the Little Choptank River are all connected to some degree hydrodynamically and are expected to lead to greatly enhanced oyster and fishery resources in the lower Choptank River system.  Cumulatively, the oyster restoration impacts are not anticipated to have any significant negative impacts, either direct or secondary to bluefish populations within the Bay.

### 2. SUMMER FLOUNDER (*Paralicthys dentatus*) (juvenile and adult stages)

Juvenile and adult summer flounder enter the Chesapeake Bay during spring and early summer, and exit the Bay in fall (Murdy 1997).  Both adults and juveniles exhibit a marked preference for sandy bottom and/or submerged aquatic vegetation (SAV) beds, particularly areas near shorelines (Murdy 1997).  The Magnuson-Stevens Act has identified SAV as a Habitat of Particular Concern for both juvenile and adult summer flounder. Summer flounder are not known to use oyster bars.

**Adults -** Summer flounder adults inhabit shallow coastal and estuarine waters during warmer months.  Adults utilize deep channels, ridges, sandbars, and shallow water with sandy bottoms.

**Juveniles-** Juveniles prefer shallower waters.

**Spawning-** Summer flounder are ocean spawners. Larvae migrate into the Bay in October.

**Prey-** Summer flounder feed mainly on fish, squids, shrimp, and crabs. The summer flounder prefers sandy substrate and is frequently seen near sandy shores, partly buried in the sand.

**Impact on Summer Flounder-** The extension of oyster restoration into water depths between 6 and 9 ft MLLW is not expected to have any negative impacts on any life stage of summer flounder. Juvenile and adult summer flounder are not likely to occur in the project area during alternate reef construction. Spat-on-shell planting occurs in summer when summer flounder could be present in the project area.  Spat-on-shell plantings target the restored reef and are not anticipated to have any further negative impacts. Those individuals within the project area during spat-on-shell planting would likely be able to avoid direct detrimental impacts because of their mobility.  No significant direct negative impacts are expected on any lifestage as a result of proposed activities.

Secondarily, it is likely that the creation of oyster bars and reefs would serve as an attractant and provide habitat for the small creatures that the summer flounder prey upon.

Since oysters are generally restricted to water depths between 6 and 30 feet (MLW), oyster reef restoration would not generally occur within SAV growing range. However, restored oyster bars and reefs do occur in areas adjacent to SAV beds. To minimize any potential direct impacts, no alternate material placement would occur within 300 feet of SAV beds. Alternate reef construction activities typically occur between December and March, and therefore, not during the SAV growing season. However, spat-on-shell planting does occur during the summer, but is not anticipated to have detrimental impacts. No adverse impacts to SAV are anticipated as a result of the proposed project.

Successful oyster restoration is expected to improve local water quality which would benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to summer flounder by promoting SAV habitat, which is designated as a Habitat of Particular Concern for summer flounder. Extending oyster restoration into shallower waters would reduce the distance between oyster reef habitat in deeper habitats and SA, increasing the likelihood that oyster restoration will have indirect benefits on SAV habitat.

**Cumulative impacts:** Cumulative effects from other projects discussed in the bluefish section are not anticipated to have any significant negative impacts, either direct or secondary, to summer flounder. Overall, cumulative impacts are expected to be positive.

### 3. WINDOWPANE FLOUNDER (*Scopthalmus aquosus*)

Windowpane flounder in the northwest Atlantic inhabit estuaries, nearshore waters, and the continental shelf. Windowpane juveniles that settle in shallow inshore waters move to deeper waters as they grow. Juveniles and adults may migrate to nearshore or estuarine habitats in the southern mid-Atlantic bight in the autumn. The EFH designation for this species includes the mixing water/brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰). Windowpane is not a species targeted by commercial fishing. It is predominantly caught as bycatch in bottom trawl fisheries.

**Adults-** Adults typically migrate into the Chesapeake Bay during spring through fall. Windowpane flounder adults prefer bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border. Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 26.8°C (80°F), depths from 1 - 75 meters (3 - 250 ft), and salinities between 5.5 - 36‰ (NMFS 2001). Windowpane flounder are sensitive to hypoxia.

**Juveniles-** Juveniles are most typical in the project area from March through September. Windowpane flounder juveniles prefer bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder juveniles are found: water temperatures below 25°C (77°F), depths from 1 - 100 m (3 - 330 ft), and salinities between 5.5 - 36‰ (NMFS 2001).

**Prey**- Juvenile and adult windowpane feed on small crustaceans and various fish larvae. Spiny dogfish, thorny skate, goosefish, Atlantic cod, black sea bass, weakfish, and summer flounder are important windowpane predators. Eggs, larvae, and juveniles are also eaten by adult windowpane flounder (Chang et al. 1999).

**Impact on Windowpane Flounder**- The extension of oyster restoration into water depths between 6 and 9 ft MLLW is not expected to have any significant negative impacts on any life stage of windowpane flounder. Windowpane flounder are most likely to be in the project area from March through September. Oyster reef construction typically occurs in winter (December through March) making exposure of windowpane flounder to construction impacts low due to project timing. Those individuals within the project area during project construction would be likely to be able to avoid direct detrimental impacts because of their great mobility. Spat-on-shell planting occurs in summer when bluefish could be present in the project area. Spat-on-shell plantings target the restored reef and are not anticipated to have any further negative impacts. Those individuals within the project area during spat-on-shell planting would likely be able to avoid direct detrimental impacts because of their mobility. Windowpane flounder prefer sandy substrates which would be converted to oyster reef by the proposed activities leading to a loss of potential habitat. Approximately 3 acres of sandy bottom would be converted to oyster reef by restoration of the proposed 74 acres. This type of habitat is not limiting to windowpane flounder in the Chesapeake Bay and would therefore be a minor impact. Mud substrates are avoided by this project. Overall, detrimental impacts to the windowpane flounder population are expected to be insignificant because risks are low and there is no reason to expect that windowpane flounder will be concentrated at the site.

**Cumulative impacts:** Cumulative effects from other projects discussed in the bluefish section are not anticipated to have any significant negative impacts, either direct or secondary, to windowpane flounder. Overall, cumulative impacts are expected to be positive.

### 4. RED DRUM (*Sciaenops ocellatus*)

Red drum are bottom-feeding fish. The young prefer grassy (SAV) or mud bottoms.

EFH for red drum includes all of the following habitats to a depth of 50 meters offshore: tidal freshwater; estuarine emergent vegetated wetlands (flooded salt marshes, brackish marsh, tidal creeks); estuarine scrub/shrub (mangrove fringe); submerged rooted vascular plants (sea grasses); oyster bars and reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial bars and reefs. The area covered includes Virginia through the Florida Keys (Reagan, 1985).

**Adults**- Adults are found in SAV beds and on mud bottoms, but another preferred habitat is oyster bars and reefs. During construction, it is expected that any adults in the vicinity of the project area would be temporarily displaced. As transient species, adult red drum would be able to avoid the disrupted area and find comparable habitat in the nearby vicinity. Restored oyster bars and reefs would provide enhanced habitats for adult red drum.

**Juveniles**- Juveniles occur throughout Chesapeake Bay from September to November.

**Spawning –** Spawning is oceanic.

**Prey -** Red drum prey includes crabs, shrimp and fish. No negative impacts to prey are expected. Oyster bar and reef restoration would provide habitat for red drum prey species and therefore is expected to increase desired species.

**Impact on Red Drum-** The extension of oyster restoration into water depths between 6 and 9 ft MLLW is not expected to have any negative impacts on any life stage of red drum and would likely have a positive secondary impact by promoting prey species that use oyster bars and reefs for habitat. As oyster bars and reefs are designated EFH for red drum, oyster bar and reef restoration would directly improve and increase EFH habitat for red drum.

As discussed in the section on bluefish, the proposed action is not expected to negatively impact SAV. Alternatively, successful oyster restoration is expected to improve local water quality which would benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to red drum by promoting SAV habitat, which is designated as EFH for red drum.

**Cumulative impacts:** Cumulative effects from other projects discussed in the bluefish section are not anticipated to have any significant negative impacts, either direct or secondary, to red drum. Overall, cumulative impacts are expected to be positive.

## FEDERAL AGENCY’S OPINION ON PROJECT IMPACTS TO EFH

1. Discharge from the site during shell or alternate substrate placement operations must comply with state (Maryland Department of the Environment) water quality standards, and should result in only short term, minor perturbations to local water quality.

2. There would be short-term increases in turbidity and possibly the release of nutrients from bottom sediments during construction. This impact is expected to be direct, but minor and temporary. Long-term impacts to local water quality as a result of the restoration of oyster habitat are expected to be positive.

3. The proposed project is expected to result in direct and secondary, beneficial impacts to aquatic resources. Through the restoration of existing non-productive oyster bars, a

portion of historic oyster habitat would be directly restored. Placement of alternate substrates in waters ranging from 6 to 9 ft MLLW would form an elevated bar/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 bar/reef structure would provide, as a secondary benefit, shelter and cover for mobile invertebrates and finfish.

4. Placement of reef substrate would most likely occur between December and March. Seeding of restored oyster reefs would occur between June and September, when most species identified are present in the Bay. However, as discussed in the individual sections, no direct negative impacts are expected to the identified species as they are transient and similar habitat is abundant throughout the Bay, or prefer different habitats than those being targeted with the project. Impacts to spawning are not a concern as the species evaluated spawn outside the project area in oceanic waters.

5. The proposed action is not expected to negatively impact SAV. Alternatively, successful oyster restoration is expected to improve local water quality which would benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to SAV habitat.

6. The proposed project would directly increase EFH for red drum by restoring oyster bars and reefs. The proposed project would indirectly benefit EFH for red drum and Habitat of Particular Concern for summer flounder by promoting SAV habitat.

7. The Baltimore District, after reviewing fisheries information, has determined that the proposed action is not likely to have significant negative, direct or secondary, affects on EFH or species covered under the Magnuson-Stevens Act and is more likely to benefit these protected species than to have an adverse effect on them.

**Mitigation:** No significant adverse environmental impacts are expected as a result of the proposed project and mitigation is not necessary.

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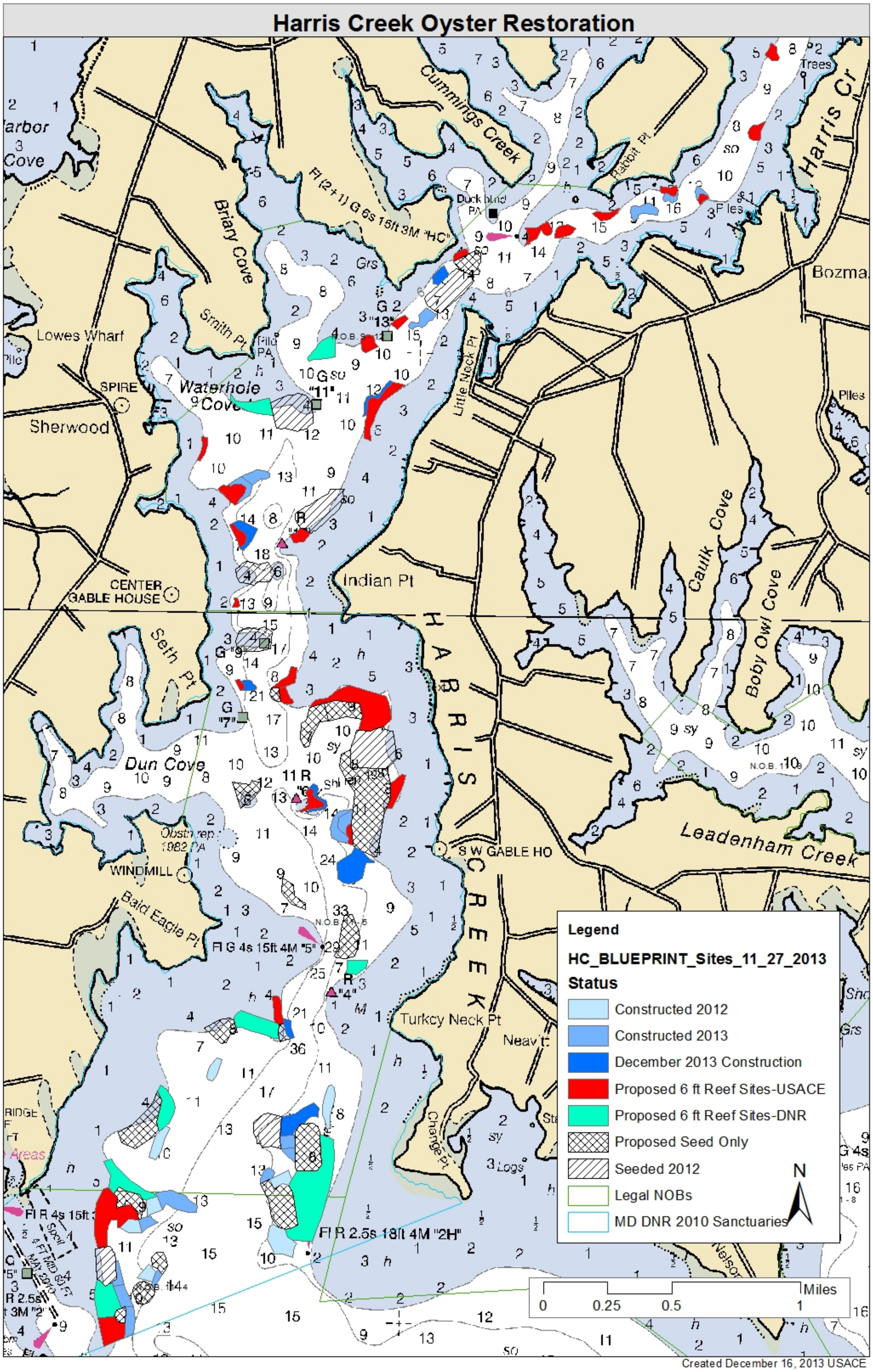
**Figure 1. Harris Creek Oyster Restoration**



# Appendix G – Agency Coordination and Pertinent Correspondence

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

DEC 19 2013

Planning Division

Mr. Chris Guy
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21014

Dear Mr. Guy:

The U.S. Army Corps of Engineers, Baltimore District (USACE) in conjunction with the Maryland Department of Natural Resources (MDNR) is conducting a supplemental Environmental Assessment (EA) to investigate opportunities to expand oyster restoration activities within Harris Creek to shallower water depths. The intent of this letter is to solicit input from your agency and request a determination that the proposed oyster restoration work in shallow water depths is in compliance with the Fish and Wildlife Coordination Act (FWCA) and Section 7 requirements of the Endangered Species Act (ESA).

Currently, USACE-Baltimore maintains 8 feet of navigational water depth clearance above all oyster restoration activities in compliance with its *Chesapeake Bay Oyster Recovery Project, Maryland* EA that was completed in 1996, and the 2009 *Chesapeake Bay Oyster Restoration Using Alternate Substrate, Maryland* EA. The 1996 EA identified six Oyster Recovery Areas (ORA's) in the Chester, Choptank, Magothy, Nanticoke, Patuxent, and Severn Rivers, and seed bar construction at two sites. USACE is proposing to remove the 8 foot clearance standard and replace it with a 5 foot water depth clearance to enable more expansive oyster restoration activities within Harris Creek. As a result of removing an 8-foot minimum navigational depth clearance, the procedures imposed by NEPA require USACE-Baltimore to evaluate the effects of this action on the quality of the human environment. This supplemental EA will fulfill that requirement and evaluate the impacts of restoring oyster reef habitat in water depths that maintain a 5 foot water depth clearance above restored reefs (between 6 and 9 ft MLLW).

Current and future USACE-Baltimore oyster restoration efforts contribute to the oyster outcomes of the Chesapeake Bay Protection and Restoration Executive Order (E.O. 13508). USACE-Baltimore has been identified with the National Oceanic and Atmospheric Administration (NOAA) to be co-leads for implementation of the oyster outcomes established by E.O. 13508. Furthermore, the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) has been charged with advancing the oyster goal of E.O. 13508. The GIT has convened interagency workgroups in Maryland and Virginia to plan restoration work in each state, in consultation with appropriate partners. The Maryland Interagency Workgroup (MIW) is composed of representatives from NOAA, MDNR, USACE-Baltimore, and the Oyster Recovery Partnership (ORP). The MIW is charged with developing and implementing large-scale oyster restoration plans towards meeting the oyster goal of E.O. 13508 and their respective agencies' goals. Based on consideration of salinity levels, available restorable bottom, protection from harvest, historical spat set, and other factors, MIW, in consultation with Maryland oyster restoration partners, selected Harris Creek as its first tributary for large-scale oyster restoration.

Harris Creek is a tributary on the north shore of the Choptank River, near its confluence with the Bay's mainstem. MIW developed a tributary restoration plan that outlines an objective of restoring and rehabilitating 377 acres of oyster reef habitat. Since 2011, USACE has constructed 79 acres of 1-foot high oyster reef using alternate substrates, primarily mixed shell and granite, including 23 acres currently under construction in December 2013. These reefs were constructed at water depths greater than 9 feet. There are an additional 136 acres of restorable bottom between the 6 to 9 foot water depths that are proposed for construction by MIW. MDNR has received a permit from USACE to perform oyster restoration activities in shallow water habitat and is planning on restoring 62 acres. The information generated from the MDNR permitting process will be incorporated into this supplemental EA. USACE-Baltimore is proposing to restore the remaining 74 acres of the shallow water habitat. The proposed areas are identified in the enclosed map in red (Encl 1). The enclosed map presents the full restoration plan for Harris Creek including alternate substrate reefs and seeding sites that have been completed.

Prior coordination completed for the 2009 Alternate Substrate EA and a 2013 USACE-Regulatory EA (completed in the MDNR permit process) identified that there were no rare, threatened, or endangered species under the purview of FWS in the project area. On December 9, 2013, the Information, Planning, and Conservation (IPaC) decision support system was utilized to generate a preliminary Endangered Species Act species list specific to Harris Creek. No rare, threatened, or endangered species were identified within the Harris Creek project area. The preliminary species list report is enclosed with this letter (Encl 2). Based on this information, extending oyster restoration to shallower waters is not anticipated to have any negative impacts on rare, threatened, or endangered species under the purview of FWS.

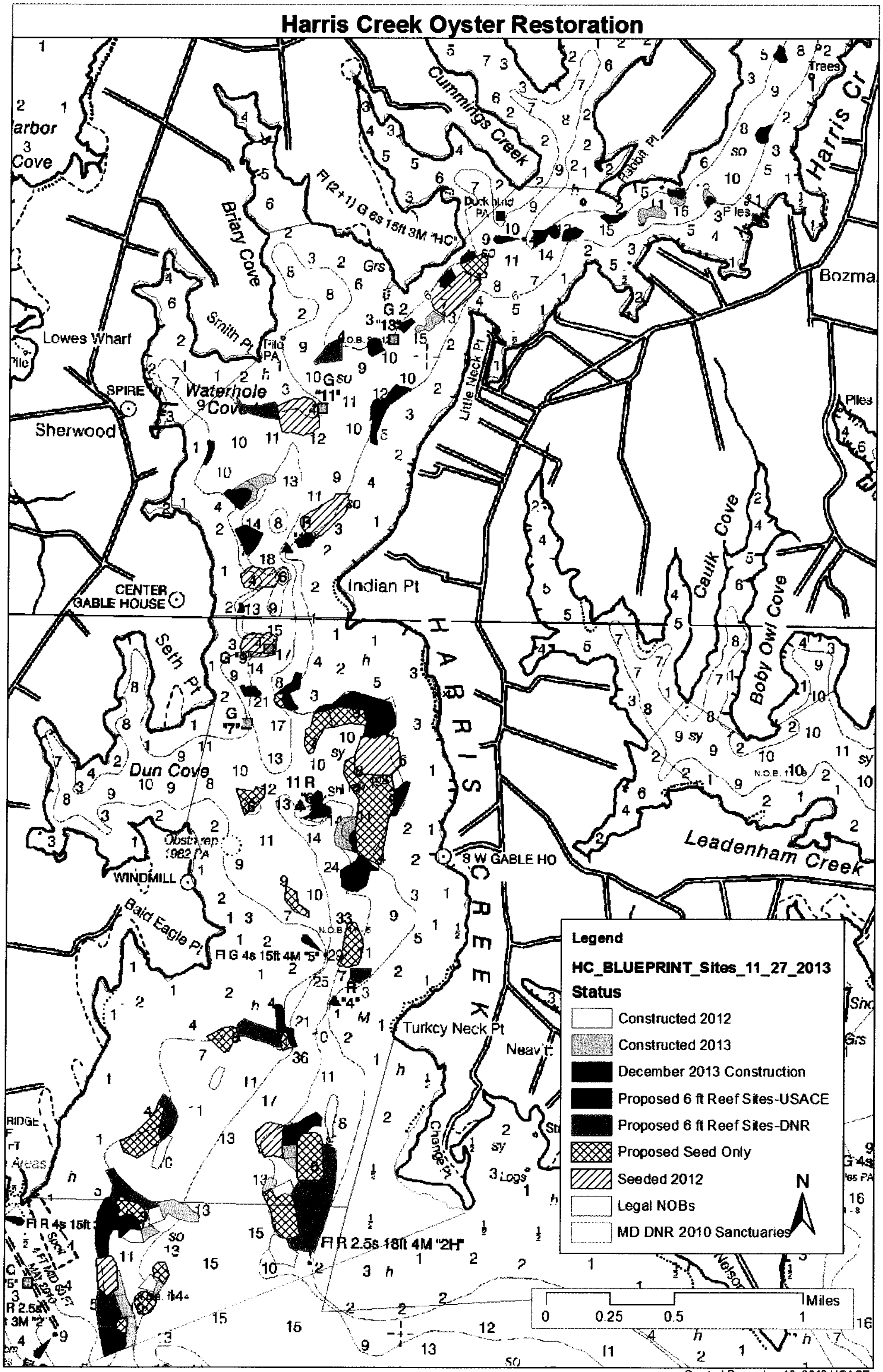
Based on past oyster restoration efforts and the investigation undertaken by MDNR to acquire a shallow water oyster restoration permit, USACE-Baltimore has determined that there will be no negative impacts to fish and wildlife resources by this action. USACE-Baltimore is requesting U.S. Fish and Wildlife concurrence with this determination for compliance with the Fish and Wildlife Coordination Act and Section 7 of the Endangered Species Act. Please provide a response within 30 days of the date of this letter. If you have any questions, please call Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Enclosures

Daniel Bierly
Acting Chief, Civil Projects Development Branch

Enclosure 1


Harris Creek Oyster Restoration
Legend
HC_BLUEPRINT_Sites_11_27_2013
Status
Constructed 2012
Constructed 2013
December 2013 Construction
Proposed 6 ft Reef Sites-USACE
Proposed 6 ft Reef Sites-DNR
Proposed Seed Only
Seeded 2012
Legal NOBs
MD DNR 2010 Sanctuaries
N
Miles
0 0.25 0.5 1
Created December 16, 2013 USACE
Cummings Creek
Briary Cove
Smith Pt
Lowes Wharf
Sherwood
Waterhole Cove
Little Neck Pt
Indian Pt
CENTER GABLE HOUSE
Seth Pt
Dun Cove
WINDMILL
Bald Eagle Pt
HARRIS CREEK
Turkey Neck Pt
Caulk Cove
Boby Owl Cove
Leadenham Creek
W GABLE HO
Bozma
Harris Cr
Fl R 2.5s 18ft 4M "2H"
Fl G 4s 15ft 4M "5"

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

REPLY TO
ATTENTION OF

Planning Division

JAN 2 4 2014

Louis Chiarella
National Oceanic and Atmospheric Administration
Assistant Regional Administrator for Habitat Conservation
55 Great Republic Way
Gloucester, MA 01930

Dear Mr. Chiarella:

The purpose of this letter is to request your review of the Essential Fish Habitat (EFH) Assessment for shallow water oyster restoration efforts in Harris Creek, Talbot County, MD. The U.S. Army Corps of Engineers, Baltimore District (USACE) in conjunction with the Maryland Department of Natural Resources (MDNR) is conducting a supplemental Environmental Assessment (EA) to investigate opportunities to expand oyster restoration activities within Harris Creek to shallower water depths. The focal species of this EFH assessment were confirmed with the National Marine Fisheries Service (NMFS) via phone conversation with David O'Brien on January 6, 2014.

USACE has authority to construct oyster habitat under Section 704(b) of the Water Resources Development Act of 1986 (amended recently by WRDA 2007, Section 5021), which authorizes the construction of alternative or beneficially modified habitats for indigenous fish and wildlife, including man-made reefs for fish habitat in the Maryland portion of the Chesapeake Bay. Currently, USACE-Baltimore maintains 8 feet of navigational water depth clearance above all oyster restoration activities in compliance with its *Chesapeake Bay Oyster Recovery Project, Maryland* EA that was completed in 1996, and the 2009 *Chesapeake Bay Oyster Restoration Using Alternate Substrate, Maryland* EA. USACE is proposing to remove the 8 foot clearance standard and replace it with a 5 foot water depth clearance to enable more expansive oyster restoration activities. As a result of removing an 8-foot minimum navigational depth clearance, the procedures imposed by NEPA require USACE-Baltimore to evaluate the effects of this action on the quality of the human environment. This supplemental EA will fulfill that requirement and evaluate the impacts of restoring 74 acres of oyster reef habitat in water depths that maintain a 5 foot water depth clearance above restored reefs (between 6 and 9 ft MLLW).

Current and future USACE-Baltimore oyster restoration efforts contribute to the oyster outcomes of the Chesapeake Bay Protection and Restoration Executive Order (E.O. 13508). USACE-Baltimore has been identified with the National Oceanic and Atmospheric Administration (NOAA) to be co-leads for implementation of the oyster outcomes established by E.O. 13508. Furthermore, the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) has been charged with advancing the oyster goal of E.O. 13508. The GIT has now convened interagency workgroups in Maryland and Virginia to plan restoration work in each state, in consultation with appropriate partners. The Maryland

Interagency Workgroup (MIW) is composed of representatives from NOAA, MDNR, USACE-Baltimore, and the Oyster Recovery Partnership (ORP). The MIW is charged with developing and implementing large-scale oyster restoration plans towards meeting the oyster goal of E.O. 13508 and their respective agencies' goals. Based on consideration of salinity levels, available restorable bottom, protection from harvest, historical spat set, and other factors, MIW, in consultation with Maryland oyster restoration partners, selected Harris Creek for large-scale oyster restoration.

Harris Creek is a tributary on the north shore of the Choptank River, near its confluence with the Bay's mainstem. MIW developed a tributary restoration plan that outlines an objective of restoring and rehabilitating 377 acres of oyster reef habitat. Since 2011, USACE has constructed 79 acres of 1-foot high oyster reef using alternate substrates, primarily mixed shell and granite, including 23 acres currently under construction in December 2013. These reefs were constructed at water depths greater than 9 feet. There are an additional 136 acres of restorable bottom between the 6 to 9 foot water depths that are proposed for construction by MIW. MDNR has received a permit from USACE to perform oyster restoration activities in shallow water habitat and is planning on restoring 62 acres. The information generated from the MDNR permitting process will be incorporated into this supplemental EA. USACE-Baltimore is proposing to restore the remaining 74 acres of the shallow water habitat. The proposed areas are identified in the enclosed map in red. The enclosed map presents the full restoration plan for Harris Creek including alternate substrate reefs and seeding sites that have been completed.

Based on past oyster restoration efforts and the enclosed EFH assessment, the District is requesting your concurrence that the proposed project complies with the provisions of the Magnuson-Stevens Fishery Conservation and Management Act, as amended, and as such will not have a substantial adverse effect on essential fish habitat for federally managed species. Please review the enclosed EFH assessment and provide your agency's concurrence or comments within 30 days of the date of this letter. If you have any questions, please call Ms. Angie Sowers at (410) 962-7440.

Sincerely,

Enclosure

Daniel Bierly
Acting Chief, Civil Projects Development Branch

| | |
|---|---|
| **From:** | David O''Brien - NOAA Federal |
| **To:** | Sowers, Angela NAB |
| **Subject:** | Re: [EXTERNAL] Re: Oyster Restoration in the Choptank- Harris Creek and Tred Avon River (UNCLASSIFIED) |
| **Date:** | Thursday, January 09, 2014 9:51:04 AM |

Hi Angela,

Yes, you are correct, the juveniles and adults would most likely be present in the creek during the months of March through September.

Hope this helps!

Dave

David L. O'Brien
Fisheries Biologist
NOAA Fisheries Service
1375 Greate Rd.
P.O. Box 1346
Gloucester Point, VA  23062
804-684-7828 phone
804-684-7910 fax
david.l.o'brien@noaa.gov

On Thu, Jan 9, 2014 at 9:08 AM, Sowers, Angela NAB <Angela.Sowers@usace.army.mil> wrote:

> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Hi Dave,
> Quick question.  Is it correct that windowpane flounder are most likely to be in the project area (Harris Creek) during spring through fall?
>
> Thanks,
> Angie
>
> -----Original Message-----
> From: David O'Brien - NOAA Federal [mailto:david.l.o'brien@noaa.gov <mailto:david.l.o%27brien@noaa.gov> ]
> Sent: Thursday, December 12, 2013 9:47 AM
> To: Sowers, Angela NAB
> Subject: Re: [EXTERNAL] Re: Oyster Restoration in the Choptank- Harris Creek and Tred Avon River (UNCLASSIFIED)
>
> Great, please call my office at 804-684-7828. If you don't reach me we can talk in the morning.
>
> Thanks!
> Dave
>
> David L. O'Brien
> Fisheries Biologist
> NOAA Fisheries Service
> 1375 Greate Rd.
> P.O. Box 1346

Gloucester Point, VA  23062
804-684-7828 phone
804-684-7910 fax
david.l.o'brien@noaa.gov <mailto:david.l.o%27brien@noaa.gov>

On Thu, Dec 12, 2013 at 7:13 AM, Sowers, Angela NAB <Angela.Sowers@usace.army.mil> wrote:

Classification: UNCLASSIFIED
Caveats: NONE

Thanks Dave.
I will be in Annapolis until about 3, but will try to sneak a call into you before I leave at the end of the day.  What phone number should I use?

Thanks,
Angie

-----Original Message-----
From: David O'Brien [mailto:david.l.o'brien@noaa.gov <mailto:david.l.o%27brien@noaa.gov>  <mailto:david.l.o%27brien@noaa.gov < A>> > ]
Sent: Tuesday, December 10, 2013 5:06 PM
To: Sowers, Angela NAB
Subject: [EXTERNAL] Re: Oyster Restoration in the Choptank- Harris Creek and Tred Avon River

Hi Angie,

I'm in Maryland until Thursday for a conference this week.  Please call me when I return to the office on Thursday and we can discuss.

Thanks,
Dave

David L. O'Brien
Fisheries Biologist
NOAA Fisheries Service
P.O. Box 1346
Gloucester Point, VA. 23062

> On Dec 10, 2013, at 10:07 AM, "Sowers, Angela NAB" <Angela.Sowers@usace.army.mil> wrote:
>
> Hi Dave,
>    I am in the Planning Division of USACE Baltimore.  I am the study manager and technical lead for our Oyster Recovery Project.  Our current restoration work is conducted under existing NEPA documentation that permits us to restore habitats, but we must maintain 8 feet of navigational water depth clearance above all oyster restoration activities.  Existing NEPA documents are Chesapeake Bay Oyster Recovery Project, Maryland EA that was completed in 1996, and the 2009 Chesapeake Bay Oyster Restoration Using Alternate Substrate, Maryland EA.  The 1996 EA identified six Oyster Recovery Areas (ORA's) in the Chester, Choptank, Magothy, Nanticoke, Patuxent, and Severn Rivers, and seed bar construction at two sites.  USACE is proposing to remove the 8 foot clearance standard and replace it with a 5 foot water depth clearance to enable more expansive oyster restoration activities that will fulfill restoration goals of EO 13508.  As a result of removing an 8-foot minimum navigational depth clearance, we are undertaking a supplemental EA to evaluate the impacts of restoring oyster reef habitat in water depths that maintain a 5 foot water depth clearance above restored reefs (between 6 and 9 ft MLLW).  We are doing a supplemental EA for Harris Creek work and for Tred Avon work.  In Harris Creek, our regulatory just completed an EA to provide a permit to MDNR for shallow water restoration.  Regulatory did some type of EFH to complete this EA.  I am working to get a copy of that.

We don't have any existing information specific to Tred Avon, but did complete an EFH for the 2009 Alternate Substrate EA and NMFS was fully supportive of the project and stated that they saw no impacts to EFH resources. In 2009, John Nichols (email dated February 9, 2009) provided us with the direction that some areas of the Bay under consideration for oyster restoration as part of this project lie within the general area that may provide EFH for some of the species managed by NMFS. Species for which EFH is a concern were as follows: summer flounder (Paralichthys dentatus), juvenile and adult life stages; bluefish (Pomatomus saltatrix), juvenile and adult life stages; windowpane flounder (Scopthalmus aquosus), juvenile and adult life stages; cobia (Rachycentron canadum), all life stages; red drum (Sciaenops ocellatus), all life stages; king mackerel (Scomberomorus cavalla), all life stages; and Spanish mackerel (Scomberomorus maculatus). For the full EFH assessment John directed us to focus on bluefish, summer flounder, and red drum due to specific habitat criteria. Window pane flounder was dropped for the full assessment because it prefers sandy substrates, and at the time it was thought the project would avoid that type of substrate. However, we have been building alternate substrate reefs (granite and/or mixed shell) on sandy substrates. Therefore, I would like your concurrence that the EFH for shallow water oyster reef construction should focus on bluefish, summer flounder, window pane flounder and red drum for Harris Creek. Using the EFH Mapper, I understand that window pane flounder does not have EFH designated in the sanctuary portion of Tred Avon. The limit of EFH nearly corresponds with the oyster sanctuary line in the southern Tred Avon and we are limited to working in the sanctuary. Therefore, the EFH assessment for Tred Avon would just focus on bluefish, summer flounder, and red drum. Please let me know if you concur with this or if you would like changes made to the species of focus for the EFH assessments for these two supplemental EAs.

>

> Thanks,

> Angie Sowers

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

<>

| | |
|---|---|
| **From:** | Brian Hug -MDE- |
| **To:** | Sowers, Angela NAB |
| **Subject:** | Re: [EXTERNAL] talbot county |
| **Date:** | Thursday, January 16, 2014 7:33:14 AM |

---

got it....all you need to do is mention the current nonattainment status in the county of the project

so I dont see any need for more work on your part

Brian

On Thu, Jan 16, 2014 at 6:59 AM, Sowers, Angela NAB <Angela.Sowers@usace.army.mil> wrote:

Hi Brian,

I am the study manager for our oyster restoration program. We currently have been constructing oyster reef habitat in Harris Creek for the past 3 winters. This work is carried out under a 2009 Environmental Assessment focused on the use of alternate substrates for oyster restoration. It was a baywide EA for Maryland. Anna Compton completed an air quality assessment and coordinated that compliance with you in 2009. Our existing NEPA (the 2009 EA and the original 1996 EA that initially allowed us to do oyster restoration) are limited to performing restoration in water depths greater than 9 feet. We typically build reefs to a height of 12 inches off the bottom. The idea was that we would leave at least 8 feet of navigational water clearance above the reefs to avoid any navigational conflicts. However, now that oyster restoration has shifted to large-scale, tributary based restoration where we are concentrating reef restoration with the goal of affecting a system-wide change that will be sustainable in the long-term, we are doing a supplemental EA to evaluate extending reef restoration into shallower water depths (6 to 9 ft). These areas are historic oyster habitat and needed to reach project goals. We are also undertaking a shallow water EA for restoration in Tred Avon. My question is that since these tributaries are in Talbot County and Talbot Co. is in attainment for all NAACS air pollutant standards, do we have to do anything further for Clean Air Act compliance?

I can be reached today at 443 676 4679 <tel:443%20676%204679> if you want to discuss.

Thank you for responding to my phone message.
Angie

From: Brian Hug -MDE- [mailto:brian.hug@maryland.gov]
Sent: Wednesday, January 15, 2014 06:54 AM
To: Sowers, Angela NAB
Subject: [EXTERNAL] talbot county

Angela

im not in the office much the next few days...email me your question(s) and I will get back to you as quick as I can

Brian

--
Brian J. Hug
Deputy Program Manager
Air Quality Planning Program
Maryland Department of the Environment
1800 Washington Boulevard

Baltimore, Maryland 21230
410â€ž537â€ž4125

--
Brian J. Hug
Deputy Program Manager
Air Quality Planning Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
410â€ž537â€ž4125

# United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

February 11, 2014

Daniel Bierly
U.S. Army Corps of Engineers, Baltimore District
Planning Division
Baltimore, Maryland 21014

*RE: Supplemental Environmental Assessments to investigate opportunities to expand oyster restoration activities within the Tred Avon River to shallower water depths; and, to investigate opportunities to expand oyster restoration activities within Harris Creek to shallower water depths.*

Dear Mr. Bierly:

The U. S. Fish and Wildlife Service (Service) appreciates the opportunity to comment on the Army Corps of Engineers' (ACOE) plan and future strategies for expanding oyster restoration in the Tred Avon River and Harris Creek. This letter constitutes the report of the Service on the proposed supplemental Environmental Assessments and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48stat. 401, as amended; 16 U.S.C. 661 et sec.)

Oyster restoration is vital to the health and long-term stability of the Chesapeake Bay ecosystem. Restoration sites located in the Tred Avon and Harris Creek were selected after long discussions with Federal, State partners and non-governmental stakeholders. These sites are well suited for oyster restoration and have an excellent chance for success. Historically, oyster reefs in the bay were in much shallower water than initially proposed for these sites, and the effort to expand into shallower waters could bring the oyster closer to their historic natural state. Therefore, the Service fully supports the opportunity to restore oysters to shallower depths in these systems. The Service appreciates the opportunity to comment on ACOE's planning projects; particularly those that we believe will benefit Fish and Wildlife resources in the Chesapeake Bay. If you have any questions, please feel free to contact Chris Guy at 410-573-4529.

Sincerely,

Genevieve LaRouche
Supervisor

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

MAR 10 2014

Mr. Daniel Bierly
Acting Chief, Civil Projects Development Branch
Baltimore District, Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Attn: Angie Sowers

Re: Harris Creek Shallow Water Oyster Restoration, EFH Assessment

Dear Mr. Bierly,

We have reviewed the essential fish habitat (EFH) assessment submitted in association with the supplemental Environmental Assessment (EA) prepared to investigate expanding oyster restoration activities within Harris Creek. Specifically, you are proposing to remove the existing 8-foot clearance standard above restored oyster reefs in Harris Creek and replace it with a shallower 5-foot water depth clearance standard. This change would allow for the expansion of reef building activities on an additional 136 acres in the Harris Creek oyster sanctuary where depths range between 6 and 9 ft. MLLW, thus increasing suitable areas available for oyster restoration activities designed to meet the goals of the Chesapeake Bay Protection and Restoration Executive Order (E.O. 13508).

Your office previously coordinated with Mr. John Nichols of our Annapolis, MD field office on the 2009 *Chesapeake Bay Oyster Recovery Using Alternative Substrate, Maryland* EA and determined that some areas of the Chesapeake Bay under consideration for oyster restoration in Maryland, including Harris Creek, may be designated as essential fish habitat (EFH) for federally managed species. As indicated in your *Shallow Water Oyster Restoration in the Harris Creek Oyster Sanctuary* EFH assessment, the placement of natural shell or alternative substrate will be conducted at existing oyster bars within Harris Creek at water depths between 6 and 9 ft. MLLW. Some areas of substrate placement will occur adjacent to existing submerged aquatic vegetation (SAV), designated a habitat area of particular concern (HAPC) for federally managed red drum and summer flounder. You have indicated in your EFH assessment that the placement of alternative reef material will not occur within 300 ft. of SAV beds and that reef construction typically occurs between December and March, outside the typical growing season for SAV. Provided reef construction does not occur within 300 ft. of existing SAV beds and the placement of natural shell or alternative substrate occurs between December and March of any year as indicated in your EFH assessment, minimal adverse impact to SAV or HAPC is anticipated.

We support efforts underway by your office, the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) and Maryland Interagency Workgroup (MIW) to restore oyster reef habitat, critically important to various life stages of numerous state and federally managed species, in Maryland tributaries such as Harris Creek. Therefore, provided the reefs are constructed as outlined in your EFH assessment, we concur with your determination that shallow water oyster restoration (between 6 and 9 ft. MLLW) in Harris Creek will have minimal adverse effects on EFH or HAPC.

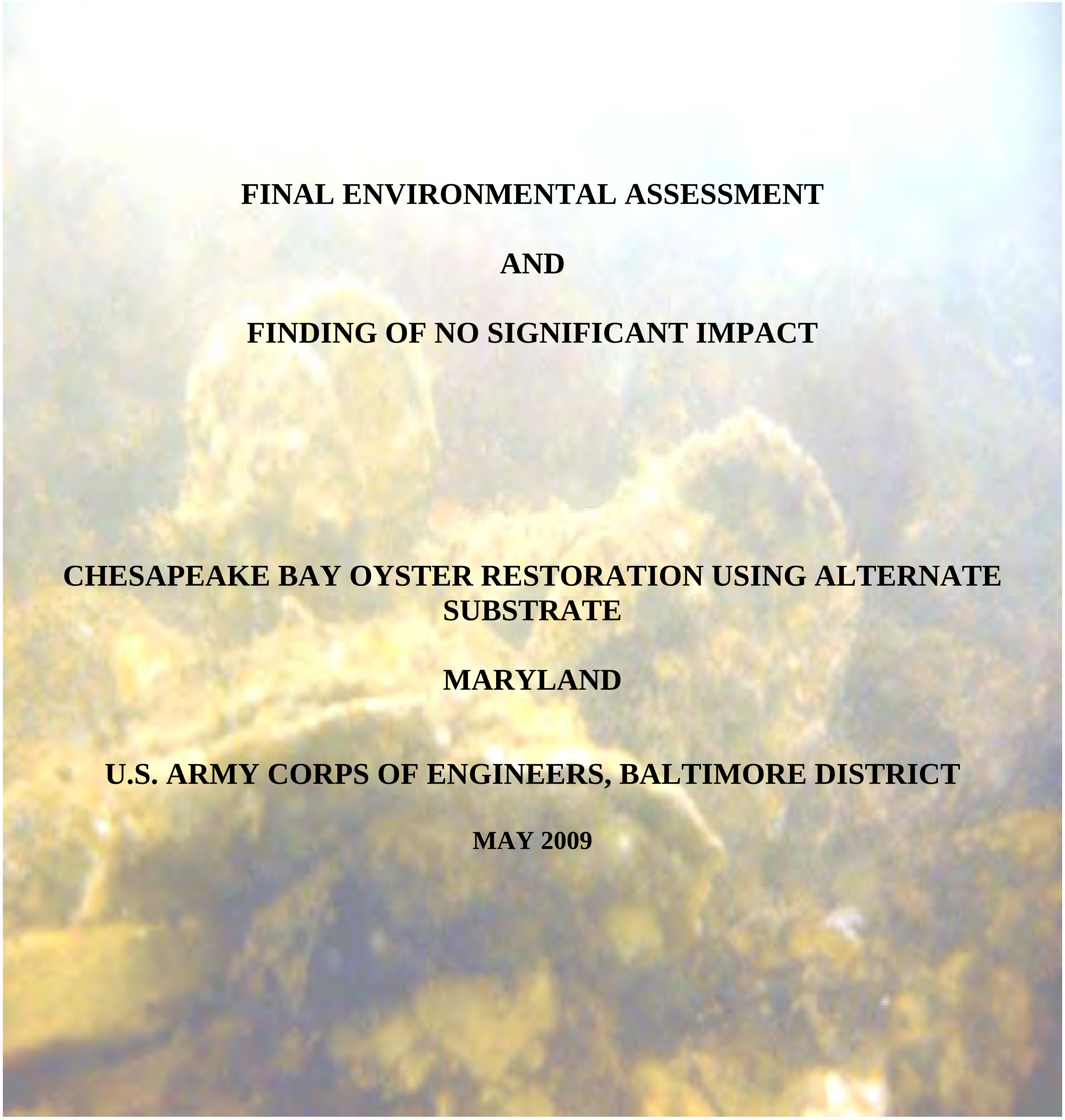
Please feel free to contact Mr. David L. O'Brien of our Virginia field office at 804-684-7828 (david.l.o'brien@noaa.gov) if you have any questions or require additional information

Sincerely,

Christopher Boelke
Field Offices Supervisor
Habitat Conservation Division

cc. Stephanie Westby, NOAA Restoration Center

# Appendix F – Existing NEPA documentation relevant to USACE oyster restoration



# FINAL ENVIRONMENTAL ASSESSMENT

# AND

# FINDING OF NO SIGNIFICANT IMPACT

## CHESAPEAKE BAY OYSTER RESTORATION USING ALTERNATE SUBSTRATE

## MARYLAND

## U.S. ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT

**MAY 2009**

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DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

# FINDING OF NO SIGNIFICANT IMPACT

# CHESAPEAKE BAY OYSTER RESTORATION USING ALTERNATE (NON-OYSTER SHELL) SUBSTRATE

## MARYLAND

In 1996, U.S. Army Corps of Engineers, Baltimore District (USACE) completed a report, the *Chesapeake Bay Oyster Recovery Project*, Maryland which documents the plan formulation conducted by USACE and the non-Federal sponsor, Maryland Department of Natural Resources (MD DNR) for restoration in the Chesapeake Bay within the Oyster Recovery Areas of the Chester, Choptank, Patuxent, Severn, Magothy, and Nanticoke Rivers. Implementation of the eastern or American oyster (*Crassostrea virginica*) restoration recommendations made by this plan began in 1997 and is ongoing, but is restricted to using only oyster shell for substrate. A supplemental Environmental Assessment (EA) was prepared in 1999 to evaluate the construction of seed bars in the Eastern Bay of Queen Anne's County, Maryland. Additionally, another supplemental EA was prepared in 2002 that evaluated the cost effectiveness of USACE-led oyster restoration in order to continue construction activities. Oyster shell is in short supply. This has hampered past activities and is expected to impact future oyster restoration activities if alternate substrate is not used to create oyster bars and reefs.

USACE proposes the use of alternate substrate in addition to oyster shell to construct oyster bars and reefs within the Maryland portion of the Chesapeake Bay and its tidal tributaries. Restoration projects assessed for this action would be performed under the Corps' authority to restore native oysters codified in 33 U.S.C. § 2263. This construction is targeted to begin in spring/summer 2009, and will continue in annual cycles thereafter, subject to availability of funding. Potential substrate includes (but is not limited to) clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any substrate utilized would be clean material and free of building debris such as wiring, pipes and other debris. No protruding re-bar would be allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls).

USACE has prepared an EA documenting the expected project impacts of using alternate substrate for Corps projects implemented in the Maryland portion of the Chesapeake Bay. This EA was prepared in accordance with the provisions of the National Environmental Policy Act of 1969, as amended. Potential impacts from the proposed action 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. This EA documents the overall effects of the proposed action and finds that there will be minor, temporary impacts, during construction to benthic organisms, local turbidity, recreational and commercial fishermen, fish (eggs, larval, and juvenile stages) as well as noise levels and aesthetics for residents. There will be a long-term beneficial impact and no long-term adverse impacts associated with the project.

In accordance with Section 404 of the Clean Water Act, a Section 404(b)(1) analysis was conducted for the proposed action. The analysis determined that the use of alternate substrate to create oyster bars and reefs would result in beneficial impacts to the aquatic environment. On August 13, 2008 USACE (Baltimore Operations Division) signed a FONSI and issued a permit under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act to allow MD DNR to use alternate substrate materials to construct oyster sanctuaries and harvest reserves (Permit # CENAB-OP-RMN (MD DNR/Alternate Material) 2007-03659-M24).

Upon reviewing the EA, I find that the potential negative impacts to benthic and open water habitat associated with the implementation of the project will occur over a small area and will be short-term. 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 and does not constitute a major Federal action significantly affecting the quality of the human environment. Based upon this finding, preparation of an Environmental Impact Statement (EIS) is not required.

Peter W. Mueller
Colonel, Corps of Engineers
District Engineer

Date: 29 May 2009

## EXECUTIVE SUMMARY

As part of the Chesapeake Bay Oyster Recovery Project, Maryland the U.S. Army Corps of Engineers, Baltimore District (USACE) is undertaking the preparation of this environmental assessment (EA) to construct and cost share eastern or American oyster (*Crassostrea virginica* bar and reef restoration in the Maryland portion of the Chesapeake Bay and its tributaries using alternate (non-oyster shell) substrate, as authorized by Section 5021 of Water Resources Development Act (WRDA) of 2007. Previous oyster restoration efforts in this area by USACE have been limited to the use of clean oyster shell as substrate, which has become increasingly unavailable. The purpose of this proposed action is to enhance oyster propagation efforts in the Chesapeake Bay and six tidal tributaries (Chester, Choptank, Patuxent, Severn, Magothy, and Nanticoke Rivers) by seeding native oysters on alternate (non-oyster shell) materials. Taking this action within Maryland natural oyster bars (NOB's) will assist the regional effort of establishing an abundant and self-sustaining oyster population. These efforts support the Chesapeake Bay Program 2000 Agreement and 2005 Oyster Management Plan (OMP). The proposed project is located in the Chesapeake Bay and its tidal tributaries in Maryland. The non-Federal sponsor is the Maryland Department of Natural Resources (MD DNR).

Construction using alternate substrate rather than oyster shell is targeted to begin in spring/summer 2009 and continue thereafter in annual placement cycles subject to the availability of funds. Potential alternate substrate for construction includes (but is not limited to) clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be placed would be free of building debris such as wiring, pipes and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). On August 13, 2008, USACE (Baltimore District Engineer) signed a Finding of No Significant Impact (FONSI) in response to a Permit Evaluation and Decision Document (EA) to permit MD DNR to use alternate materials to construct oyster sanctuaries and harvest reserves.

The Baltimore District prepared oyster restoration decision documents in 1996, 1999, and 2002. These reports address the use of oyster shell; not alternate substrate. Areas considered and addressed in the 1996 report are designated Oyster Recovery Areas (ORA's) within the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers. A supplemental EA was prepared in 1999 to evaluate the use of the Eastern Bay as a seed bar area for the project. Additionally, another supplemental EA was prepared in 2002 that evaluated the cost effectiveness of USACE-led oyster restoration in order to continue construction activities.

This project is authorized under Section 704(b) of WRDA 1986, as amended by Section 505 of WRDA 1996, Section 342 of WRDA 2000, Section 113 of the Energy and Water Development Appropriations Act (EWDA) of 2002, and Section 5021 of WRDA 2007. Section 505 of WRDA 1996 increased the authorization limit from $5 million to $7 million. Section 342 of WRDA 2000 further increased the project authorization limit to $20 million, as well as provided guidance on allowable project activities. Section 113 of the EWDA further modified the authorization to permit the non-Federal interest to provide its share, including the provision of suitable shell stock, as in-kind services, and permits USACE to consider such services provided on or after October 1, 2000. The authorization for the program is codified at 33 U.S.C. 2263, entitled 'Study of Corps Capability to Conserve Fish and Wildlife'. One of the provisions of WRDA 2007 provides the USACE with authority to construct restore and rehabilitate habitat for fish, including native oysters, in the Chesapeake Bay and its tributaries in Maryland and Virginia, and to evaluate and use appropriate alternative substrate material for these projects.

The analysis conducted in this supplemental EA identifies minor, temporary, and short term adverse impacts from using alternate substrate. There is a net beneficial impact from this proposed action that will contribute to the restoration of oyster populations and overall ecology of the Chesapeake Bay.

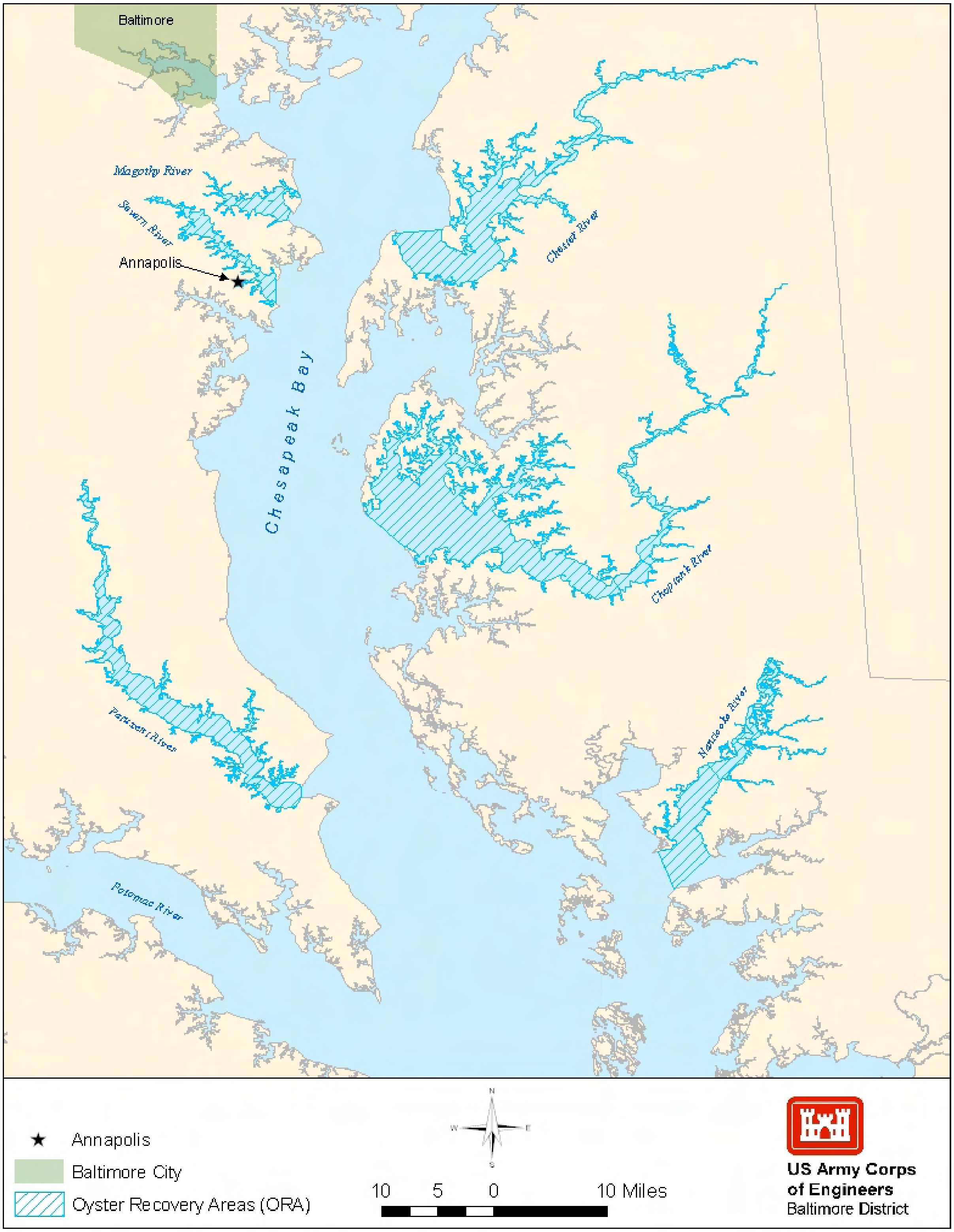
# TABLE OF CONTENTS

## 1.0 INTRODUCTION

The U.S. Army Corps of Engineers, Baltimore District (USACE) is preparing this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA). The EA addresses the use of alternate (non-oyster shell) substrate in Maryland waters as part of the USACE Chesapeake Bay Oyster Recovery Project. The overall purpose of the proposed alternate substrate project is to enhance eastern or American oyster (*Crassostrea virginica)* propagation efforts in the Chesapeake Bay and its tidal tributaries, specifically the Chester, Choptank, Patuxent, Severn, Magothy, and Nanticoke Rivers, in Maryland, by seeding native oysters on alternate substrate within natural oyster bars (NOBs). All previous oyster restoration efforts by USACE have been limited to the use of clean oyster shell as substrate which has become increasingly unavailable due to overharvesting and disease. This work, similar to all previous oyster restoration efforts by USACE in the Maryland portion of the Bay and its tributaries, aids in the rehabilitation of oyster bar habitat and the re-establishment of an abundant and self-sustaining oyster population. These efforts support the Chesapeake Bay Program (CBP) 2000 Agreement and 2005 Oyster Management Plan (OMP) prepared by the Environmental Protection Agency (EPA).

In 1996, USACE completed a report, the *Chesapeake Bay Oyster Recovery Project*, which documents the plan formulation conducted by USACE and the non-Federal sponsor, Maryland Department of Natural Resources (MD DNR). This supplemental EA for alternate substrate is consistent with the goal and authority of this recovery project which provides the bar and reef development material upon which to construct future bars and reefs. Implementation of the recommendations made by this plan began in 1997 and is ongoing, but is restricted to using only oyster shell for substrate. The 1996 EA proposed the following: creation of new oyster bars and rehabilitation of existing non-productive bars; 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. Areas addressed in the 1996 report are designated Oyster Recovery Areas (ORA's) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers (Figure 1). A supplemental EA was prepared in 1999 to include the construction of seed bars in the Eastern Bay area. Additionally another supplemental EA was prepared in 2002 that evaluated the cost effectiveness of USACE-led oyster restoration in order to continue construction activities. Appendix F contains cover pages and authorization letters for these oyster decision documents.

**Figure 1. Chesapeake Bay Oyster Recovery Areas**



All previous oyster restoration efforts by USACE in these areas have been limited to the use of clean oyster shell as substrate. In order for USACE to construct and cost share oyster bar and reef restoration using alternate substrate, as was authorized by the Water Resources Development Act (WRDA) of 2007, USACE is undertaking the preparation of this EA. Construction using alternate substrate rather than oyster shell is targeted to begin in spring/summer 2009 and continue annually thereafter subject to the availability of program funds. Potential alternate substrate for construction includes (but is not limited to) clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be planted would be free of building debris such as wiring, pipes and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls).

On August 13 2008, USACE (Baltimore Operations Division) signed a Finding of No Significant Impact (FONSI) and issued a permit to MD DNR to use alternate materials to construct oyster sanctuaries and harvest reserves (Permit #CENAB-OP-RMN (MD DNR/Alternate Material) 2007-03659-M24) (Appendix E). The proposed action of this EA is the USACE-led equivalent of the permitted MD DNR action.

### 1.1 Authority

This project is authorized under Section 704(b) of WRDA 1986, as amended by Section 505 of WRDA 1996, Section 342 of WRDA 2000, Section 113 of the Energy and Water Development Appropriations Act (EWDA) of 2002, and Section 5021 of WRDA 2007. Section 505 of WRDA 1996 increased the authorization limit from $5 million to $7 million. Section 342 of WRDA 2000 further increased the project authorization limit to $20 million, as well as provided guidance on allowable project activities. Section 113 of the EWDA further modified the authorization to permit the non-Federal interest to provide its share, including the provision of suitable shell stock, as in-kind services, and permits USACE to consider such services provided on or after October 1, 2000. The authorization for the program is codified at 33 U.S.C. 2263, entitled ‘Study of Corps Capability to Conserve Fish and Wildlife’. One of the provisions of WRDA 2007 provides the USACE with authority to construct restore and rehabilitate habitat for fish, including native oysters, in the Chesapeake Bay and its tributaries in Maryland and Virginia, and to evaluate and use appropriate alternative substrate material for these projects.

### 1.2 Study Area

The proposed project is located in the Chesapeake Bay and its tidal tributaries in Maryland and specifically on the designated ORA’s of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers (Figure 1) which is the same project area established in the 1996 document. The plantings of alternate material would take place on NOB’s in the Chesapeake Bay.

### 1.3 Recent and Proposed Federal Actions Affecting the Study Area

The Chesapeake Bay Oyster Recovery Project has been performed in two phases: Phase I was conducted in 1996-2000 and Phase II activities were beyond 2000. A 2002 decision document entitled *Chesapeake Bay Oyster Recovery Project, Maryland* completed by USACE initiated Phase II construction beyond 2000. This document provided the basis to amend the project cooperation agreement (PCA) to extend the duration of construction activities and increased the project cost to $6.7 million. As in Phase I, MD DNR was the local sponsor. The activities implemented in Phase II projects were identical to those implemented under Phase I. Of the six areas authorized in Phase I, Phase II activities were limited to the Chester, Choptank, and Patuxent Rivers. The areas excluded for Phase II construction were judged to not have suitable substrate and environmental conditions. Phase II activities have resulted in the construction of 250 acres in the Chester, Choptank, and Patuxent Rivers between 2001 and 2008.

The original Phase I project was described in the C*hesapeake Bay Oyster Recovery Project, MD* report prepared by the Baltimore District in May 1996. The 1996 report covered construction activities and potential environmental impacts for the four-year period of 1997 through 2000. The report addressed alternatives, risk management, and included an EA and FONSI that were fully coordinated with the public and resource agencies. The 1996 report and EA recommended hatchery upgrades, seed bar construction, seed bar harvests and replanting, new bar construction, planting of hatchery-produced seed, and planting disease-resistant strains of native oyster in various locations in the Bay. This report evaluated actions in six ORAs: Chester, Choptank, Severn, Magothy, Nanticoke, and Patuxent Rivers plus the construction of seed bars near James Island and Smith Island in the lower portion of the Chesapeake Bay in Maryland. The Smith Island, James Island and the Eastern Bay (1999 EA) areas are not ORA's but are suitable for the growing of oysters to be used as seed oysters at ORAs.

Although evaluated as an alternative, the 1996 recommended plan did not include the use of alternate materials for bar construction other than the use of dredged material in geotextile tubes. At the time, the construction of oyster bars and reefs through the use of concrete and other materials was being addressed by the Maryland Artificial Reef Program and the CBP, and was therefore not included in further USACE projects. Phase I project construction activities through 2000 resulted in the creation of 99 acres of new bars at a cost of $3.3 million. The construction was carried out in the Choptank, Magothy, Patuxent, Chester, and Severn Rivers.

A supplemental EA *Construction of Seed Bars in Eastern Bay as part of Chesapeake Bay Oyster Recovery Project, MD* was completed by USACE-Baltimore in 1999. The 1999 report evaluated seed bar construction in Eastern Bay, the use of dredged material in geotextile tubes as an alternate substrate, and planting of hatchery seed. The use of dredged material for oyster restoration was determined to be infeasible due to time and funding constraints. Additionally, due to hatchery seed limitations at the time, the construction of seed bars in Eastern Bay was deemed to provide a better source of seed for restoration activities.

Additionally, the non-profit group, Oyster Recovery Partnership (created in 1994) works with experts in their respective fields and management agencies including National Oceanic and Atmospheric Agency (NOAA), USACE, and MD DNR to coordinate oyster restoration efforts among state and federal governmental agencies, scientists, watermen and conservation organizations. Experts include scientists from the University of Maryland Center for Environmental Science (UMCES) environmental organizations like the Chesapeake Bay Foundation and Maryland watermen. Since 1994, the Maryland Oyster partners have planted more than 1.6 billion oysters on 1,100 acres, a majority of which are permanently protected and managed. Production output has increased from 15 million oysters per year, to a record 525 million, disease-free, spat on shell in 2008 https://www.oysterrecovery.org/.

Baywide funds contributed by Maryland, Virginia and Federal government agencies such as the NOAA, USACE, and others, to support in-water restoration of the native oyster population and recovery of the fishery throughout the Chesapeake Bay totaled approximately $17 million for sanctuaries and $41 million for harvest areas from 1994 through 2006 (USACE, 2008). The current high rate of loss of oyster habitat from overharvesting and disease is estimated at 2,600 acres per year (USACE, 2008). This high rate of loss combined with the disappearance of sources of oyster shell for enhancing habitat are generally recognized as major obstacles to all oyster restoration efforts. As implemented to date, management programs have produced no substantial increase in oyster harvests over the past decade. The likelihood of attaining the Chesapeake 2000 goal of a standing oyster population that is 10 times greater than the 1994 baseline by the year 2010 appears small (USACE, 2008).

Currently, the USACE, Baltimore and Norfolk Districts are jointly preparing a Native Oyster Restoration Master Plan (NORMP) that will be instrumental in large scale oyster restoration for the entire Bay. Maryland and Virginia historically have managed oysters in their respective portions of the Bay separately, using a combination of harvest restrictions, size limits, habitat enhancement, and planting of seed oysters to support the oyster fishery.

In addition to the development of the NORMP, each state continues to have separate programs for restoration in their respective portions of the Chesapeake Bay. Over the next three years, MD DNR plans on implementing recommendations made by the Oyster Advisory Commission (OAC) report. This report was released in 2009 and includes investing in training and infrastructure to encourage aquaculture, undergoing oyster bar rehabilitation, reopening the Piney Point Hatchery for seed production, and investing in cameras to monitor oyster sanctuaries to deter poaching. The Virginia Marine Resources Commission (VMRC) plans on implementing recommendations made by the Blue Ribbon Oyster panel report which was released in 2007 including the creation of larger oyster sanctuaries, rotating oyster bars for harvesting, and developing a commercial fishery for cownose rays which are a predator of oysters. NOAA was recently appropriated $4.6 million dollars for Fiscal Year (FY) 2009 for MD and VA oyster restoration activities; specific activities to be carried out by NOAA with this funding are still being determined.

## 2.0 PURPOSE AND NEED

NEPA requires the preparers of an EA to develop specific definitions of the purpose and need of a proposed action so that reasonable alternatives can be formulated for objective and consistent analysis and evaluation.

### 2.1 Purpose

The purpose of the project is to evaluate the use of alternate substrate to restore oyster habitat and to increase populations of the eastern oyster in the Chesapeake Bay. In addition to having economic value as a commercial fishery, oysters provide significant environmental benefits. Oysters are a keystone species in the Chesapeake Bay, serving both water quality and habitat functions. There is no substitute for a thriving oyster community in the Bay. The oysters filter the water, play an important role in sediment and nutrient removal, and provide a hard structure that serves as habitat for not only future oyster generations, but also a variety of fish and benthic species, including economically important species such as juvenile striped bass and blue crabs. It is anticipated that restoring functioning oyster bars and reefs would provide habitat and water quality improvements, at least locally, that will promote a healthy estuarine system.

Oyster restoration is a significant component of current efforts to restore the Chesapeake Bay ecosystem. The proposed project supports objectives of CBP 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 and other USACE oyster restoration projects and reports.

The Maryland OAC released a 2008 Legislative Report that recommended a multi-faceted strategy for restoring the Chesapeake's native oyster population and specifically highlighted the need to identify new sources of substrate:

> "*Increasing and diversifying sources of disease free oyster seed and identifying new sources of substrate to meet future ecologic and economic needs.*"

### 2.2 Need

A need exists to restore the ecological role of oysters in the Bay that would restore lost functions such as sediment and nutrient removal.

The oyster was historically found in extensive bars and reefs many acres in size throughout its range in the Chesapeake Bay watershed. These bars and reefs covered an estimated 200,000 to 400,000 acres prior to harvesting by European settlers. Today, oyster stock is estimated to be just one percent of its historical abundance. The current estimate of oyster bar and reef area in the Bay is 20,000 acres, and remaining bars and reefs are in very poor condition. It is estimated that 2,600 acres of habitat are degraded and lost per year (USACE, 2008).

### 2.3 Problem Identification

Oyster populations in Maryland have declined dramatically since the turn of the century, largely due to parasitic diseases, historic overharvesting, declining water quality, and the loss of habitat. Various decision documents USACE (1996, 1999, 2002) as discussed in previous sections, discuss these problems in detail. Extensive research confirming the decline of oyster populations in the Chesapeake Bay have been conducted by various agencies such as the Chesapeake Bay Program, NOAA, University of Maryland, and the National Research Council (NRC) and there are many reports supporting these conclusions such as the CBP (2007) *Chesapeake Bay 2006 Health and Restoration Report, Part One: Ecosystem Health;* Newell (1988) *Ecological Changes in Chesapeake Bay: Are they the Result of Overharvesting the Eastern Oyster;* NRC (2004) *Nonnative Oysters in the Chesapeake Bay;* Rothschild et al. (1994) *Decline of the Chesapeake Bay Oyster Population: a Century of Habitat Destruction and Overfishing;* and Smith et al. (2005) *Assessment of Recent Habitat Conditions on Crassostrea virginica bars in Mesohaline Chesapeake Bay*.

The main focus of the proposed action is to use alternate substrate to address habitat loss and subsequent scarcity of oyster shell for restoration activities.

#### 2.3.1 Habitat Loss

Much of the historical range of oyster habitat has been lost, and total oyster habitat in the Maryland portion of the Bay has been estimated to be one percent or less of what it was in the late 1800s. Harvesting directly removes habitat by removing shell, culminating in a flattening and fragmenting of oyster bars. Flattening of bars places oysters lower in the water column exposing them to reduced currents, 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 (CBP, 2005). Free-swimming oyster larvae attach to oyster shells or other hard substrate in a process known as "setting." Larval setting has been impaired as habitat has been reduced, fragmented, and dispersed. Siltation of oyster bars further reduces the amount of suitable habitat for larval setting and impairs the health of adult oysters.

#### 2.3.2 Scarcity of Oyster Shell for Restoration

Programs to replenish or recondition hard bottom oyster substrate have been under way for more than 100 years. Numerous Federal, State, and Local entities have come together under a broad commitment agreement called Chesapeake 2000 (C2K) and set a goal to restore oysters 10-fold by 2010 (estimated to be approximately 10,000 acres). Recently, this goal has been refined to implementing oyster restoration practices on 2,466 acres of oyster bar and reef habitat between 2007 and 2010 (CBP, 2008). Following the C2K efforts, there was a sharp increase in the need for dredge shell; in fact, so much that the existing available sources are being rapidly depleted, and new sources or alternatives are being sought. In order to restore long-term goals of significant acreage and a sustainable population, many of the historic sites will need to be reshelled.

The oyster-shell dredging and planting program in Maryland began in 1960. Buried shells were dredged, washed, and transported to productive oyster bars, where they were planted with oyster spat. Due to stakeholder concerns regarding shell dredging practices altering the bottom substrate, thereby impacting other fisheries and creating sediment plumes, the shell-dredging program ceased in 2006 (USACE, 2008). The MD DNR has investigated alternative means of enhancing substrate suitable for oysters. One alternative is shell reclamation. This involves retrieving previously planted shell that has been reburied due to siltation. Another management technique, seed-area plantings, involves planting shell located in areas of high salinity where large spat sets are most likely to occur, and the resulting spat are moved to areas of lower salinity to attempt to protect them from disease (MSX and Dermo) that occur in the higher salinity waters.

Prior to significant degradation of the oyster population, oyster shell was readily available in the region and was used not only for restoration and repletion, but also for roadbed and driveways, and as crushed calcium sources, fertilizer additives, and chicken feed. As oyster populations collapsed in the past 50 years, not only have oyster shell resources become scarce, but the collapse in itself has resulted in a greater need for shell for restoration. Numerous Federal, State, and Local entities committed to the Chesapeake 2000 goal of restoring oysters 10-fold by 2010 which equates to more than 10,000 acres at 10,000 to 100,000 bushels of dredged oyster shell per acre. Although this goal has bee recently refined to 2,466 acres between 2007 and 2010, the original goal speaks to the scale of restoration that needs to be met to restore a long-term sustainable oyster population.

In recent decades, clean oyster shell for restoration was available from shucking houses and restaurants, but the primary source has been dredged fossil oyster shell deposits. Fossil shell deposits had been dredged from the northern Bay tributaries at levels that have reached approximately 2 to 3 million bushels in any given year (E. Campbell, MD DNR, personal communication February 17, 2009). However, many of the shell deposits fall within traditional fishery management protection zones because they are seasonally important spawning or nursery grounds for anadromous and other commercially important fish species. Dredging fossils shell produces turbidity and sediment-related impact issues on water quality and habitat. Recently, there have been concerns with the environmental impacts of dredging, specifically to spawning and nursery grounds of commercially important fish species. As a result, the dredging of fossil shell deposits was discontinued in Maryland in 2006. Fossil oyster shell had constituted approximately 95 percent of the substrate placed for oyster restoration since 1986 (MD DNR, Chris Judy, email dated Feb 6, 2009). Without the ability to dredge fossil shell, oyster restoration using clean oyster shell has come to a halt. Restaurants and shucking houses do not currently produce the volumes necessary to restore the desired acres of oyster beds. MD DNR plans to submit a permit to dredge fossil shell in limited areas.

## 3.0 EXISTING CONDITIONS

As allowed by 40 CFR 1508 information from previous Baltimore District and Norfolk District reports are incorporated by reference. Appendix F contains the cover pages and approval letters (FONSI or Record of Decision) for the following documents incorporated by reference in the report:

*Chesapeake Bay Oyster Recovery Project Report January 1996.*

*Environmental Assessment for the Construction of Seed Bars in Eastern Bay as Part of the Chesapeake Bay Oyster Recovery Project, July 1999.*

*Decision Document Chesapeake Bay Oyster Recovery Project, Maryland; dated May 2002.*

*Programmatic Environmental Impact Statements for Oyster restoration in Chesapeake Bay Including the Use of a native and/or Nonnative dated October 2008.*

The project sites are open water with hard shell bottom, portions of which have been previously dredged for over 40 years for oyster restoration efforts. The plantings of alternate material could take place on NOBs in the Chesapeake Bay within the ORAs of the Chester, Choptank, Patuxent, Severn, Magothy, and Nanticoke Rivers.

### 3.1 Physical Environment

#### 3.1.1 Physiography and Topography

The Chesapeake Bay proper encompasses over 2,200 square miles. If tributaries are included, this area becomes approximately 4,400 square miles. Nineteen principal rivers and 400 lesser creeks and streams are tributaries to the Bay (Lippson and Lippson 1984).

The Bay lies within the Atlantic Coastal Plain Physiographic Province. Coastal plain topography exhibits rolling hills and broad open valleys with streams that have flat slopes and shallow channels. The Chester, Choptank, and Nanticoke rivers are located on the Eastern Shore of Maryland. The Magothy, Severn, and Patuxent rivers are on the Western Shore of Maryland. 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 River are narrow, and some reaches are enclosed by high banks. The Patuxent River is the deepest Maryland tributary to the Bay with depths over 130 feet, but it has sufficient shallow areas to support a large amount of oyster habitat.

The Chesapeake Bay is an estuary, which is defined as a semi-enclosed coastal body of water where the flow of freshwater mixes with high-salinity ocean water (White, 1989). Salinity increases from the head of the Bay and the head of each Bay tributary in a downstream direction to an average of about 15 parts per thousand (ppt) in the mid-Bay. Salinity of ocean water averages 30 to 35 ppt. Salinity levels within the Bay vary widely, both seasonally and from year to year depending on the volume of flowing freshwater. The average depth of the mainstem of the Bay is less than 30 feet, and the average depth of the entire system, including all tidewater tributaries, is 20 feet. The vast expanses of relatively shallow water in the Bay support a wide variety of bottom life. The tidal range of the Bay is about 3 feet at the mouth, gradually decreasing to 1 foot in the vicinity of Annapolis, from where it increases to approximately 2 feet at the head of the Bay.

### 3.1.2 Geology

The Chesapeake Bay lies within the Atlantic Coastal Plain Physiographic Province. The Coastal Plain consists of layers of sediment laid down in ancient marine, estuarine, and riverine environments tens of millions of years ago. These sedimentary deposits originated from changes in sea level over geologic time that allowed deposition of sediment when the area was flooded by ancient seas.

### 3.1.3 Soils

The aquatic substrate is firm sand, firm silt, mud and shells. The project sites are open water with hard shell bottom, portions of which have been previously dredged for over 40 years for oyster restoration efforts.

### 3.1.4 Prime and Unique Farmlands

Prime farmland is available land that provides the best combination of physical and chemical characteristics for producing crops. As the project would be constructed in open water, there are no prime or unique farmlands located within the project area.

### 3.1.5 Bathymetry

The mean depth of existing oyster habitat in Maryland's portion of the Bay is 13 feet, with a range of 6 feet to 30 feet (USACE, 2008).

### 3.1.6 Water Quality

The waters that flow into the Bay carry effluent from wastewater treatment plants and septic systems serving a population of 18 million people, and nutrients, sediment, and toxic substances from a variety of anthropogenic sources, such as agricultural lands, industrial discharges, automobile emissions, and power generating facilities. Five major rivers contribute 90 percent of the freshwater delivered to the Bay: Susquehanna, Potomac, Rappahannock, James, and York (USACE, 2008).

Hypoxic waters generally occur in the Bay during the summer of each year in deep areas of the mainstem and at the mouths of the major tributaries. From 1985 to 2006, during the period June through September, on average 1.44 percent of the volume of the mainstem was anoxic, and 5.25 percent was hypoxic (CBP, 2007). Water quality data gathered between 2004 and 2006 indicate that only about 33 percent of the Bay's tidal waters met standards for dissolved oxygen (DO). DO levels are the concentrations established by regulatory agencies as appropriate for biota that occupy different habitats in the Bay, including open water, deep water, and deep channel during the months of June through September (http://www.chesapeakebay.net/do.htm).

Impaired water quality in the Bay is linked to nutrient over-enrichment and high concentrations of suspended sediment. Forest clearing, agricultural practices, and urban development contribute large amounts of nutrients and sediment that are transported to the Bay by its tributaries. Increased algal growth (from nutrient over-enrichment) and sediment runoff also contribute to reducing water clarity in Chesapeake Bay.

Water clarity is usually low in the upper Bay (above 39ºN latitude). The lower Bay generally has the clearest waters. Water clarity is also low in most of the tributaries. Recent CBP data show a trend toward decreasing water clarity in many tributaries, including the Patuxent, Potomac, York, James, and Choptank rivers, the smaller tributaries of the lower eastern shore of Maryland, Tangier Sound, and the mainstem of the Bay. Only 7 percent of the Bay's waters had acceptable water clarity in 2006 relative to water clarity goals established by the CBP (http://www.chesapeakebay.net).

### 3.1.7 Climate

The project area has a continental type of climate with four well-defined seasons. The coldest months are January and February with temperatures averaging about 30 degrees Fahrenheit. The warmest month is July with temperatures averaging in the upper 80's (°F). Annual precipitation ranges from 40 to 44 inches, distributed fairly evenly throughout the year. The greatest rainfall intensities occur in summer and early fall, the season for severe thunderstorms and part of the hurricane season while winter low pressure systems moving up the Atlantic Coast cause most of the precipitation during the cold months. Snowfall occurs on about eleven days per year on the average, but snow accumulations of one inch or greater happen only about six days annually.

The prevailing winds are southerly from May through September and west-northwesterly to northwesterly during the rest of the year. Hurricanes, blizzards, and tornadoes are infrequent.

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.

### 3.1.8 Air Quality

The six air pollutants commonly found throughout the United States are ozone, carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide and lead. These pollutants can injure health, harm the environment, and damage property. The EPA calls these air pollutants "criteria pollutants". According to the Maryland Department of the Environment (MDE), all of Maryland is in attainment for four of the six criteria pollutants. The D.C. metropolitan area which includes Prince George's County and Baltimore County, Maryland, are designated as a serious ground level ozone non-attainment area by the EPA, as well as being in nonattainment for particulates (PM 2.5). Non-attainment areas are designated regions where air pollution levels do not meet National Ambient Air Quality Standards (MDE website).

Additionally the principal pollutants from atmospheric deposition that affect the Chesapeake Bay are nitrogen oxides (NOX) and chemical contaminants.  Some of the NOX deposited in the Bay is converted into a form that is useable by algae, thereby increasing nutrient enrichment that contributes to causing anoxic conditions in the Bay. The CBP estimates that a quarter of the total nitrogen load to the Bay comes from atmospheric deposition; 75 percent of that load is deposited on land and later transported to the Bay by surface water runoff and groundwater flow.  The remaining 25 percent is deposited directly into the Bay. NOX emissions in the watershed have increased by 3.5 million tons since 1970, and this trend is likely to continue in the immediate future as the population increases within the Bay's watershed.

### 3.1.9 Wild and Scenic Rivers & American Heritage Rivers

Maryland's Scenic and Wild Rivers Act of 1968 recognizes specific rivers as significant environmental resources for the State. The Act directs the MD DNR Secretary to "provide for wise management...and preservation" of the land resources as well as the scenic and wild qualities of these rivers.  The Patuxent and Severn are two rivers located within the project area that are designated as State scenic rivers as stipulated in the 1968 Maryland Scenic and Wild Rivers Act.

A river designated as an American Heritage River by EPA enables local communities to receive Federal assistance to restore and protect their rivers. There are no EPA designated American Heritage Rivers located within the project area.

## 3.2 Biological Resources

### 3.2.1 Submerged Aquatic Vegetation

The Virginia Institute of Marine Science (VIMS) conducts annual aerial surveys of submerged aquatic vegetation (SAV) in the Bay.  SAV has been documented in the tributaries where the designated ORA's are located. However, due to the associated water depths, SAV does not usually occur within oyster bars (SAV is typically not found in areas greater than 6 feet deep depending on water clarity).

### 3.2.2 Wetlands and Wetland Vegetation

There are no wetlands in the vicinity of the project footprint.

### 3.2.3 Upland Vegetation

There are no uplands in the vicinity of the project footprint.

## 3.3 Animal Resources

### 3.3.1 Benthic Macroinvertebrates

Benthic communities play a central role in the transfer of materials from the water column to higher levels in the food web. Much of the productivity of fisheries in Chesapeake Bay is linked directly to the benthos through feeding (Virnstein 1977; Holland et al. 1988; Diaz and Schaffner 1990).

The variety and density of benthic organisms generally increase with increasing salinity in the Bay. Tidal freshwater habitats are numerically dominated by tubeworms and insect larvae, and the Asian clam (*Corbicula fluminea*). Mesohaline (5 to 18 ppt) regions exhibit high densities of bivalves (e.g., clams, oysters), except where low oxygen conditions prevail; segmented worms (i.e., polychaete annelids), small crustacea, and suspension-feeding bivalves (*Rangia cuneata*, *Macoma* spp.) dominate these areas. Suspension feeding polychaetes and tunicates are important contributors to biomass in high-salinity environments.

Human activities have increased the volume of sediment and nutrients that enter the Bay and have contributed to altering the Bay from one dominated by benthic production and SAV to one heavily influenced by pelagic (water column) processes (mainly phytoplankton production). In 2006, 59 percent of the Bay's benthic habitat was considered degraded according to the Benthic Index of Biotic Integrity (B-IBI) (CBP, 2007). The percentage of habitat classified as degraded in 2006 was substantially greater than the values for 2004 and 2005, probably as a result of prolonged persistence of low DO during 2006 (USACE, 2008).

Oyster habitat is a unique feature of Bay benthic habitats. The bars and reefs themselves provide hard structure used by a diversity of macroinvertebrates and fish. As it settles, sediment covers oyster bars and reefs and other hard-bottom substrate that oysters need to settle on; most of the historical oyster shell substrate in Chesapeake Bay is now covered with sediment consequently, which may limit future increases in oyster abundance. Most suitable substrate occurs within areas where the MD DNR has planted shell recently; however, planted shell becomes covered with sediment after an average of 5.5 years in the Bay (Smith et al. 2005). Excessive sediment loads delivered by increased runoff bury shell faster than current oyster populations can create new shell, resulting in a severe and continuing decline in habitat suitable for oysters.

3.3.1.1 Eastern Oysters

The Eastern oyster was once so abundant in Chesapeake Bay that it inspired the Algonquin to name the bay Chesepiook, meaning "great shellfish bay." The eastern oyster occurs subtidally throughout the Bay, mostly in water depths ranging from 6 to 30 feet. Oysters tolerate a wide range of salinities from 5 to 30 ppt, although salinities must remain at or above 9 ppt for successful reproduction. Oyster bars and reefs are formed by the continual attachment of individual oysters. The Eastern oyster is a keystone species that provides a variety of ecological services within the Chesapeake Bay ecosystem including improved water clarity via filter feeding, and oyster bar and reef habitat for fish and other species in the Bay.

Oysters can affect other organisms by changing the physical and chemical environment of the Bay ecosystem. Oysters filter water while feeding, thereby removing sediment and other particles from the water and depositing it on the bottom in pellets called pseudo-feces. Filtration by large numbers of oysters can reduce the time that sediment remains suspended in the water column and increase the clarity of the filtered water. Oysters' pseudo-feces are rich in nutrients and, therefore, help to support primary production among bottom-dwelling organisms in areas immediately surrounding oyster bars and reefs. Local nutrient enrichment also stimulates the exchange of various forms of nitrogen and nitrogen compounds from one part of the system to another (Newell et al. 2002). In addition to filtering suspended particles, large populations of oysters create bars and reefs of accumulated shell that are unique among kinds of habitat in Chesapeake Bay. Successive generations of oysters growing on the shells of previous generations gradually accrete large, three-dimensional structures that can compensate for sedimentation, if the rate of growth of the oyster bar or reef exceeds the rate of sedimentation.

The elevated structure of an oyster bar provides habitat for oyster spat, barnacles, mussels, hydroids, nudibranchs, and algae. These communities support blue crabs (*Callinectes sapidus*) and finfish, such as oyster toadfish (*Opsanus tau*), naked goby (*Gobiosoma bosci*), striped blenny (*Chasmodes bosquianus*), Atlantic croaker (*Micropogonias undulatus*), summer flounder (*Paralichthys dentatus*), striped bass (*Morone saxitilis*), white perch (*Morone americana*), and spotted sea trout (*Cynoscion nebulosus*).

In addition to its ecological functions, the Eastern oyster provides an important commercial fishery. Commercial landings of oysters in Chesapeake Bay declined steadily during the late 19$^{th}$ and early 20$^{th}$ centuries. Major factors believed to have contributed to that decline include intense fishing pressure, mechanical destruction of habitat, siltation of optimal substrate, and stock over fishing (Rothschild et al. 1994). Dredging for oysters began to degrade the physical integrity of centuries-old bars and reefs (DeAlteris 1988) by breaking off shell and oysters that were too small to harvest, thereby reducing the population and the habitat available for future production and harvest. Declining water quality also contributed to reducing the oyster population.

The Bay's oyster population is now estimated to be less than 1 percent of its size during the 1800s (Newell 1988). The more recent decline in the population has been attributed primarily to the introduction of two foreign diseases to which the Eastern oyster had no resistance: Dermo and MSX. Oysters infected with Dermo, generally live only two or three years, and oysters infected with MSX generally die within one year. High mortality rates caused by these diseases not only remove oysters potentially available for harvest, but also reduce the number of large, highly reproductive oysters that are left to propagate. Overall, oyster populations in the Bay are now strongly controlled by disease pressure (Ford and Tripp 1996) in addition to being negatively affected by harvest, degraded oyster habitat, poor water quality, and complex interactions among these factors (Hargis 1999; NRC 2004).

3.3.1.2 Clams

Oyster bars or reefs provide valuable habitat for many organisms such as clams which are important food items for higher order prey. Suspension-feeding bivalves, such as clams, dominate the soft-bottom benthic community in mesohaline regions of Chesapeake Bay (Holland et al. 1987). Two key species of bivalves considered to be representative of the soft-bottom benthic community are the hard clam and the Baltic clam. These two species occupy different salinity regimes covering the range of salinities in which oysters occur (hard clams are found predominantly in higher salinities and Baltic clams in lower salinities), and both are filter-feeding infauna (i.e., species that live completely or mostly buried within the bottom sediment). Commercially important species within the project area include the softshell clam (*Mya arenaria*). The soft-shell clam is a bivalve mollusk found over a wide range of bottom types, but prefers substrate with mixes of fine sand and silt. Clams are harvested in subtidal areas ranging in depth from 6 to 20 feet. Clam dredging is restricted within 150 feet of legal oyster bars.

The major potential mechanisms for these species to interact with oysters are through competition for food and space. Competition for space could occur on a local scale if an increase in oyster population causes an expansion of hard-bottom habitat over existing soft-bottom habitat. Increased competition between clams and oysters for food could result in a reduction in the abundance of infaunal bivalves.

### 3.3.2 Blue crab

Oyster bars and reefs provide valuable habitat for many organisms, including the blue crab which is a commercially important species in the Bay. The blue crab is an important predator of bivalves, such as young oysters, in the Bay as well. The blue crab occupies a variety of aquatic habitats ranging from the mouth of the Bay to fresher rivers and creeks and occupies different trophic levels during various stages of its life cycle. Throughout the year, crabs may burrow into the bottom, shed and mate in shallow waters and beds of SAV, or swim freely in open water.

Both juvenile and adult blue crabs forage on the bottom and hibernate there through the winter. During spring, blue crabs migrate from the southern part of the Chesapeake to tidal rivers and northern portions of the Bay. During the rest of the year, adult blue crabs are dispersed throughout the Bay.

Although adult oysters are too large for blue crabs to open and prey upon (White and Wilson 1996), crabs feed readily and opportunistically on juvenile oysters (Eggleston, 1990). Oysters attain a partial refuge from predation at low densities (Eggleston, 1990), but predation by blue crabs might increase with increasing oyster abundance. Mobile predators such as the blue crab produce strong direct effects of predation and disturbance on the benthic communities in Chesapeake Bay (Hines et al. 1990). Changes in the community structure and population density of predators and of prey species resulting from complex interactions with introduced species usually have cascading trophic effects that alter the entire structure of an ecosystem, as documented for the Hudson River estuary (Strayer et al. 1999) and San Francisco Bay (Carlton et al. 1990). An increase in the oyster population could increase the food supply for blue crabs. An increase in the abundance of SAV resulting from increased filtration by oysters could enhance the blue crab population by providing more refuge for juvenile crabs.

Annual commercial harvests of blue crabs from Chesapeake Bay since 2004 have been approximately 60 million pounds, which is well below the 73-million-pound annual average for the period 1968 to 2004 (CBP 2007). This is attributed to low exploitable stock abundance and restrictive harvest management measures enacted in 2001 and 2002. In 2006, the abundance of adult crabs was about 57 percent of the CBP's interim restoration goal of 232 million crabs (CBP 2007).

### 3.3.3 Fish

Approximately 267 species of fish can be found in the Chesapeake Bay (White 1989). The fishes of the Bay are either resident or migratory. Migratory fish fall into two categories: (1) anadromous fish, which spawn in the Bay or its tributaries, and (2) catadromous fish, which spawn in the ocean. Anadromous fish migrate varying distances to spawn in freshwater. Striped bass spawn in the tidal freshwater areas of the Bay and major tributaries; younger fish remain in the Bay to feed while many adults migrate to ocean waters after spawning. Shad and herring are truly anadromous, traveling from the ocean to freshwater to spawn and returning to the ocean to feed. Eels are the only catadromous species in Chesapeake Bay. Other migratory fish use the Bay strictly for feeding. Some species, like croaker, drum, menhaden, weakfish, and spot, journey into the Bay while still in their larval stage to take advantage of the rich supply of food. Bluefish generally enter the Bay as juveniles or adults (USACE, 2008).

Fish in the Bay can also be categorized as planktivorous, reef-oriented, or piscivorous. Planktivorous fish are a key part of the food web in Chesapeake Bay. They consume plankton, and are preyed upon by larger fishes such as striped bass and bluefish (piscivores). The larval and early juvenile stages of all fish species in the Bay feed on plankton; however, bay anchovy and menhaden are the only two major species in Chesapeake Bay that feed primarily on plankton throughout their life cycles. Because oysters also feed on some types of phytoplankton, and phytoplankton serve as a food source for zooplankton, the mechanism of interaction between oysters and planktivorous fishes would be through the food chain. The primary mechanism of interaction between oysters and planktivorous fish would be the potential to compete for food.

Oyster bars provide habitat for several species of fish (reef-oriented), many of which are important in commercial and recreational fisheries. The naked goby resides on oyster bars throughout its juvenile and adult lifestages (Breitburg 1991) and is considered an exclusively reef-dwelling species. Black sea bass (*Centropristis striata*), which is considered to be a temperate reef fish, is found seasonally on oyster bars and other hard substrate and structures in the middle and lower Bay during warm months. Although black sea bass generally migrate to ocean waters during the winter, they are reef dependent for a significant portion of each year. A third category of reef-oriented fish includes species that use a variety of habitats but frequent hard-bottom habitat, such as oyster bars; the Atlantic croaker is an example of such reef-aggregating species. These three species, naked goby, black sea bass, and Atlantic croaker, represent the suite of species that orient to and may be affected by changes in the availability of oyster-reef habitat.

### 3.3.4 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Section 305(b)(2)) requires that essential fish habitat (EFH) areas be identified for each fishery management plan and that all

Federal agencies consult with National Marine Fisheries Service (NMFS) on all Federal actions that might adversely affect EFH. Under the Magnuson-Stevens Act each Federal agency is required to prepare an EFH Assessment for all proposed actions that occur within coastal waters of the United States.

The 1996 amendments to the Magnuson-Stevens Fishery Act strengthened the ability of NMFS to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans." Essential fish habitat is defined in 50 Code of Federal Regulations (CFR) part 600 as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.

After consultation with John Nichols, NMFS, Maryland Habitat Office, (personal communication Feb 12, 2009) it was determined that some areas of the Bay under consideration for alternate substrate for oyster restoration as part of this project placement lie within the general area that may provide EFH for some of the species managed by NMFS. Species of concern are: Summer flounder, Windowpane flounder (*Scopthalmus aquosus*), Bluefish (*Pomatomus saltatrix*)**,** Cobia (*Rachycentron canadum*), Red drum (*Sciaenops ocellatus*), King mackerel (*Scomberomorus cavalla*), and Spanish mackerel (*Scomberomorus maculates*). Due to specific habitat needs, it is unlikely that cobia, king mackerel, Spanish mackerel, or windowpane flounder would be in the project area (Murdy et al., 1994). Windowpane flounder prefers sandy substrates which would be avoided for this project. As a result, the EFH analysis focused on bluefish, summer flounder, and red drum. The EFH assessment was prepared and is located in Appendix B. Coordination regarding EFH is ongoing with NMFS.

### 3.3.5 Avifauna

The Chesapeake Bay is located along the Atlantic flyway, which channels the annual seasonal flights of millions of migratory waterfowl to the Bay. The shallow waters and wetlands of the Bay and its temperate climate offer a fertile and diverse environment for waterfowl. Four categories of waterfowl inhabit Chesapeake Bay: dabbling ducks, diving ducks, geese, and swans. All four kinds depend on agricultural areas, bay bottom, and wetlands for food and nesting habitat. Black ducks (*Anas rubripes*) depend upon the condition of the bottom of the bays and wetlands in which they feed. Diving ducks such as canvasbacks (*Aythya valisineria*) depend totally on aquatic habitats throughout their life cycle. They feed on plants and animals in wetlands and shallow benthic habitats.

Numerous avian species in the Chesapeake Bay watershed use benthic species as a primary food source such as the American oystercatcher (*Haematopus palliates*), black duck, and canvasback. These waterfowl may feed on or around oyster bars. The primary mechanism of interaction between oysters and these benthic-feeding birds is indirect, through changes in the kinds and distribution of benthic invertebrates that could result from competition with oysters for food and habitat.

Oystercatchers were once hunted almost to extinction but are now conspicuous shorebirds found throughout the Chesapeake Bay region. Oystercatchers at times consume oysters by using their brightly colored bills to open the shells of bivalves. Several studies have shown that a decrease in shellfish stocks negatively affects the oystercatcher population (Goss-Custard et al. 2003; Atkinson et al. 2003; Tuckwell and Nol 1997). The primary mechanism of interaction for oystercatchers is direct, through a change in the availability of oysters as a food source. A secondary mechanism of interaction could be through competition between oysters and other shellfish, which could shift the prey-suite for oystercatchers. Many avian piscivore species use the abundant fish populations of Chesapeake Bay as their primary food sources. Two of the species documented best in the literature are the bald eagle (*Haliaeetus leucocephalus*) and the North American osprey (*Pandion haliaetus*).

### 3.3.6 Mammals

Numerous mammals inhabit the Bay watershed. Many piscivorous mammals inhabit the shores and waters of Chesapeake Bay such as the raccoon (*Procyon lotor*) and river otter (*Lontra Canadensis*). The raccoon is an omnivorous nocturnal mammal that prefers to inhabit trees near streams, springs, or rivers. The river otter spends most of its life in the rivers, marshy ponds, and wooded riparian areas of the Chesapeake and its tributaries. Although these mammals do not feed directly on oysters to any significant extent, a change in oyster populations could affect them indirectly through competition between oysters and planktivorous fish, which are food for piscivorous mammals.

### 3.3.7 Rare, Threatened, and Endangered Species

Species of plants and animals that have been designated as rare, threatened, or endangered (RTE) are protected under Federal and State regulations. The Endangered Species Act (ESA) of 1973 (16 USC 1531-1543) regulates activities affecting plants and animals classified as endangered or threatened, as well as the designated critical habitat of such species.

A few of the 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 kempiz*), and the endangered leatherback turtle (*Dermochelys coriacea*), occasionally move into the central and upper Chesapeake Bay during warm weather months. Additionally the Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) may occur in the project area. An email was received from Ms. Julie Crocker, NFMS, dated March 12, 2009, which concurred with USACE (marine turtles, and Atlantic sturgeon may occur in the project area). Coordination with Dr. Roland Limpert, MD DNR (personal communication February 24, 2009) indicated that at this time, there are no State listed RTE species within the project site under the agency’s purview. A letter was received from USFWS dated February 10, 2009 indicating that no RTE under their purview are expected in the project area.

### 3.4 Community Settings

#### 3.4.1 Land Use

The watershed of the Chesapeake includes parts of New York, Pennsylvania, West Virginia, Delaware, Maryland, and Virginia, and the entire District of Columbia. Before European settlement, forests covered about 95 percent of the Chesapeake Bay watershed. Now, forests are concentrated in the Appalachian region of Pennsylvania and West Virginia and account for only 60 percent of the total land area in the watershed. Agricultural land is most common in the coastal lowlands north and east of the Bay and accounts for 28 percent of the total land area of the watershed. Developed lands and wetlands each account for about 3 percent to 4 percent of the total land area; the remaining 5 percent is open water and other land uses.

#### 3.4.2 Recreation

The hospitable climate and abundant natural resources of the Chesapeake Bay make it a heavily utilized area for recreation. Hunting, camping, swimming, boating, waterskiing, and crabbing are major attractions. Sportfishing is another major recreational activity in the Chesapeake. The Chesapeake Bay provides one of the primary focal points for tourism in Maryland and tourism attracted almost 28 million people to Maryland in 2005. Those visitors spent more than $10 billion on accommodations, services, and attractions throughout the state (MD Tourism Development Board 2006). Boating on Chesapeake Bay is a popular recreational activity and an important component of the economy of Maryland. Approximately 209,500 boats are registered in Maryland (MD Sea Grant 2004). In 2000, recreational boating contributed approximately 1.6 billion dollars in revenue for Maryland and supported 28,200 jobs in the state (MD Sea Grant 2004). Fish species supported by oyster communities are key elements in providing recreational opportunities.

#### 3.4.3 Cultural and Historic 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).

Coordination with the Maryland Historical Trust (MHT) (the SHPO) occurred at the inception of the Chesapeake Bay Oyster Recovery Project in 1996. MHT indicated areas that should be avoided due to known or suspected historical resources. Subsequent shell placement activities have been conducted since 1997 and have avoided those areas MHT identified in the project area. There have been no adverse impacts on historical resources thus far. The alternate substrate project has the same footprint, as it is part of the Chesapeake Bay Oyster Recovery Project.

Follow up coordination to notify MHT of the change in substrate ensued on December 22, 2008 (Public Notice was issued) and USACE received a letter from Maryland Department of Planning on January 8, 2009 stating that MHT was forwarded a copy of the Public Notice by the State Clearinghouse which requested that if MHT (among other agencies) had comments they were to inform USACE directly by February 4, 2009; USACE received no comments from MHT at this time.

### 3.4.4 Hazardous, Toxic, and Radioactive Waste

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 were generated by the Baltimore District for the 1996 Decision Document.

### 3.4.5 Socioeconomic Conditions

According to the most recent census (2000) the population of Maryland is 5,618,344. Eight-four percent of the population are high school graduates and 31 percent are college graduates. Also the average income for Maryland is $25,614 http://quickfacts.census.gov/qfd/states/24000.html. Table 3-1 summarizes additional population statistics of Maryland.

**Table 3-1. Summary of Population Statistics**

| Percent | Parameter |
|---|---|
| 30 | African American |
| 0.3 | Native American |
| 5 | Asian |
| 24.2 | Under 18 |

The Eastern oyster is highly valued as a source of food, a symbol of heritage, an economic resource supporting families and businesses, and a contributor to the health of the Chesapeake Bay ecosystem. Harvesting, selling, and eating oysters has historically been a central component and driver of social and economic development in the region. From the colonial period to the 20th century, oyster harvests supported a vibrant regional industry, which in turn supported secondary industries, fishing communities, and a culinary culture centered on the bivalve.

Oysters are an economic resource that supports unique communities and an industry that is an important component of the region's heritage and identity. Within these communities, oysters are a source of income for families of watermen and those employed in the processing of oysters (e.g., shuckers); they support multigenerational businesses and contribute to a regional economy.

The seafood industry contributes approximately $400 million each year (State of MD 2006) to Maryland's total gross domestic product of $257.8 billion (http://www.bea.gov/regional/gsp/). In 2005, commercial fisheries landings (i.e., the weight, number and/or value of a species of seafood caught and delivered to a port) alone earned $63,669,831 million in the state of Maryland (NMFS, 2006). Direct users include watermen, oyster growers, and oyster processors, packagers, shippers, and retailers.

More than 6,600 watermen work Chesapeake Bay, providing seafood to 74 seafood processing plants in Maryland; these plants employ more than 1,300 people (MD Seafood 2005). These jobs represent an assortment of positions including day laborers, sales representatives, managers, maintenance workers, delivery personnel, and others. The sector relies on immigrant workers, particularly in oyster and crab processing facilities (Kirkley 2005).

In Maryland, most oysters are harvested from public grounds during the winter (depending on the kind of equipment used, a designated time frame between October and March; MD DNR 2006). During the 1990s, more than 96 percent of the oyster harvest in Maryland came from public beds.  Although oystering earns watermen much less money than they earn from crabbing during the spring and summer, dredging or tonging for oysters during fall and winter enables them to continue to earn a small income, providing a financial safety valve for watermen and their families (NRC 2004).

In Maryland, anyone seeking to harvest oysters must first obtain an Oyster Harvesting License (OHL) or a Tidal Fish License (TFL), which allows the holder to harvest a range of commercially valuable, marine species in the Bay. To qualify to harvest oysters in any particular year, holders of an OHL or TFL must pay an annual oyster surcharge, which currently costs $300. In any given year, many TFL holders elect not to fish for oysters; consequently, the number of oyster surcharges purchased by OHL and TFL holders is the best indicator of the number of Maryland harvesters active in the fishery during a year. In 2001, more than 1,000 watermen in Maryland paid the oyster surcharge. That same year, these harvesters earned an estimated $5,300 per license (either OHL or TFL) (NRC 2004). In 2004, only 284 watermen in Maryland paid the oyster surcharge (MD DNR 2006).

Aquaculture operations are equally diverse and can include growers singly engaged in oyster aquaculture, wild harvesters who also grow oysters, and processors engaged in aquaculture to serve their shucking needs. A small number of active growers operate in Maryland. Intensive aquaculture of native oysters can be undertaken in several different ways to serve a variety of markets. Historically, oyster grow-out operations involved moving wild seed to privately leased ground (Murray and Oesterling 2006). Due to increased rates of disease and mortality, this type of aquaculture is rarely practiced today. Intensive native aquaculture is conducted in contained racks, floats, or bags either on-bottom or off-bottom. Growers' dependence on oysters varies with the size and nature of their operation, the degree to which they are diversified or vertically integrated, and the markets they target. A significant number of growers are employed in oyster aquaculture part-time.

Despite the effects of severely reduced harvest levels, oysters in Chesapeake Bay remain important culturally and economically at the regional, community, at the regional, community, and household levels.

### 3.4.6 Environmental Justice

On February 11, 1994, President Clinton issued Executive Order (E.O.) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."  The

E.O. requires Federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

As defined by the “Final Guidance for Addressing Environmental Justice Under NEPA” (CEQ, 1997), “minority” includes persons who identify themselves as Asian or Pacific Islander, Native American or Alaskan Native, black (not of Hispanic origin) or Hispanic. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations are identified using the Census Bureau’s statistical poverty threshold, which is based on income and family size. The Census Bureau defines a “poverty area” as a Census tract with 20 percent or more of its residents below the poverty threshold and an “extreme poverty area” as one with 40 percent or more below the poverty level (Census Bureau, 1995). Only two areas in the project area have poverty levels above the State average of 8.3 percent: Kent County has a poverty level of 12.7 percent and Dorchester County has a poverty level of 13.7 percent.

Based on recent survey work by the University of Maryland, no low-income or minority populations appear to be significantly involved in harvesting oysters in the Bay. Historically, significant numbers of African-Americans were employed in shucking houses, but today most shuckers are immigrant Hispanic workers. Most employment in the oyster industry today consists of harvesters, growers, and processors (including buyers); harvesters are the largest group. Although minorities participate in these activities, none dominate. Harvesters’ incomes generally fall in the middle to lower-middle levels, and growers’ and processors’ into somewhat higher levels. Additionally there is no evidence of significant Native American involvement in oystering or the oyster industry in the Bay (UMD, 2008).

### 3.4.7 Visual and Aesthetic Resources

The Chesapeake Bay’s diverse landscape has long been revered for its scenic beauty. The western shore of Chesapeake Bay in Maryland, from the Susquehanna River to the Potomac River, has comparatively high topographic relief, sandy beaches, and actively eroding coastal bluffs. Vegetation ranges from uplands dominated by oak and loblolly pine to bald cypress swamps and freshwater marshlands in the region’s series of smaller tributaries. Low topographic relief, irregular shoreline, and offshore islands characterize the eastern shore of Chesapeake Bay and provide a unique aesthetic appeal. Areas of open water and extensive wetlands with tall marsh grasses, shrubs, and trees characterize much of the middle and lower eastern shore. Hummock-and-hollow microtopography (upland mounds surrounded by lowlands) is predominant in the near-shore habitats in this region.

In addition to the Chesapeake’s natural beauty, the traditional waterfront communities are of particular aesthetic value. The historic watermen’s communities along the Chesapeake’s western and eastern shores offer an aesthetic charm and have contributed greatly to tourist-based industries in these areas. Traditional workboats operating in these areas bring aesthetic appeal to the region as well as cultural value. Notably, Maryland’s historic skipjack fleet has become a visual symbol of the state and has received attention as the nation’s last sail-powered, commercial fishing fleet.

### 3.4.8 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.

### 3.4.9 Noise

Excess noise levels are not only annoying, but may cause adverse health effects in humans and disrupt wildlife behaviors. For purposes of regulation, noise is measured in dBA or A-weighted decibels. This unit uses a logarithmic scale and weights sound frequencies. Individuals with good hearing perceive a change in sound of 3 dB as just noticeable, a change of 5 dB as clearly noticeable and 10 dB is perceived as doubling (or halving) of the sound level. The threshold of human hearing is 0 dBA. Values above 85-90 dBA would be considered very loud (Table 2.1) and have the potential to harm hearing given sufficient exposure time. Noise levels above 140 dBA can cause damage to hearing after a single exposure. The proposed project area can be generally classified as urban with moderate noise levels. Ambient noise levels through the proposed project area include noise related to traffic along business/commercial roadways, public gatherings, and passive recreational activities (walking and bicycle riding). These activities can vary widely in the amount of noise produced, but according to the League for the Hard of Hearing (LHH), background noise levels are about 40 dBA on a quiet residential street. A typical maximum permitted sound level in rural and suburban areas is 55 dBA.

**Table 2-1. Typical Noise Levels and Subjective Impressions**

| Source | Decibel Level (dBA) | Subjective Impression |
|---|---|---|
| Normal Breathing | 30 | Threshold of hearing |
| Soft Whisper | 30 | -- |
| Library | 40 | Quiet |
| Normal conversation | 60 | -- |
| Television Audio | 70 | Moderately loud |
| Ringing Telephone | 80 | -- |
| Snowmobile | 100 | Very Loud |
| Shouting in Ear | 110 | -- |
| Thunder | 120 | Pain Threshold |

While the background noise level for residents within the vicinity of the project area might typically be 40 dBA, a resident may also hear acute noise sources, particularly in the daytime, associated with suburban neighborhoods such as a power mower, which will generate 65-95 dBA at 50 ft or a leafblower (110 dBA at 50 ft). Freeway traffic is in the range of 70 dBA at 50 ft, although large trucks may typically generate 90 dBA (LHH 2006). Sensitive noise receptors in the vicinity include, residents living near the water.

## 3.5 Executive Orders

### 3.5.1 Children's Protection Executive Order Compliance

On April 23, 1997, President Clinton issued Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks." Under this Executive Order, Federal agencies are required to make it a high priority to identify and assess environmental health risks and safety risks resulting from its policies, programs, activities, and standards that my disproportionately affect children.

> *"A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks…Therefore, …each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." (Executive Order 13045, April 21, 1997).*

In Maryland 24.2 percent of the population are less than 18 years of age. Children are not expected to be in the vicinity of the proposed project area because it is open water.

### 3.5.2 Floodplain Protection Executive Order Compliance

On May 24, 1977, President Carter issued Executive Order 11988 "Floodplain Management". This E.O. requires Federal agencies to provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

The project area is not in a floodplain area as it is located in open water.

## 4.0 ALTERNATIVES ANALYSIS

As discussed previously, habitat is a limiting factor for oyster populations. Phase I and Phase II construction activities were limited to restoration of oyster bars using clean oyster shell. With the discontinuation of dredging fossil shell in 2006 and the scarcity of oyster shell from shucking houses and restaurants, the remaining substrate option available to restore the hard substrate required for oyster habitat and enable oyster bed restoration is the use of alternate substrate.

The purpose of this EA is to evaluate the use of alternate substrate to restore oyster beds as was recently authorized by WRDA 2007.

### 4.1 Alternatives Considered

**Alternative 1** No action alternative: The continuation of currently approved Chesapeake Bay Oyster Recovery Project activities (pending availability of clean shell).

Under this alternative, approved *Chesapeake Bay Oyster Recovery Project* restoration activities would continue with the use of clean oyster shell for oyster bar restoration which has limited availability. This alternative could also use fossilized oyster shell to the extent that it is available. However, in recent years fossilized shell has become less available because of concerns for the fishery habitat value of fossilized oyster shellbeds.

New bars could be constructed and existing bars enhanced in the targeted tributaries within the boundaries of natural oyster bars (NOBs) depending on availability of clean oyster shell. Bars would be constructed in flat and mounded morphologies. Depending upon location and availability of seed, new bars would be planted with hatchery-produced seed, with natural seed, or could remain unseeded to receive a natural set.

**Alternative 2** Rehabilitate shell from existing oyster bars that are covered with sediment.

This alternative would involve locating and then rehabbing shell from existing NOBs that are currently covered by sediment. Rehabbing occurs when oyster dredges are used to pull up the shell, allowing the sediment to be washed off of the surface. The oyster shell is then replaced on the bar. This activity would occur in the targeted tributaries within the boundaries of NOBs using this shell resource. Once clean of sediment, bars could receive additional substrate to increase their elevation in the water column. Also, depending upon location and availability of seed, new bars could be planted with hatchery-produced seed, with natural seed, or could remain unseeded to receive a natural set.

**Alternative 3** Reclaim buried shell that has been previously placed through repletion programs or to restore oyster bars.

This alternative would involve locating and then dredging shell that has been placed in the past to restore oyster bars or provide seed bars through repletion programs. Millions of bushels of fresh and dredged fossil oyster shell have been placed since the 1960s in order to restore oyster habitat and provide seed bars. The shell may be currently buried under sediment or may be clean shell that was placed in areas no longer receiving productive spat sets. New bars could be constructed and existing bars enhanced in the targeted tributaries within the boundaries of NOBs using this shell resource. Bars would be constructed in flat and mounded morphologies. Depending upon location and availability of seed, new bars would be planted with hatchery-produced seed, with natural seed, or could remain unseeded to receive a natural set.

**Alternative 4** (Proposed Action) Use alternate substrate for the restoration and rehabilitation of oyster bars within the boundaries of NOBs.

New bars could be constructed and existing bars enhanced in the targeted tributaries within the boundaries of NOBs using (but not limited to) any of the following alternate substrate: clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar would be allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). Bars would be constructed in flat and mounded morphologies. Depending upon location and availability of seed, new bars would be planted with hatchery-produced seed, with natural seed, or could remain unseeded to receive a natural set. Further, advances in technology and research may identify new substrate that could be used for the construction of oyster bars and reefs once approved by state and federal resource agencies.

### 4.2 Ecosystem Benefits

The following ecological functions are provided by oyster bars and reefs:

1. enhanced recruitment, growth, and survival of oyster populations
2. water filtration and regulation of water column phytoplankton dynamics
3. enhanced nitrogen (N) cycling between the benthic and pelagic system components
4. enhanced phosphorus (P) burial in sediments
5. nursery and predation refuge habitat for a diverse community of invertebrates and small fishes
6. foraging habitat for transient piscivorous and benthivorous fishes

(Rodney and Paynter, 2006; Newell, et al. 2004)

Oysters can affect other organisms by changing the physical and chemical environment of the Bay ecosystem. Oysters filter water while feeding, thereby removing sediment and other particles from the water and depositing it on the bottom in pellets called pseudo-feces. Filtration by large numbers of oysters can reduce the time that sediment remains suspended in the water column and increase the clarity of the filtered water. Oysters' pseudo-feces are rich in nutrients and, therefore, help to support primary production among bottom-dwelling organisms in areas immediately surrounding oyster bars and reefs. Local nutrient enrichment also stimulates the exchange of various forms of nitrogen and nitrogen compounds from one part of the system to another (Newell et al. 2002).

A study by Rodney and Paynter (2006) investigated the community supported by restored oyster bars and reefs. Total macrofaunal (animals visible to the naked eye) abundance (free living macrofauna plus fouling (sessile) organisms) was an order of magnitude higher on restored bars and reefs compared to unrestored bars and reefs, free living macrofauna were twice as abundant on restored bars and reefs and fouling organisms were two orders of magnitude more abundant. Epifaunal organism densities were on average 3 times higher in restored bars and reefs. Demersal (dwelling at or near the bottom) fish density was four times higher in restored plots. They found an average of 14.9 species on restored bars and reefs versus 12 on unrestored bars and reefs. Restored bar and reef plots supported a higher level of secondary production. Many of the organisms that were significantly more abundant on restored bars and reefs are also known to be important food items for several commercially and recreationally important finfish species. Additionally, Peterson et al. (2003) determined that $10m^2$ of restored oyster bars and reefs in southeast United States would likely yield an additional 2.6 kg/yr of production of fish and large mobile crustaceans over the functional lifetime of a bar or reef.

With respect to the nutrient sequestration ability of oyster bars and reefs, Newell et al. (2004) evaluated the potential of increased oyster populations to remove nitrogen (N) and phosphorus (P) in the Choptank River. Seasonal N and P removal of current oyster densities in summer in Choptank River is approximately 5 percent N and approximately 34 percent P (based on hydrochemical modeling performed by the study). An increase in oyster density to $10/m^2$ would increase N removal to approximately 50 percent and P removal to approximately 340 percent. On an annual basis, removal of N and P by current oyster stocks is 0.6 percent and 8 percent, respectively. On a restored bar or reef with 10 oysters per meter squared expected annual removal increases to 6 percent N and 80 percent P. This work determined that the value of the Choptank River oyster stock to remove 13,080 kg N per year is $314,836 which sums to $3.1 million over the lifetime of the oysters.

### 4.3 Evaluation of Alternatives

**Alternative 1** No action/continuation of current Chesapeake Bay Oyster Recovery Project activities

Although, oyster shell is the preferred material for providing hard substrate for oyster bar restoration, it has become extremely scarce. In recent decades, clean oyster shell for restoration was available from shucking houses and restaurants, but the primary source has been dredged fossil oyster shell deposits. As discussed in Section 2.3.2, the dredging of fossil oyster shell was discontinued in 2006 due to concerns over the environmental impact to important spawning or nursery grounds for anadromous and other commercially important fish species. MD DNR plans to request a permit to dredge fossil shell in limited areas, but as of now the action is not authorized. Currently, the need for oyster shell for restoration greatly exceeds the amount of available shell. This alternative would provide for a very limited extent of oyster bar restoration, likely only a few acres per year. This assumes that USACE can obtain a great portion of the available clean oyster shell from restaurants and oyster shucking houses. Currently a significant portion of available shucking house shell in Maryland is bought by MD DNR and used in their hatchery to produce oysters. Since 1986, on average only 5 percent of the substrate placed for restoration has been clean shell from restaurants and shucking houses (MD DNR, Chris Judy, email Feb 6, 2009). If all the available shell (obtained from restaraunts and shucking houses) were devoted to restoration, it is estimated that roughly 500 to 600 acres of habitat could be restored based on available shell resources (MD DNR, Chris Judy, email Feb 6, 2009). The shell however, would not all be available to USACE as there are many groups involved with oyster restoration that would be competing for the limited resource of clean oyster shell. Furthermore this would not leave shell for the hatchery to use to produce oysters. Since it is also estimated that 2600 acres of oyster habitat are lost each year in the Chesapeake Bay due to sediment and poor water quality, and lack of recruitment (USACE, 2008), this action alone will not result in a net benefit of increasing oyster habitat within the Bay. This alternative would provide the benefits discussed in Section 4.2, but on a limited scale. The alternative would not meet the objectives of the project due to its inability to restore significant acres of oyster bars and reefs and is therefore not considered acceptable. This alternative would contribute very minimally to Chesapeake 2000 goals of restoring significant oyster bar habitat in the Chesapeake Bay.

**Alternative 2** Rehabilitate shell from existing oyster bars that are covered with sediment.

The MD DNR currently funds watermen to recover shell from existing oyster bars that have been buried by sediment. It is projected that 1000 acres can be reclaimed on an annual basis with given funding levels. Given that 2600 acres of oyster habitat are lost each year in the Chesapeake Bay due to sediment and poor water quality, and lack of recruitment (USACE, 2008) this action alone will not result in a net benefit of increasing oyster habitat within the Bay. Any bars restored by cleaning the sediment from the shell would provide the environmental benefits discussed in Section 4.2 however, there would be negative impacts associated with the recovery of the shell. Cleaning the sediment from the shell would result in a temporary increase in turbidity to the water column. Resources such as SAV would be negatively impacted by the sediment disturbed by the dredging. It is likely this activity would be restricted in areas near SAV resources. The release of nutrients into the water column from disturbed sediments could also be significant and would need to be assessed.

**Alternative 3** Reclaim buried shell that has been previously placed through repletion programs or to restore oyster bars.

At this time, this alternative is not a permitted action within the State of Maryland. Therefore, it is not viewed as feasible at this time. However, MD DNR has recently submitted a permit that would enable them to recover historically placed shell. This alternative could recover vast amounts of shell that have been placed since the 1960s, which could substantially contribute to restoring significant oyster habitat acreage. Any bars restored using reclaimed shell would provide the environmental benefits discussed in Section 4.2, however, there would be negative impacts associated with the recovery of the shell. Recovering buried shell would result in a temporary increase in turbidity (that moves out of oyster habitat area) to the water column. Resources such as SAV would be negatively impacted by the sediment disturbed by the dredging. It is likely this activity would be restricted in areas near SAV resources. The release of nutrients into the water column from disturbed sediments could also be significant and would need to be assessed.

**Alternative 4** Use alternate substrate for the restoration and rehabilitation of oyster bars within the boundaries of NOBs.

Table 4-1 provides a summary of potential alternate substrate, their costs, and availability, as well as a performance rating that was assigned based on completed scientific research and professional experience of restoration practitioners.

**Table 4-1. Costs, Performance, and Availability of Alternate Substrate**

| Substrate | Delivered Cost per cy | Estimated Performance Rating*** | Available |
|---|---|---|---|
| Dredged Oyster Shell | $15** | High | Not available |
| "Shucked" Oyster shell | $25* | High | Low |
| Hard Clam | $21* | Low | High |
| Surf Clam Shell | $15* | Low | High |
| Stone (gabion 2-7") | $26* | Medium | Moderate |
| Crushed Concrete (2-8") | $45** | High | Intermittent |
| Marl (marine limestone) | $50* | High | High |
| Slag | $23* | Undetermined | Moderate |
| Reef balls | $60* | High | High |

Source: *NOAA alternative substrate website: http://chesapeakebay.noaa.gov/alternativesubstrates.aspx; **MD DNR;***USACE

Field trials to date have shown that free-swimming oyster larvae (in both a natural and hatchery setting) will settle on virtually all hard substrate tested or available. Significant differences exist, however, in the setting density and subsequent survival of those oyster spat. This apparently results from the significant differences in surface area of the various substrates, both of the individual pieces, and of the interstitial space between piles or layers of the material. Monitoring also suggests that the refuge provided by the irregular surfaces and pore spaces of certain materials (natural oyster shell, stone, crushed concrete, and marl) provide better predation protection than those materials that eventually align themselves such that surface area and crevices are minimized (clam shell and surf clam shell).

One benefit alternate substrate may provide over oyster shell is that burrowing organisms (e.g., oyster drills, etc) which predate on oysters may not be able or desire to burrow into the more dense and thicker alternate substrate. Therefore, there may be a reduction in burrowing organisms that have detrimental effects on oysters. Alternatively, some alternative substrates such as clam shell do not provide interstitial space comparable to natural oyster shell bars and reefs. The interstices within substrate provide oysters with increased surface area on which to set and protection from predation. When choosing an appropriate alternate substrate, interstitial space provided by any given substrate is a significant consideration. If substrates such as clam shell that become consolidated and do not provide sufficient interstitial space are chosen for construction, a veneer of oyster shell and living oyster shell should be placed on top to provide good bar or reef structure.

Although no conclusive research program has evaluated the performance and benefits of all potential alternate substrate, there are multiple study results available that support the successful use of alternate substrate. Limestone has been used since the 1990s in Louisiana to catch oyster spat and has performed exceptionally well likely due to its calcium content. Although oyster larvae will set upon a variety of hard surface, calcium carbonate (or perhaps simply calcium) seems to be an important component of an effective substrate to attract larval sets (Hidu et al., 1975; Sonia et al., 1990). A concrete modular reef deployed subtidally in the Rappahannock River in 2000 had extremely good success. The reef was sampled after being deployed for 4.5 years and held densities of 1,085 oysters/$m^2$ of river bottom amongst a diverse assemblage of benthic organisms. This is 1000 times the average density of oysters on existing unrestored oyster habitat. Additionally, the size structure of oysters indicated the presence of four year classes, with approximately half of all oysters more than two years old and therefore of reproductive age (Lipcius and Burke 2006).

### 4.4 Preferred Alternative

Based on the evaluations discussed in Section 4.3, the preferred alternative is Alternative 4- Use alternate substrate for the restoration and rehabilitation of oyster habitat within the boundaries of NOBs. This is the only alternative that is able to achieve project objectives due to the scarcity of clean oyster shell and the degraded quality of existing oyster habitat. With the discontinuation of dredging fossil oyster shell, enough clean oyster shell does not exist to restore any significant level of oyster habitat. No other alternative, alone, is currently able to produce a net increase of oyster habitat. Acreage restored using alternate substrate would achieve similar benefits to those discussed in Section 4.2. Selecting this alternative does not eliminate the use of oyster shell. It is anticipated that alternate substrates would be used in conjunction with any available oyster shell.

## 5.0 IMPACT EVALUATION

This section is an assessment of impacts from the recommended plan. This section presents *direct* and *indirect* impacts resulting from the project. Direct impacts are those that occur directly as a result of the project while indirect impacts would occur as a result of natural or other processes modifying the project or adjacent areas.

The original Phase I project was described in the C*hesapeake Bay Oyster Recovery Project, Maryland,* report prepared by the Baltimore District in May 1996. The 1996 report covered construction activities and potential environmental impacts for the four-year period of 1997 through 2000. The report addressed alternatives, risk management, and included an EA and FONSI that were fully coordinated with the public and resource agencies. The magnitudes of the direct or indirect impacts are also considered. *Insignificant* impacts are those impacts having little effect on the environment. Insignificant impacts range from *minor to moderate* and may be referred to as such throughout this document.

Further, the direct or indirect impacts are evaluated from the standpoint of whether they are *short-term or long-term*. Short-term or temporary effects would last only during the project construction period while long-term effects would persist for many years.

This section also investigates the *cumulative impacts* of the project. Cumulative impacts result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (Federal or non-Federal) or person undertakes such actions.

Furthermore, it is the intent of this document to assess the impacts of the proposed concepts in the entire watershed, beyond the physical construction footprint of the recommended alternative or real estate easement area. Hazardous, toxic, and radioactive waste (HTRW), environmental, social and cultural impacts have all been addressed in the watershed context and not solely based on specific stream alignments or treatment strategies. Therefore, design changes to the recommended alternative, which may result from buildability, constructability, operability or value added engineering are considered to be covered under this document (provided resource agency coordination occurs) unless proven to be substantial.

### 5.1 Physical Environment

#### 5.1.1 Physiography and Topography

Oyster bar creation/alternate substrate placement 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.

### 5.1.2 Geology

Historically, oyster bar and reef communities covered large portions of the Bay bottom and its tributaries. Proposed activities will restore a small portion of their historic range. No impacts to geology are expected.

### 5.1.3 Soils

To minimize the potential for siltation and burial of alternate substrate, substrate will be placed on firm bottoms of sand, shell, gravel. No impacts to soils are expected.

### 5.1.4 Prime and Unique Farmlands

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

### 5.1.5 Bathymetry

According to Eric Campbell of MD DNR, existing oyster habitat in the project area is normally 6 to 8 inches and placement of oyster shell/alternate substrate would bring the oyster habitat to no more than 1 foot in depth (with a minimum of 8 feet of clearance) (E. Campbell, MD DNR personal communication March 3, 2009). Alternate substrate will not be placed in depths of less than -8 feet. Bathymetry will be affected by project activities, but no adverse impacts are anticipated.

### 5.1.6 Water Quality

Only clean alternate substrate will be utilized for the project. A temporary minor detrimental impact to water quality is anticipated as a result of the proposed project. A temporary increase in turbidity within the water column is expected during placement of alternate material. However, long-term impacts to water quality as a result of the creation and restoration of oyster habitat using alternate substrate are expected to be positive due to the ability of oysters to filter water at a rate of about two gallons per hour per oyster. In abundance, oysters help clarify the water, which allows bay grasses to receive more sunlight. Then in turn, plentiful grasses increase oxygen levels, reduce wave energy and shoreline loss, and habitat for aquatic life.

### 5.1.7 Climate

There will be no impact to climate due to project implementation.

### 5.1.8 Air Quality

Because the project area is located in a non-attainment area for ozone and particulate matter, a conformity analysis was completed. The basic intent of the Federal Conformity Program is to ensure that all Federal actions comply with the requirements of the applicable State

Implementation Plan (SIP) and do not cause or contribute to a new violation of the National Ambient Air Quality Standards in non-attainment or maintenance areas.

Ozone is created at ground level by a chemical reaction between nitrogen oxides (NOx) and volatile organic compounds (VOCs). The annual emission rates for these criteria pollutants in a non-attainment area are 25 tons/year for NOx and 25 tons/year for VOCs.

The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as "fine" particles. Sources of fine particles include all types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. On July 17 2006, EPA published a direct final rule (71 FR 40420) establishing a 100 tons per year (TPY) *de minimis* levels for PM2.5, SO2, NOx, and 50 TPY for VOCs.

Total emissions from project activities were estimated to demonstrate that they are below established emission rate thresholds for non-attainment areas. The estimates from project construction represent only 1 percent of the annual limit for NOx, and less than 1 percent of the annual limit for VOCs, SO2 and PM 2.5. Although construction activities would result in short-term, increased air emissions, these emissions would be less than the *de minimus* thresholds. Further details on air quality emissions are located in Appendix D. No major, long-term or adverse impacts are anticipated. Coordination with MDE regarding air quality is ongoing at this time.

### 5.1.9 Wild and Scenic Rivers

The project is expected to benefit the aquatic environment, and will not result in adverse impacts to the two State-designated scenic rivers (Patuxent and Severn).

## 5.2 Biological Resources

### 5.2.1 Submerged Aquatic Vegetation

SAV coverage from the years 2002 through 2006 (VIMS, 2009) were compared with NOB boundaries. Over the vast extent SAV and oyster habitat are separate or adjacent. SAV bed locations and densities fluctuate annually, and therefore there are some small areas, particularly in the Choptank and Severn Rivers where SAV and oyster habitat overlapped. No oyster habitat will be restored where SAV grows on oyster bars and reefs. No long-term adverse impacts are expected to SAV.

### 5.2.2 Wetlands and Wetland Vegetation

Since the project is not located on shallow water or on land, no impacts to wetlands or wetland vegetation are expected.

### 5.2.3 Upland Vegetation

Since the project is not located on shallow water or on land, no impacts to uplands or upland vegetation are expected.

## 5.3 Animal Resources

### 5.3.1 Benthic Macroinvertebrates

The proposed project is expected to result in beneficial impacts to benthic macroinvertebrates. Through the creation of new seed bars a portion of historic oyster habitat will be restored. Placement of alternate substrate and seeding activities will form an elevated bar/reef structure with greatly increased surface area for the attachment of sessile organisms (e.g. algae, barnacles, sponges, bryozoans, and tube-building worms). Some of the benthic organisms will be impacted by the placement of alternate substrate. The benthic community will be altered in the placement areas; benthic organisms that prefer soft (mud) bottom will not benefit, however, there is much more available soft bottom habitat in the Bay and there is a shortage of hard bottom substrate. It is expected that benthic macroinvertebrates will colonize the alternate substrate shortly after placement.

Oysters can affect other organisms directly through biological mechanisms of interaction such as competition and predation. Oysters feed primarily on phytoplankton and may compete for food with other filter-feeding invertebrates (e.g., hard clams, *Mercenaria mercenaria,* and Baltic clams, *Macoma balthica*), planktivorous fish (i.e., fish that eat minute, free-floating plants and animals collectively called plankton), and zooplankton (i.e., minute aquatic invertebrate animals) (Kennedy et al. 1996; NRC 2004). The extent of such competition depends on the food preferences of the competing species; moreover, significant competition is likely to occur only when the concentration of phytoplankton in the water is low in relation to the number of consumers. Currently, competition for phytoplankton is believed to be minimal because oyster numbers are low compared with their historical abundance and because nutrient input and the resultant production of phytoplankton are high (Newell 1988). No long-term impacts to benthic macroinvertebrates are expected.

<u>5.3.1.1 Eastern Oyster</u>

The proposed project is expected to result in beneficial impacts to the Eastern oyster as portions of historic oyster habitat will be restored.

Placement of alternate substrate is expected to increase oyster populations. Consideration will be taken when designing bars and reefs with alternate substrate to ensure appropriate interstitial space to protect oyster from predation and to mimic natural bar and reef structures as closely as possible. There are no anticipated adverse impacts.

5.3.1.2 Clams

The proposed project is expected to result in beneficial impacts to clams. Through the placement of alternate substrate a portion of historic oyster habitat will be restored, and will form an elevated bar/reef structure with greatly increased surface area for the attachment of clams. Some of the clams that prefer soft substrate will be covered, but, this type of habitat is plentiful throughout the bay. However the proposed areas are NOBs and are likely to have more hard than soft bottom. No long-term, adverse impacts to clams are expected.

### 5.3.2 Blue Crabs

The proposed project is expected to result in beneficial impacts to blue crabs. Through the placement of alternate substrate, elevated bar/reef structure will be formed which will provide shelter and good cover for crabs. Clams are important food items for blue crabs and epibenthic fish (Hines et al. 1990). Therefore, the potential for reduction in the abundance of infaunal bivalves due to an increase in the abundance of oysters is an indirect mechanism of interaction that could trigger a shift in the prey selections of crabs from clams to oysters. Blue Crabs are usually only able to prey on young oysters. There are no long-term, adverse impacts expected.

### 5.3.3 Fish

The proposed project has the potential to indirectly benefit fish, as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, and improves water quality. The project will provide bar/reef structure that will provide shelter and cover for finfish. The three-dimensional habitat of an oyster bar results in a higher level of primary and secondary production than is produced inmost-other benthic substrate.

Alternate substrate placement 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 would not be used as a part of this project.

An increase in the amount (area and volume) of oyster bars and reefs in Chesapeake Bay could directly affect the populations of some species of bar/reef-oriented fish and indirectly affect others through increases in the availability of prey items and valuable habitat associated with bars and reefs. For the bar/reef dependent species, an increase in the amount of available habitat and the resultant increase in food resources could affect the population size. For bar/reef aggregating species, a change in bar/reef habitat could change the food resources associated with the habitat and, thus, the size of the croaker population. For species that prefer soft bottom there will be some loss. However, since the proposed areas are NOBs, the surfaces are most likely primarily hard substrate and therefore not primary habitat for these species. Therefore, the project is not expected to have an adverse impact on these species.

Additionally, a change in the oyster population (abundance and distribution) could influence planktivorous fish directly through competition for food, and piscivorous fish could be influenced by the associated change in the availability of their fish and non-fish prey. No long-term impacts, adverse impacts are expected.

### 5.3.4 Essential Fish Habitat

USACE, after reviewing fisheries information, has determined that the proposed action is not likely to significantly affect EFH or species covered under the Magnuson-Stevens Act and is more likely to benefit these protected species than to have an adverse effect on them. The full EFH assessment is in Appendix B. NMFS concurred with the EFH assessment and recommended the placement of some of the substrate as "mounds" to provide some vertical relief for EFH conservation. USACE will follow NMFS EFH conservation recommendation and will place substrate in a few locations that will bring the area to a height of 3 to 6 feet above soft bottom bay floor. The "mounds" will be incorporated into the site design to provide heterogeneity and varying vertical relief to constructed oyster habitat.

### 5.3.5 Avifauna

The proposed project has the potential to indirectly benefit avifauna as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species on which they predate. The mechanism of interaction between some avian piscivores species such as the bald eagle and North American osprey species is indirect: a change in the oyster population could cause changes in the populations of planktivorous fish (particularly menhaden) through competition for food, which could affect avian piscivores. No long-term, adverse impacts to avifauna are expected.

### 5.3.6 Rare, Threatened, and Endangered Species

The proposed project is not expected to jeopardize the continued existence or critical habitat of any RTE species. A USFWS letter received February 10, 2009, and a follow-up email from Mr. George Ruddy (USFWS) on February 12, 2009, states that they do not expect any adverse effects on RTE's. Coordination with NMFS (email from J. Crocker on March 12, 2009) confirmed that NMFS does not expect any impacts to RTE species under their purview.

### 5.3.7 Mammals

The proposed project has the potential to indirectly benefit mammals such as raccoons or otters as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species on which they predate. No long-term, adverse impacts are expected.

## 5.4 Community Setting

### 5.4.1 Land Use

Historically, oyster bar/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. No detrimental or beneficial impacts are predicted for land use in the area as a result of the proposed work as the project is compatible with current land use. Additional shoreline development is not anticipated as a result of the project.

### 5.4.2 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. Oyster bars and reefs are a desirable place to fish for some recreational boaters because of the habitat they provide. Consequently, there are expected to be some benefits for recreational fishermen. However, during construction there will be temporary adverse impacts on recreational fishing of finfish and shellfish, which will be temporarily disrupted by the work. However oystering is not permitted in the summer which is when alternate substrate for the project would be placed. During placement some recreational boaters may be displaced due to barge activity; impacts to recreational boaters will be short-term and temporary. The oyster bars and reefs will not have great enough heights to impact navigation routes; therefore, long-term, adverse impacts to recreational or commercial boaters are not expected.

### 5.4.3 Cultural and Historic Resources

Since the approval of the 1996 project, USACE and its restoration partners have been actively working within the identified area, placing shell and spat. The alternate substrate would be placed along the same footprint as outlined in the 1996 report. The placement of alternate substrate would be done in the same manner and within the same footprint as the previously approved project. No deviation to the footprint or manner of placement is proposed. This footprint and the activity of placing shell on top of this footprint was coordinated with MHT in 1996. Based upon coordination with MHT, site selection would be sensitive to the nature of submerged resources. Project sites would be selected to avoid submerged resources in areas that have been previously surveyed or would be in locations with a low potential for containing significant cultural resources. Because of the large areas for placement, sensitive areas have been easily avoided and would continue to be avoided; therefore it is unlikely that the alternate substrate placement would have any adverse impacts to 106 resources. However, USACE and MHT agreed that additional investigations could become necessary if sensitive areas are selected for oyster recovery actions with the potential to affect significant cultural resources.

Project activities will continue 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.

### 5.4.4 Hazardous, Toxic, and Radioactive Wastes

The proposed project is not expected to result in the use or production of hazardous materials. All alternate substrate chosen for oyster bar and reef restoration would be determined to be clean and environmentally suitable by previous studies. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Determination of project sites would include coordination with appropriate agencies and a review of historical data concerning potential contaminants. The project will avoid known CERCLIS and RCRIS sites. No significant levels of contaminants would be released into the water column. Further, any new substrate identified by advances in technology or research that could be used for the construction of oyster bars/reef would be required to be clean and free of toxics and would be approved by state and federal resource agencies prior to use.

### 5.4.5 Socioeconomic Conditions

The proposed project is expected to have slight, temporary adverse impacts on recreational and commercial fishing of finfish and shellfish, which will be temporarily disrupted by the work. However oystering is not permitted in the summer which is when alternate substrate for the project would be placed. Upon completion of the work, however, it is likely that shellfish and finfish will return to the project areas. As a result of previous oyster projects, oyster populations in the Chesapeake Bay have increased, benefiting watermen harvesting oysters. A minor temporary beneficial impact by providing employment for a marine contractor and a few employees will occur. No long-term adverse impacts on population or growth are expected.

### 5.4.6 Environmental Justice

Environmental justice is the protection of every person regardless of color, race, or income from negative health, environmental, and economic impacts from a Federal project http://www.epa.gov/compliance/environmentaljustice/index.html. The project is expected to comply with Executive Order 12989, dated February 11, 1994 (*Environmental Justice in Minority Populations and Low-Income Populations)*. Any change in the Bay's oyster population that affects water quality and habitat in the Bay will affect all residents of the Bay area, regardless of minority or economic status. To the extent that minorities or low-income individuals are involved in oystering or in other components of the oyster industry they would be positively affected by alternatives that result in increases in oyster populations or oyster-related businesses. The project is not expected to adversely impact any minority or low-income communities. The economic and environmental impacts of the recommended plan of using alternate substrate for oyster restoration are expected to be beneficial, so there would be no adverse impact, either short- or long-term, related to environmental justice for all persons.

### 5.4.7 Visual and Aesthetics Values

Transport vehicles, boats, and heavy equipment associated with the proposed project could be a temporary adverse impact to aesthetics of the area. The location of the substrate would occur under water, and it would not have a visual impact once the project is complete. No long-term adverse impacts are expected.

#### 5.4.8 Public Health and Safety

The proposed project is not expected to impact human health. Determination of project locations avoid pollution sources and areas where shellfish harvest is restricted.

#### 5.4.9 Noise

The proposed project will generate noise through the use of barges and tugboats to transport alternate substrates to project sites and the use of a water cannon. The dBA level for a tug is estimated to be 82 at 50 feet, a barge is 79 at 160 feet, and the water cannon is 72 at 50 feet (E. Price, UMD email on March 17, 2009). In addition, no work is expected to take place in close proximity to residences. Noise would be no greater than current oyster restoration project which is ongoing.

### 5.5 Additional Executive Orders

#### 5.5.1 Children's Protection Executive Order Compliance 13045

No health or safety risks to children associated with the project have been identified. The types of activities associated with the project will not generate chemical constituents that may pose health risks to children. Additionally, because the project is located offshore, children will not have general access to construction areas located on site.

#### 5.5.2 Floodplain Protection Executive Order Compliance 11988

No detrimental or beneficial impacts are predicted for flood heights and drift as a result of the proposed work. No detrimental or beneficial impacts are predicted for floodplain values as a result of the proposed work.

### 5.6 Cumulative Impacts

In regulations implementing the procedural provisions of NEPA (40 CFR 1500-1508), CEQ defines cumulative effects as follows:

"…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions…" (40 CFR 1508.7)

The proposed action evaluated in this EA achieves the purpose as stated in Section 2.1; it would affect local (and possibly beyond local) habitat and water quality and promote a healthy estuarine system in the Chesapeake Bay. The CBP (www.chesapeakebay.net) addresses in detail all major "…past, present and reasonably foreseeable future actions…." that may affect the Chesapeake Bay which is summarized below. Since its inception in 1983, the CBP has documented the major problems facing the Chesapeake Bay and the actions needed to resolve those problems. An overview of past, current and future stressors drawn from the CBP web page provides a context for addressing the cumulative effects of oyster restoration.

The major pollutants affecting the Bay are excess nutrients, which come from agriculture, urban/suburban runoff, vehicle emissions, and many other sources. Excess nutrients fuel the growth of algae blooms, which block sunlight that underwater grasses need to grow. When algae die, they are decomposed in a process that depletes the water of oxygen, which all aquatic animals need to survive. Other major stressors on the Bay include erosion, chemical contaminants, air pollution, and landscape changes. Natural factors can have a great direct influence on the Chesapeake Bay ecosystem and also on the magnitude and scope of the effects of human activities. Total river flow into the Bay can vary dramatically from year to year, causing large fluctuations in salinity that affect the Bay's biological communities and oysters in particular, dramatically. Droughts result in high salinity throughout much of the Bay, which contribute to the range expansion and increase in severity of diseases that affect the Eastern oyster population. In wet years, when precipitation is frequent and heavy, normally brackish regions of the Bay can become fresh and cause mortality of oysters and other animals and plants that cannot survive in fresh waters. Some scientists contend that extremes of precipitation will become more frequent in the future due to climate change. Climate change and variability have caused water temperatures in the Bay to exhibit greater extremes during the 20$^{th}$ century than during the previous 2,000 years. Sea-level rise related to climate change is contributing to the loss of vital coastal wetlands. The amounts of pollutants entering the Bay continue to exceed target levels established by the CBP to restore the Bay's water quality. The human population in the Bay watershed is now growing by about 130,000 residents annually. The cumulative impact of centuries of population growth (currently nearly 17 million) and landscape change has taken its toll.

Historical over-harvest compounded by the effects of poor water quality and disease has resulted in the current low abundance of oysters in the Bay. Excess suspended sediment is one of the largest contributors to the Bay's impaired water quality. The culprits are the tiny clay- and silt-sized fractions of sediment. These particles frequently are suspended in the water because of their size and can be carried long distances during storms. In excess, these smaller grains of sediment cloud the water, reducing the amount of sunlight that reaches submerged grasses. Without enough sunlight, these underwater grasses are not able to grow and provide habitat for young fish and blue crabs. The excess suspended sediment can carry chemical contaminants that may affect fish and other living things in the Bay, as well as humans and animals that swim in it. When it settles to the bottom, the excess sediment also covers and degrades hard-bottom habitat that is essential for the growth of the oyster population and the well being of other aquatic organisms that require that kind of habitat.

The use of alternate substrate would permit oyster restoration to continue on a scale that could address goals of restoring significant oyster bar/reef acreage and could result in ecosystem changes that would counteract some of the cumulative effects of watershed development and pollutant loading to the Bay, on a local scale. It is expected that in conjunction with the use of alternate substrate, other oyster restoration activities would also continue by various groups including some amount of restoration using oyster shell (Alternative 1) and rehabilitating oyster habitat that has been covered by sediment (Alternative 2). However, without the use of alternate substrate, it is extremely unlikely that significant acreage could be restored and long-term goals achieved.

Other restoration activities include the activities discussed in the *Draft Programmatic Environmental Impact Statement for Oyster Restoration in Chesapeake Bay Including the Use of a Native and/or Nonnative Oyster* (Released October 17, 2008 by U.S. Army Corps of Engineers, Norfolk District). For this project the proposed actions include introducing a non-native species, *Crassostrea ariakensis*, and to continue efforts to restore the native Eastern oyster. Another project that is occurring is the development of the Native Oyster Restoration Management Plan (NORMP) by both the Baltimore and Norfolk Districts of USACE. The NORMP presents a plan for pursuing wide-scale oyster restoration throughout the Bay that complements other Bay-wide restoration efforts and future uses of Chesapeake Bay. The MD DNR has recently been permitted to conduct an alternate substrate restoration project (described in Section 1) which involves the placement of alternate substrates within Maryland charted oyster bars in the Chesapeake Bay. MD DNR will also be developing infrastructure and training for aquaculture, continuing bar rehabilitation, (1000 acres planned over the next three years), reopening Piney Point Hatchery to produce spat, and placing cameras to continuously monitor oyster sanctuaries to deter poaching. Additionally there is a bill now under consideration to permit non-private entities to lease the Maryland Bay bottom. It contains restrictions that would require leaseholders to submit a "use" plan and if there is no proof of use, the lease will be transferred to another individual (exception is demonstration leases). Over the last 10 years, NOAA has coordinated community based restoration projects, hatchery infrastructure support, and oyster research and monitoring in the Bay. A recently passed Omnibus bill includes 2.4 million dollars for NOAA to conduct oyster restoration activities in MD; no specific plans have been developed yet. In the last 10 years through the Chesapeake Bay Oyster Recovery Project USACE has established new oyster habitat in the Choptank, Patuxent, and Chester Rivers (437 acres), and placed spat in the project area (1997-2008).

There are Federal channels that are periodically maintained by dredging as needed within all six tributaries. Any dredging of channels that occurs within 500 yards of an oyster bar is subject to time of year restrictions. Hydraulic dredging is restricted from June 1 to September 30 because of concerns over the potential of entrainment of larvae. Mechanical dredging is restricted from December 15 to March 14 due to concerns with increased turbidity.

This alternate substrate project is expected to increase the acreage of available oyster bar/reef habitat as well as enhance recruitment, growth, and survival of oyster populations. The cumulative impact of this project and other oyster restoration projects constructed by MD DNR, ongoing Oyster Recovery Project activities, NOAA and various non-profit and citizens groups is expected to be positive, with the creation of more diverse and productive habitat ) improve water quality and promote a healthy estuarine system in the Chesapeake Bay.

## 6.0 ENVIRONMENTAL COMPLIANCE AND COORDINATION

In addition to the environmental impacts discussed in this EA, a review of the proposed action has been made with regard to other potential areas of concern. Due to the expected impacts, a 404(b)(1) evaluation of the proposed project on waters of the United States was performed pursuant to the guidelines promulgated by the Administrator, U.S. EPA., under authority of Section 404 of the Clean Water Act. A report of that evaluation can be found in Appendix A along with the approved Section 401 Water Quality Certification for all Chesapeake Bay Oyster Recovery Project activities which will expire in April 2010.

EFH coordination was initiated by a letter sent to NMFS on December 22, 2008. NMFS provided technical information in an email dated February 9, 2009. Based on this coordination an EFH assessment was completed (Appendix B) and was submitted to NMFS for review and approval. NMFS concurred with the EFH assessment.

Coordination for Section 7 of the ESA and Fish and Wildlife Coordination Act were initiated by a letter sent to USFWS December 22, 2008. A USFWS response letter dated February 10, 2009, stated that the USFWS expects that there would be no impacts to federally listed or proposed endangered or threatened species under USACE jurisdiction, the letter also discussed recommendations for using alternate substrate and potential shortcomings of this new substrate when compared to native oyster shell substrate. A follow-up phone call with Mr. Ruddy took place on March 17, 2009. Overall, Mr. Ruddy is satisfied with USACE coordination up to this point and was open to continuing the coordination as the project progresses to design, construction, and monitoring phases. He suggested that monitoring include the investigation of the ecological community of constructed bars and reefs and use and coverage of spat on bars and reefs.

Coordination with NMFS regarding endangered species has been completed as of March 12, 2009. No adverse impacts to species under their purview are expected. Verbal coordination with Mr. Roland Limpert of MD DNR, on February 25, 2009, confirmed that no State listed rare or threatened species will be impacted by the placement of alternate substrate at the oyster bars in the project areas.

A Study Initiation Notice announcing an EA was being prepared for the project was issued on December 22, 2008. A public notice announcing the availability of the draft document was issued on April 13, 2009. The notice was distributed to Federal, State, and local agencies, special interest groups, and other interested parties. The notice was also available on the USACE website, and available for review at select public libraries.

The public review period ended on May 13, 2009. A letter received from Maryland Department of Planning informing USACE that the EA was received by the State Clearinghouse Review Process and that the following agencies were forwarded a copy of the document for review: the Counties of Calvert, Caroline, Charles, Dorchester, Wicomico, Anne Arundel, Prince George's, Queen Anne's, Somerset, St. Mary's, and Talbot; the Maryland Department of Planning including MDE, Maryland Department of Transportation (MDOT), MD DNR, and the Maryland Historical

Trust (SHPO). During this time, three coordinating agency comments were received. MDE corrected a statement in section 5.1.8 clarifying that the current *de minimis* levels for MD are 50 tons for VOC, 100 for NOx, SO2 and PM2.5. This change was made to the final document. NMFS recommended the placement of some of the substrate as “mounds” to provide some vertical relief for EFH conservation. USACE will follow NMFS recommendation and will place substrate in a few locations that will bring the area to a height of 3-6 feet above soft bottom bay floor. The "mounds" will be incorporated into the site design to provide heterogeneity and varying vertical relief to constructed oyster habitat. Additionally, MDE recommended that actual batches of alternate substrate (if the source and specific composition is unknown) be tested to assure that there are no unexpected contaminants that would not be a problem in air but could leach into water. USACE will follow MDE recommendations. The non-profit agency, the Oyster Recovery Partnership sent an email dated, May 7, 2009 suggesting the removal of the abbreviation of "ORP" to reduce confusion between the organization and the USACE program, as well as adding text describing the various Maryland partners that do work together in the oyster recovery efforts. These comments were incorporated into the final document. No comments were received from the general public.

A Section 401 Water Quality Certification for the Chesapeake Bay Oyster Recovery Project has been issued by MDE. The proposed project complies with and will be conducted in a manner consistent with Maryland's federally approved Coastal Zone Management (CZM) Program. The Public Notice for this EA requested the State’s concurrence with this determination which was received. Table 6-1 outlines the statutes and executive orders that are potentially applicable to the project, including the level of compliance.

In compliance with the National Environmental Policy Act of 1969 and the Clean Water Act, the proposed project has been coordinated with concerned resource agencies and members of the public. USACE is working with a number of government agencies and non-profit organizations to facilitate oyster restoration in the Chesapeake Bay. The focus of the coordination efforts with Federal and State resource agencies is to ensure that environmental factors are considered while planning and executing a prudent and responsible project. These coordination efforts are expanded upon in Appendix C.

**Table 6-1. Compliance with Applicable Federal Laws, Regulations, and Executive Orders**

| Federal Statutes | Level of Compliance[1] |
|---|---|
| Archeological and Historic Preservation Act | Full |
| Clean Air Act | Full |
| Clean Water Act | Full |
| Coastal Barrier Resources Act | N/A |
| Coastal Zone Management Act | Full |
| Comprehensive Environmental Response, Compensation and Liability Act | Full |
| Endangered Species Act | Full |
| Estuary Protection Act | Full |
| Federal Water Project Recreation Act | N/A |
| Fish and Wildlife Coordination Act | Full |
| Land and Water Conservation Fund Act | Full |
| Magnuson-Stevens Act | Full |
| Marine Mammal Protection Act | Full |
| National Historic Preservation Act | Full |
| National Environmental Policy Act | Full |
| Resource Conservation and Recovery Act | N/A |
| Rivers and Harbors Act | Full |
| Watershed Protection and Flood Prevention Act | Full |
| Wild and Scenic Rivers Act | N/A |
| | |
| Executive Orders, Memoranda, etc. | |
| Migratory Bird (E.O. 13186) | Full |
| Protection and Enhancement of Environmental Quality (E.O. 11514) | Full |
| Protection and Enhancement of Cultural Environment (E.O. 11593) | Full |
| Floodplain Management (E.O. 11988) | N/A |
| 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 |
| Invasive Species (E.O. 13112) | Full |
| Protection of Children from Health Risks & Safety Risks (E. O. 13045) | Full |

[1] *Full Compliance (Full):* Having met all requirements of the statute, E.O., or other environmental requirements for 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. *Partial:* In process of meeting requirements of statute.

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# APPENDICES

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# APPENDIX A

Clean Water Act Section404(b)(1) Evaluation
Chesapeake Bay Oyster Recover Project Section 401Water
Quality Certification

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**CLEAN WATER ACT SECTION 404(B)(1) EVALUATION**

# Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate

**CHESAPEAKE BAY OYSTER RECOVERY PROJECT, MARYLAND**
**April 2009**

## 1. PROJECT DESCRIPTION

### A. Location

The Project would occur within the Maryland portion of the Chesapeake Bay. Project activities would occur in Oyster Recovery Areas (ORA's) established by the Maryland Oyster Roundtable Action Plan in the Chester, Choptank, Nanticoke, Patuxent, Magothy, and Severn Rivers.

### B. General Description

The United States Army Corps of Engineers (USACE) Oyster Recovery Project is recommending the use of alternate substrates to construct oyster bar and reef habitat.

### C. Purpose

The purpose of the proposed project is to use alternate substrate for the approved native oyster restoration project in the Maryland portion of the Chesapeake Bay due to limited availability of native oyster shell. In addition to having economic value as a commercial fishery, oysters provide significant environmental benefits. Oysters are a keystone species in the Chesapeake Bay, serving both a water quality and habitat function. There is no substitute for a thriving oyster community in the Bay. The oysters filter the water, playing an important role in sediment and nutrient removal, and provide a hard structure that serves as habitat for not only future oyster generations, but also a variety of fish and benthic species, including juvenile striped bass and blue crabs. It is anticipated that restoring functioning oyster bars and reefs would provide habitat and water quality improvements, at least locally, that would promote a healthy estuarine system. Even in low setting areas, these materials are important as habitat to prepare a base for the planting of hatchery seed.

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 Action Plan. The project is also consistent with the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay* of 1994.

### D. General Description of Material

**(1) Characteristics of Material-** The alternate (non-oyster shell) materials suitable for use include, but are not limited to clam shell, marl, concrete, stone, slag, brick, porcelain, and cinderblock. Any concrete rubble to be used would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). Only clean material free of contaminants and hazardous materials are suitable for disposal within State waters and would be used. Further, advances in technology and research may identify new substrates that could be used for the construction of oyster habitat once approved by State and Federal resource agencies. The size of individual pieces of material used would vary with the material type and project purpose. The larger the material, the greater the relief provided for the benthic population. No materials other than reef balls would be utilized larger than 12 inches in size.

**(2) Fill Material Quantities -**Fill material quantity is essentially dependent on funding and availability of resources such as substrate and oyster spat. Given sufficient substrate and spat, funding levels ultimately determine the amount of oyster habitat that can be restored. On average, an acre of oyster habitat receives 900 cubic yards (cy) of substrate material. This provides a base of hard substrate elevated 6 inches off the Bay floor. Some sites would be planted less than 6 inches thick (a 3 inch thickness equates to 450 cy/acre) and others include higher mounds. Based upon current cost projections for the procurement, transportation, and planting of alternate materials, it is estimated that approximately 25 to 40 acres of material could be planted per million dollars of available funding, requiring the placement of 22,500 to 36,000 cy of alternate substrate material.

**(3) Source of Material -**Sources of alternate materials varies. Some substrates such as reef balls are purchased from companies that make the reef balls. Stone can be purchased from regional quarries. Clam shell is available from wholesalers and is readily available. However, many of the substrates are byproducts of other uses and may only be available sporadically. Slag is a byproduct of metal smelting and has become increasing less available in recent years. Crushed concrete is generally produced from a demolition project such as the replacement of a bridge or building and is intermittently available. Cinderblock, porcelain, and brick are readily available for purchase or can possibly be obtained intermittently from demolition projects. Marl or marl limestone is a calcium carbonate or lime-rich stone which contains variable amounts of clays and aragonite. Marl is mined and is readily available. All materials used in this project would be clean and free of contaminants and hazardous materials.

## E. Description of the Proposed Discharge Sites

New oyster habitat would be constructed in the targeted tributaries within the boundaries of natural oyster bars (NOBs). Targeted tributaries include the Chester, Choptank, Patuxent, Severn, Magothy, and Nanticoke Rivers. Specific locations for project activities would be determined based on bottom composition, salinity, water depth, water currents, levels of dissolved oxygen, and disease prevalence. GIS mapping would be utilized to identify sites.

## F. Description of Placement Method

Project activities would involve the placement of alternate substrates to create oyster habitat. Alternate materials would be placed primarily by tugboat and barge but large workboats may also be used. With either barges or large workboats, the material would be washed overboard using high pressure water hoses or cannons, with the vessel moving continuously through the planting area to control the thickness and acreage of the planting. Materials may also be placed using a crane/excavator or front-end loader to place material on the oyster bar. To date, the majority of alternate material placements have been less than one foot in height off of the bottom. Restored areas may also receive a thin veneer of native oyster shell, if available; and would be planted with spat on shell.

## 2. FACTUAL DETERMINATIONS

### A. Physical Substrate Determinations

**(1) Substrate Elevation and Slope-**The elevation of the discharge site would range from +3 inches to a (+) few feet off existing bottom. All elevations would maintain 8 feet of open water clearance above them. The minimum water depth in the oyster placement areas would be -8 feet.

**(2) Sediment Type**- Oyster bars and reefs would be constructed on firm bottom.

**(3) Discharge Material Movement -** It is not expected that the material would move off site once placed on a bar. There would likely be some settling of the material. Smaller pieces of material would likely be displaced off of higher relief bars and reefs and settle at the base of these bars and reefs.

**(4) Other Effects**-None expected.

**(5) Actions Taken to Minimize Impacts-** The substrate material would be discharged in a manner that minimizes the disruption of bottom sediments. Environmental protection measures, such as time-of-year restrictions on construction and proper site selection to avoid sensitive areas, would be employed at project sites to avoid and minimize impacts to the aquatic environment. Construction specification would state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement.

Measures to protect SAV: The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by the Virginia Institute of Marine Sciences (VIMS) in coordination with the Maryland Department of Natural Resources (MDNR) Resource Assessment Service. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed.

Measures to protect existing oyster habitat: Time-of-year restrictions apply to activities occurring within 500 yards of NOBs.

### B. Water Circulation, Fluctuation, and Salinity Determinations

**(1) Water Quality-**Temporary, localized changes may occur in clarity, color, and quality of Bay waters in the immediate vicinity during substrate placement. No negative impacts are expected following construction.

(a) Salinity – No change expected.
(b) Chemistry – No negative impacts expected.
(c) Clarity – Minor and temporary changes are possible in the immediate vicinity during construction due to turbidity. There would likely be localized improvements in clarity due to oyster filtration following establishment of an oyster population on the substrate.

(d) Color – Minor and temporary changes are possible in the immediate vicinity during construction due to turbidity.
(e) Odor – No change expected.
(f) Taste – Not applicable.
(g) Dissolved Oxygen Levels –No change expected.
(h) Nutrients – Not expected to occur. There would likely be localized improvements in nitrogen (N) and phosphorus (P) due to oyster filtration following establishment of an oyster population on the substrate.
(i) Eutrophication – Not expected to occur.
(j) Temperature – No Change expected.

**(2) Current Patterns and Water Circulation**

(a) Current Patterns and Flow- Minimal effects are expected, but would likely be a positive improvement that benefits the restored oyster habitat. Elevation of an oyster bar or reef may increase flow and turbulence in the vicinity of the bar or reef, resulting in enhanced mixing and food delivery downstream.
(b) Velocity- No significant change in velocity is expected.
(c) Stratification- No change expected.
(d) Hydrologic Regime- No significant changes are expected.

**(3) Normal Water Level Fluctuation**-No change is expected.

**(4) Salinity Gradients-**Not applicable.

**(5) Actions That Will Be Taken to Minimize Impacts**-Not applicable

**C. Suspended Particulate/Turbidity Determinations**

**(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site-**A minor and temporary increase in suspended sediment and turbidity is expected in the immediate vicinity of the placement sites. Suspended sediment and turbidity in the vicinity of restored oyster habitat is likely to be reduced after habitat is restored due to stabilizing the sediments with the hard substrate and oyster filtering capabilities.

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

(a) Light Penetration-Minor, temporary, and localized reduction in light penetration due to turbidity would occur in the immediate vicinity of the substrate plantings during placement. Light penetration would depend on placement thickness and the density of the material. Oyster bars and reefs are in 6 to 30 ft. depths and not in the photic zone.
(b) Dissolved Oxygen-Minor, temporary, and localized reduction in dissolved oxygen in conjunction with elevated turbidity levels may occur in the immediate vicinity of placement operations. However, sites that are typically characterized by low oxygen levels would likely be avoided for oyster habitat restoration.
(c) Toxic Metals and Organics-Placement operations are not expected to result in the release of any measurable amounts of contaminants into the water column.
(d) Pathogens-No pathogens are expected to be released into the water column.
(e) Aesthetics-Transport vehicles, boats, and heavy equipment associated with the proposed project would be a temporary negative impact. Project activities would occur under water, and therefore would not impact visual and aesthetic values.
(f) Temperature- No change expected.

**(3) Actions Taken to Minimize Impacts-**Construction activities would be limited to the immediate project area except for the barge loading sites which would vary with material type. All sites would be within NOB's. All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by VIMS in coordination with the MD DNR Resource Assessment Service.

## D. Contaminant Determinations

All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Determination of project sites would include coordination with appropriate agencies and a review of historical data concerning potential contaminants. No significant levels of contaminants would be released into the water column.

## E. Aquatic Ecosystem and Organism Determinations

**(1) Effects on Plankton -**As construction is a very short-term event and plankton are mobile, no effect is expected. The areas restored to oyster bars and reefs from open water would still be available to the plankton community.

**(2) Effects on Benthos-**The placement of alternate substrates would permanently cover the existing substrate and benthos. Non-sessile dwellers may be able to avoid burial, but sessile species could be buried. However, the restored oyster habitat would provide enhanced habitat for recolonization by benthic epifauna. Oyster bars and reefs are three-dimensional structures which provide more surface area for the attachments of oysters and other sessile organisms (mussels, barnacles, hydroids, algae, etc.) than that provided by relatively flat bottom.

(a) Primary Production/Photosynthesis-Any turbidity generated during construction may reduce photosynthesis within the area of the oyster bar or reef and possibly slightly outside.
(b) Suspension/ Filter Feeders-Minor, temporary, and localized impacts due to turbidity may occur during construction.
(c) Sight Feeders-Minor, temporary, and localized impacts due to turbidity may occur during construction.

**(3) Effects on Nekton-**No long-term negative impacts are expected. Nekton would be temporarily disturbed during construction, but would be able to avoid the area during substrate placement. Following construction, the restored oyster bar or reef would provide an enhanced habitat for species that rely on structure for habitat, protection, and foraging such as fish, amphipods, shrimp, worms, and crabs.

**(4) Effects on Food Web-**No adverse, long term effects are expected. The long-term project effects are expected to be positive by providing bar and reef habitat and subsequent oyster populations and associated assemblages. A great diversity of macroinvertebrates, fish, and shellfish have been shown to colonize restored oyster habitats (Rodney and Paynter 2006). Organisms associated with oyster habitat recycle nutrients and organic matter, and are prey for commercially and recreationally important finfish species.

**(5) Effects on Special Aquatic Sites-**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 SAV. However, appropriate measures such as time-of-year restrictions to minimize impact to NOBs and restrictions on construction near SAV, would be implemented during substrate placement to protect special aquatic sites in adjacent areas from elevated turbidity. There would be no significant negative impacts or effects to other special aquatic sites including marine sanctuaries and refuges, wetlands, or tidal flats.

(a) Sanctuaries and Refuges- Temporary and minor impacts would occur to designated oyster sanctuaries since the material would be placed within existing areas designated as sanctuaries by MDDNR. These impacts would include temporary increased turbidity and covering the benthos with the newly placed substrate. There would be no impacts to any other marine sanctuaries or refuges.

(b) Wetlands- There would be no impacts to wetlands as wetlands do not occur in the project area.

(c) Tidal flats- No impacts since tidal flats do not occur in the project area.

(d) SAV – SAV habitat coverage of the Bay bottom is variable from year to year. A comparison was made of SAV coverage within the past 5 years using maps produced by VIMS to NOBs. There are some minor areas where SAV has occurred within the boundaries of NOBs. Any areas containing SAV would be avoided during site selection. Also, existing restrictions on construction within 300 yards of existing SAV beds would be upheld to prevent negative impacts associated with construction such as increased turbidity.

(e) Riffle and Pool Complexes- None in project area.

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

**(7) Other Wildlife-** Construction would have expected noise associated with the machinery used to place the material. This noise would temporarily disrupt some species of wildlife during periods of work. Also, the presence of humans and equipment may disturb some species. Species are expected to return when construction is completed and the equipment leaves the area.

**(8) Actions to Minimize Impacts-**Construction activities would be limited to the immediate project area. All sites would be within NOBs. All alternate substrates chosen for oyster habitat restoration would be determined to be clean and free of toxics. Any concrete rubble to be placed would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. The placement of alternate materials would not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by VIMS in coordination with the MD DNR Resource Assessment Service.

**F. Proposed Placement Site Determinations**

**(1) Mixing Zone Determinations-** Not applicable.

**(2) Compliance with Applicable Water Quality Standards Determinations-**Alternate substrates used would be clean and would meet all applicable water quality standards. The proposed work would be performed in accordance with all applicable State of Maryland water quality standards. All work would be conducted in compliance with conditions specified in the project's Water Quality Certification.

**(3) Potential Effects on Human Use Characteristics Determinations**

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

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

(c) Water Related Recreation- As an indirect benefit of the proposed work, some increase in recreational fishing may occur following establishment of communities on the restored bars and reefs.

(d) Aesthetics-Minor during construction.

(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 use of alternate substrates would permit oyster restoration to continue on a scale that could address goals of restoring significant oyster habitat acreage. Without the use of alternate substrates it is extremely unlikely that significant acreage could be restored due to the current degraded condition of existing oyster habitat and the limited availability of native oyster shell for habitat restoration. The project is expected to increase the acreage of available oyster habitat as well as enhance recruitment, growth, and survival of oyster populations. The cumulative impact of this project and other oyster restoration projects constructed by MDNR, Federal agencies, and various non-profit and citizens groups 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. Additional benefits from oyster restoration would include water filtration and regulation of water column phytoplankton dynamics; enhanced nitrogen (N) cycling between the benthic and pelagic system components; enhanced phosphorus (P) burial in sediments; nursery and predation refuge habitat for a diverse community of invertebrates and small fishes; and foraging habitat for transient piscivorous and benthivorous fishes.

The mandatory sequence of the Section 404(b)(l) Guidelines has been applied in evaluation of the proposed action. The proposed use of alternate substrates to restore oyster habitat is in compliance with the Section 404(b)(l) Guidelines. Parts II and IV of the analysis show that the proposed use of alternate substrates do not contribute to the significant degradation of waters of the United States and as such, the proposed project and proposed use of the placement sites comply with the requirements of 40 CFR 230.10(c). Appropriate steps to minimize potential impacts of the placement of the alternate substrate in aquatic systems would be followed.

## 3. FINDING OF COMPLIANCE

a. Adaptation of the Section 404(b)(1) Guidelines to This Evaluation - No adaptations of the Guidelines were made relative to this Evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. – None of the alternatives are expected to provide the same benefits with fewer impacts.

c. Compliance with Applicable State Water Quality Standards. – In full compliance. WQC 05-WQ-001.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. – N/A.

e. Compliance With Endangered Species Act of 1973 – In full compliance. No impacts are anticipated to these resources.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 – N/A.

g. Evaluation of Extent of Degradation of Waters of the United States – No adverse impacts, permanent or temporary, to the aquatic ecosystem diversity, productivity, stability, recreation, and aesthetics and economic values would occur as a result of this project.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – Best management practices such as targeted placement of material at bars and reefs would occur.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material - On the basis of the guidelines, the proposed discharge sites for the material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

## REFERENCES

Rodney, W.S., and K.T. Paynter. 2006. Comparisons of macrofaunal assemblages on restored and non-restored oyster reefs in mesohaline regions of Chesapeake Bay in Maryland. *Journal of Experimental Marine Biology and Ecology* 335: 39-51.

MDE

**MARYLAND DEPARTMENT OF THE ENVIRONMENT**
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Deputy Secretary

**WATER QUALITY CERTIFICATION**

**NABOP** **CERTIFICATION 05-WQ-001**

**PUBLIC NOTICE DATE August 24, 1995**

**TO: Planning Division**
**Baltimore District, Corps of Engineers**
**P.O. Box 1715**
**Baltimore, MD 21203-1715**

**RE: Implementation of the Chesapeake Bay Oyster Recovery Project involving numerous restoration and remediation activities to increase oyster habitat and populations.**

**This water quality certification is issued under authority of Section 401 of the Federal Water Pollution Control Act and its Amendments and the Environment Article, Sections 9-313 - 9-323, inclusive, Annotated Code of Maryland. A copy of this required certification has been sent to the Corps of Engineers. This certification does not relieve the applicant of responsibility for obtaining any other approvals, licenses or permits in accordance with federal, State, or local requirements and does not authorize commencement of the proposed project. The Maryland Department of the Environment has determined from a review of the plans that the construction of this facility and its subsequent operation as noted herein will not violate Maryland's water quality standards, provided that the following conditions are satisfied.**

**The applicant shall comply with the conditions marked (X) below:**

**(X) (1) The proposed project shall be constructed in a manner which will not violate Maryland's Water Quality Standards as set forth in COMAR 26.08.02. The applicant is to notify this department ten (10) days prior to commencing work. Verbal notification is to be followed by written notice within ten (10) days.**

**(X) (2) The proposed project shall be constructed in accordance with the plan and its revisions as approved by the:**

**(X) (a) Corps of Engineers**
**( ) (b) Water Management Administration**

**(X) (3) All fill and construction materials not used in the project shall be removed and disposed of in a manner which will prevent their entry into waters of this State.**

**(X) (4) The applicant shall notify this Department upon transferring this ownership or responsibility for compliance with these conditions to another person. The new owner/operator shall request transfer of this water quality certification to his/her name.**

**(X) (5) The certification holder shall allow the Maryland Department of the Environment or its representative to inspect the project area at reasonable times and to inspect records regarding this project.**

**Page Two Water Quality Certification**

( ) (6) Construction of any bulkhead shall be completed prior to filling behind the bulkhead. The bulkhead shall be constructed in such a manner so as to prevent the loss of fill material to waters of this State. Only clean fill, which is free of organic, metallic, toxic or deleterious materials shall be used.

( ) (7) The disturbance of the bottom of the water and sediment transport into the adjacent State waters shall be minimized. The applicant shall obtain and certify compliance with a grading and sediment control plan which has been approved by the:

( ) (a) ____________________ Soil Conservation District or
( ) (b) Erosion and Control Representative, Division of Environmental Services, Bureau of Highways, Department of Public Works of the City of Baltimore or
( ) (c) The Department of the Environment, Water Management Administration or
( ) (d) Montgomery County Department of Environmental Protection.

The approved plan shall be available at the project site during all phases of construction.

( ) (8) The spoil disposal area(s), including dikes where applicable, shall be constructed to limit the suspended solids content in the discharge to the waters of this State to four hundred (400) parts per million or less.

( ) (9) ____________ shall be done only in the period ____________________.

( ) (10) Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway. The natural vegetation shall be maintained and restored when disturbed or eroded. Stormwater drainage facilities shall be designed, implemented, operated and maintained in accordance with the requirements of the applicable approving authority.

( ) (11) ________________________________________ shall provide to the Water Management Administration a stormwater management plan including cross-sections which incorporates effective pollutant removal strategies in uplands to treat a minimum of the first one-half inch of runoff from impervious surfaces prior to release of stormwater into State waters or wetlands. There shall be no discharge of untreated stormwater to State waters or wetlands. The plan shall be provided by ________________ and shall be implemented by ______________________________.

( ) (12) ________________________________________ shall provide to the Water Management Administration a mitigation plan for the construction of ________________ acre(s) of ______________________ wetland for review and approval by ______________________________. The plan shall be implemented by ______________________________. The plan shall show:

- the source of hydrology for the constructed wetland
- the source and amount of soil to be used in constructing the wetland
- the species, size and density of vegetation to be planted in the constructed wetland and a planting schedule.
- a monitoring/maintenance plan.

( ) (13) ________________________________________ shall monitor the mitigation site for a period of five years and shall determine whether the wetland construction has been successful. A successful mitigation project shall result in: ______ plants/acre and 85% survivability of plants in forested and scrub/shrub wetlands and plants covering 85% of the area for emergent wetlands. If these standards are not met, ______________________________ shall determine the reason(s) for failure, the problem(s) shall be corrected, and the area(s) shall be replanted and monitored.

**Page Three Water Quality Certification**

**( ) (14) The mitigation site shall be constructed in accordance with the plan, dated____________________.**

**( ) (15) ________________________________________ shall provide a ______________________________ plan for review and approval by ______________________. This plan shall be implemented by ________________________________.**

**( ) (16) At least one culvert in every stream crossing shall be depressed at least one foot below existing stream bottom under the low flow condition. A low flow channel shall be provided through any riprap structures. The culvert shall be constructed and any riprap placed so as not to obstruct the movement of aquatic species.**

**( ) (17) Stormwater discharges from ponds, stormwater management outfalls, and stormwater facilities shall have a velocity no greater than four feet per second for the two year storm in order to prevent erosion in the receiving waterway or wetland.**

**( ) (18) Future stormwater discharges to certified pond(s) are prohibited unless the first one half inch of stormwater runoff from impervious surfaces is managed in uplands for effective pollutant removal.**

**( ) (19) Authorized stormwater detention ponds shall have a maximum detention time of ____________________ hours.**

**( ) (20) __________________________ shall restore and revegetate all temporarily disturbed waters and wetlands to original contours upon completion of construction.**

**Failure to comply with these conditions shall constitute reason for suspension or revocation of the Water Quality Certification and legal proceedings may be instituted against the applicant in accordance with the Annotated Code of Maryland. In granting this certification, the Department reserves the right to inspect the operations and records regarding this project at anytime.**

**CERTIFICATION APPROVED**

Ellen A. Ghigiarelli
**Water Management Administration**

April 15, 2010
**Expiration Date**

# APPENDIX B

# Essential Fish Habitat Assessment

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**Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate**

**Chesapeake Bay Oyster Recovery Project, Maryland**

**Essential Fish Habitat Assessment**

**May 2009**

**Prepared By: Baltimore District, U.S. Army Corps Of Engineers**

Pursuant to Section 305 (b)(2) of the Magnuson-Stevens Fishery Conservation & Management Act, the U.S. Army Corps of Engineers (USACE) is required to prepare an Essential Fish Habitat [EFH] Assessment for the placement of alternate substrate on natural oyster bars (NOBs) as part of the Chesapeake Bay Oyster Recovery Project, Maryland that began in 1996.

Based on the prescribed protocol for preparation of an EFH Assessment, the assessment is comprised of the following components:

1. A description of the proposed action;
2. A listing of the life stages of all species with EFH designated in the project area;
3. An analysis of the effects of the proposed action;
4. The Federal agency's opinions regarding the effects of the proposed action; and,
5. Proposed mitigation, if applicable.

## DESCRIPTION OF THE PROPOSED ACTION

The Baltimore District, U.S. Army Corps of Engineers proposes to place alternate (non-shell) substrate at existing oyster bars within Oyster Recovery Areas (ORAs) in Maryland of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers. Figure 1 provides a map of the project area. The material would be brought to the project area by tug and barge and it would be removed from the barge by means of a water cannon, a crane, or other mechanical means. All previous oyster restoration efforts by USACE have been limited to the use of clean oyster shell as substrate. Construction using alternate substrates rather than oyster shell is targeted to begin in spring/summer 2009. In subsequent years, additional placement of substrates would occur between June and September. Potential alternate substrates for construction could include, but are not limited to clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be used would be free of building debris such as wiring, pipes and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). Further, advances in technology and research may identify new substrates that could be used for the construction of oyster bars and reefs once approved by state and federal resource agencies.

## SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

After consultation with John Nichols, NMFS, (email dated February 9, 2009- Appendix C) it was determined that some areas of the Bay under consideration for oyster restoration as part of this project lie within the general area that may provide EFH for some of the species managed by NMFS. Species for which EFH is a concern are as follows: summer flounder (*Paralichthys dentatus*), juvenile and adult life stages; bluefish (*Pomatomus saltatrix*), juvenile and adult life stages; windowpane flounder (*Scopthalmus aquosus*), juvenile and adult life stages; cobia (*Rachycentron canadum*), all life stages; red drum (*Sciaenops ocellatus*), all life stages; king mackerel (*Scomberomorus cavalla*), all life stages; and Spanish mackerel (*Scomberomorus maculatus*) (National Marine Fisheries Service, Northeast Region, Habitat Conservation Division EFH web site; *www.nero.nmfs.gov/ro/doc/hcd.htm*).

Due to specific habitat needs, it is unlikely that cobia, king mackerel, Spanish mackerel, or windowpane flounder would be in the project area (Murdy et al., 1994). Windowpane flounder prefers sandy substrates which would be avoided for this project. Cobia more commonly inhabit areas of higher salinity than would be found at most of the project area. Spanish mackerel are most abundant from the mouth of the Chesapeake Bay region to south Florida. They prefer polyhaline regions (18-30ppt) of the lower Bay. Finally, none of the life stages of king mackerel are typically found within the project area. As a result, this EFH analysis will focus on bluefish, summer flounder, and red drum.

## IMPACTS TO SPECIES WITH EFH DESIGNATED IN THE PROJECT AREA

The following section provides a brief overview of pertinent natural history information of: 1) bluefish, 2) summer flounder, and 3) red drum. Additionally, an analysis of the direct, secondary, and cumulative impacts of the proposed use of alternate substrate on federally managed species, and prey species consumed by managed species that occur in the project vicinity is provided.

### 1. BLUEFISH (*Pomatomus saltatrix*) (juvenile and adult stages)

Bluefish are usually found high in the water column. In some years, large numbers of bluefish penetrate far up the Bay; in other years, bluefish schools are sparse, with larger bluefish concentrating in Virginia waters. For juveniles, all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida are considered EFH.

Juvenile and adult bluefish enter the Chesapeake Bay during spring through summer, leaving the Bay in late fall.

**Adults –** Adults are uncommon north of Annapolis, and generally do not occur above the U.S. 50 bridge, except during years of greater up-Bay salt wedge encroachment. Adults are not typically bottom feeders and are strong swimmers. No impacts expected.

**Juveniles -** Juveniles tend to concentrate in shoal waters. In contrast to adults, the young have a wide range of salinity tolerance and penetrate much farther up the Bay and its tributaries, where they can be found in shallow waters of very low salinity (Murdy et al., 1997). Therefore, juveniles are more common in the upper Bay above the U.S. 50 Bridge, occurring as far north as the Susquehanna Flats and the lower Elk River (Lippson, 1973).

**Spawning -** Spawning is oceanic and does not occur in the Chesapeake Bay.

**Prey-** Juveniles tend to be opportunistic feeders, foraging on a wide variety of estuarine life in the pelagic zone and over a variety of bottom types (Lippson, 1973). Small fish such as Menhaden that bluefish prey upon are widely dispersed across the Bay and do not depend upon the bottom. With respect to prey, there is nothing particularly unique or valuable to bluefish at the project area. Therefore, bluefish prey species should not experience adverse effects on population levels from the proposed project.

**Impact on Bluefish-** Adults and juveniles would occur in the Bay at the same time as project activities. However, no significant impacts are expected to bluefish as a result of project activities. The use of alternate substrate is not expected to have any negative impacts on any life stage of bluefish. No impacts are expected because there is sufficient open water habitat outside of the project area during the short construction season and turbidity impacts are expected to be local, minimal, and short-lived. As a transient species, bluefish are expected to be able to avoid any direct, minor construction impacts to water quality.

**Cumulative impacts:** The use of alternate substrates would permit oyster restoration to continue on a scale that could address goals of restoring significant oyster bar and reef acreage. It is expected that in conjunction with the use of alternate substrates, other oyster restoration activities would also continue by various groups and include some amount of restoration using oyster shell to rehabilitate oyster habitat that has been covered by sediment. However, without the use of alternate substrates it is extremely unlikely that significant acreage could be restored and long-term goals achieved. The project is expected to increase the acreage of available oyster bar and reef habitat as well as enhance recruitment, growth, and survival of oyster populations. The cumulative impact of this project and other oyster restoration projects constructed by MD DNR, ORP and various non-profit and citizens groups is expected to be positive, with the creation of more diverse and productive habitat. No adverse negative cumulative impacts are expected.

There would be short-term increases in turbidity and possibly the release of nutrients from bottom sediments during placement of substrate, whether alternate substrates or native shell. This impact is expected to be direct, but minor and temporary. Alternate substrates used for restoration would be clean and would not impact water quality negatively. Long-term impacts to local water quality as a result of the restoration of oyster habitat are expected to be positive throughout the Bay.

Other restoration activities include the activities discussed in the *Draft Programmatic Environmental Impact Statement for Oyster Restoration in Chesapeake Bay Including the Use of a Native and/or Nonnative Oyster* (Released October 17, 2008 by U.S. Army Corps of Engineers, Norfolk District). For this project, the proposed actions include introducing a non-native species, the Suminoe oyster, and to continue efforts to restore the native Eastern oyster. Another project that is occurring is the development of the Native Oyster Restoration Management Plan (NORMP) by both the Baltimore and Norfolk Districts of USACE. The NORMP presents a plan for pursuing wide-scale oyster restoration throughout the Bay that complements other Bay-wide restoration efforts and future uses of Chesapeake Bay. Finally, the MD DNR has a permitted alternate substrate restoration project within Maryland charted oyster bars in the Chesapeake Bay

Cumulatively, the oyster restoration impacts are not anticipated to have any significant impacts, either direct or secondary to bluefish populations within the Bay.

### 2. SUMMER FLOUNDER (*Paralicthys dentatus*) (juvenile and adult stages)

Juvenile and adult summer flounder enter the Chesapeake Bay during spring and early summer, and exit the Bay in fall (Murdy, 1997). Both adults and juveniles exhibit a marked preference for sandy bottom and/or submerged aquatic vegetation (SAV) beds, particularly areas near shorelines (Murdy, 1997). The Magnuson-Stevens Act has identified SAV as a Habitat of Particular Concern for both juvenile and adult summer flounder. Summer flounder is not known to use oyster bars.

**Adults -** Summer flounder adults inhabit shallow coastal and estuarine waters during warmer months. Adults utilize deep channels, ridges, sandbars, and shallow water with sandy bottoms.

**Juveniles-** Juveniles prefer shallower waters.

**Spawning-** Summer flounder are ocean spawners. Larvae are not likely to be present in the project area during placement because they begin to migrate into the Bay in October well after summer construction activities are completed.

**Prey-** Summer flounder feed mainly on fish, squids, shrimp, and crabs. The summer flounder prefers sandy substrate and is frequently seen near sandy shores, partly buried in the sand.

**Impact on Summer Flounder-** Juvenile and adult summer flounder would occur in the Bay during project activities. However, no significant direct negative impacts are expected on adults or juveniles as a result of proposed activities. Secondarily, it is likely that the creation of oyster bars and reefs would serve as an attractant and provide habitat for the small creatures that the summer flounder prey upon.

Since oysters are generally restricted to water depths between- 6 and- 30 feet (MLW), oyster reef restoration using alternate substrates would not generally occur within SAV growing range. However, restored oyster bars and reefs do occur in areas adjacent to SAV beds. To minimize any potential direct impacts, no alternate material placement would occur within 300 feet of SAV beds. Further, NMFS has indicated that time-of-year restrictions may be necessary to protect SAV from elevated turbidity within 500 yards of the activity. Given these provisions, no adverse impacts to SAV are anticipated as a result of the proposed project.

Successful oyster restoration is expected to improve local water quality which would benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to summer flounder by promoting SAV habitat, which is designated as a Habitat of Particular Concern for summer flounder.

Finally, cumulative effects from other projects discussed in the bluefish section are not anticipated to have any significant negative impacts, either direct or secondary, to summer flounder.

### 3. RED DRUM (*Sciaenops ocellatus*)

Red drum are bottom-feeding fish. The young prefer grassy (SAV) or mud bottoms.

EFH for red drum includes all of the following habitats to a depth of 50 meters offshore: tidal freshwater; estuarine emergent vegetated wetlands (flooded salt marshes, brackish marsh, tidal creeks); estuarine scrub/shrub (mangrove fringe); submerged rooted vascular plants (sea grasses); oyster bars and reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial bars and reefs. The area covered includes Virginia through the Florida Keys (Reagan, 1985).

**Adults**- Adults are found in SAV beds and on mud bottoms, but another preferred habitat is oyster bars and reefs. During construction, it is expected that any adults in the vicinity of the project area would be temporarily displaced. As transient species, adult red drum would be able to avoid the disrupted area and find comparable habitat in the nearby vicinity. Restored oyster bars and reefs would provide enhanced habitats for adult red drum.

**Juveniles**- Juveniles occur throughout Chesapeake Bay from September to November.

**Spawning –** Spawning is oceanic.

**Prey -** Red drum prey includes crabs, shrimp and fish. No negative impacts to prey are expected. Oyster bar and reef restoration would provide habitat for red drum prey species and therefore is expected to increase desired species.

**Impact on Red Drum-** The use of alternate substrates is not expected to have any negative impacts on any life stage of red drum and would likely have a positive secondary impact by promoting prey species that use oyster bars and reefs for habitat. As oyster bars and reefs are designated EFH for red drum, oyster bar and reef restoration would directly improve and increase EFH habitat for red drum.

As discussed in the section on bluefish, the proposed action is not expected to negatively impact SAV. Alternatively, successful oyster restoration is expected to improve local water quality which would benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to red drum by promoting SAV habitat, which is designated as EFH for red drum.

Finally, cumulative effects from other projects discussed in the bluefish section are not anticipated to have any significant negative impacts, either direct or secondary, to red drum.

## FEDERAL AGENCY'S OPINION ON PROJECT IMPACTS TO EFH

1. Discharge from the site during alternate shell placement operations must comply with state (Maryland Department of the Environment) water quality standards, and should result in only short term, minor perturbations to local water quality.

2. There would be short-term increases in turbidity and possibly the release of nutrients from bottom sediments during construction. This impact is expected to be direct, but minor and temporary. Alternate substrates used for restoration would be clean and would not impact water quality negatively. Long-term impacts to local water quality as a result of the restoration of oyster habitat are expected to be positive.

3. The proposed project is expected to result in direct and secondary, beneficial impacts to aquatic resources. Through the restoration of existing non-productive oyster bars, a portion of historic oyster habitat would be directly restored. Placement of alternate substrates would form an elevated bar/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 bar/reef structure would provide, as a secondary benefit, shelter and cover for mobile invertebrates and finfish.

4. Most project activities would occur between June and September, when most species identified are present in the Bay. However, as discussed in the individual sections, no direct negative impacts are expected to the identified species as they are transient and similar habitat is abundant throughout the Bay, or prefer different habitats than those being targeted with the project. Impacts to spawning are not a concern as this is after the spawning season for most anadromous fish and most spawning occurs outside the project area in oceanic waters or in shallow, low salinity areas, which are not expected to be used as a part of this project.

5. The proposed action is not expected to negatively impact SAV. Alternatively, successful oyster restoration is expected to improve local water quality which would

benefit SAV beds in the local vicinity. Therefore, oyster restoration would provide secondary beneficial impacts to SAV habitat.

6. The proposed project would directly increase EFH for red drum by restoring oyster bars and reefs. The proposed project would indirectly benefit EFH for red drum and Habitat of Particular Concern for summer flounder by promoting SAV habitat.

7. The Baltimore District, after reviewing fisheries information, has determined that the proposed action is not likely to have significant negative, direct or secondary, affects on EFH or species covered under the Magnuson-Stevens Act and is more likely to benefit these protected species than to have an adverse effect on them.

**Mitigation:** No significant adverse environmental impacts are expected as a result of the proposed project and mitigation is not necessary.

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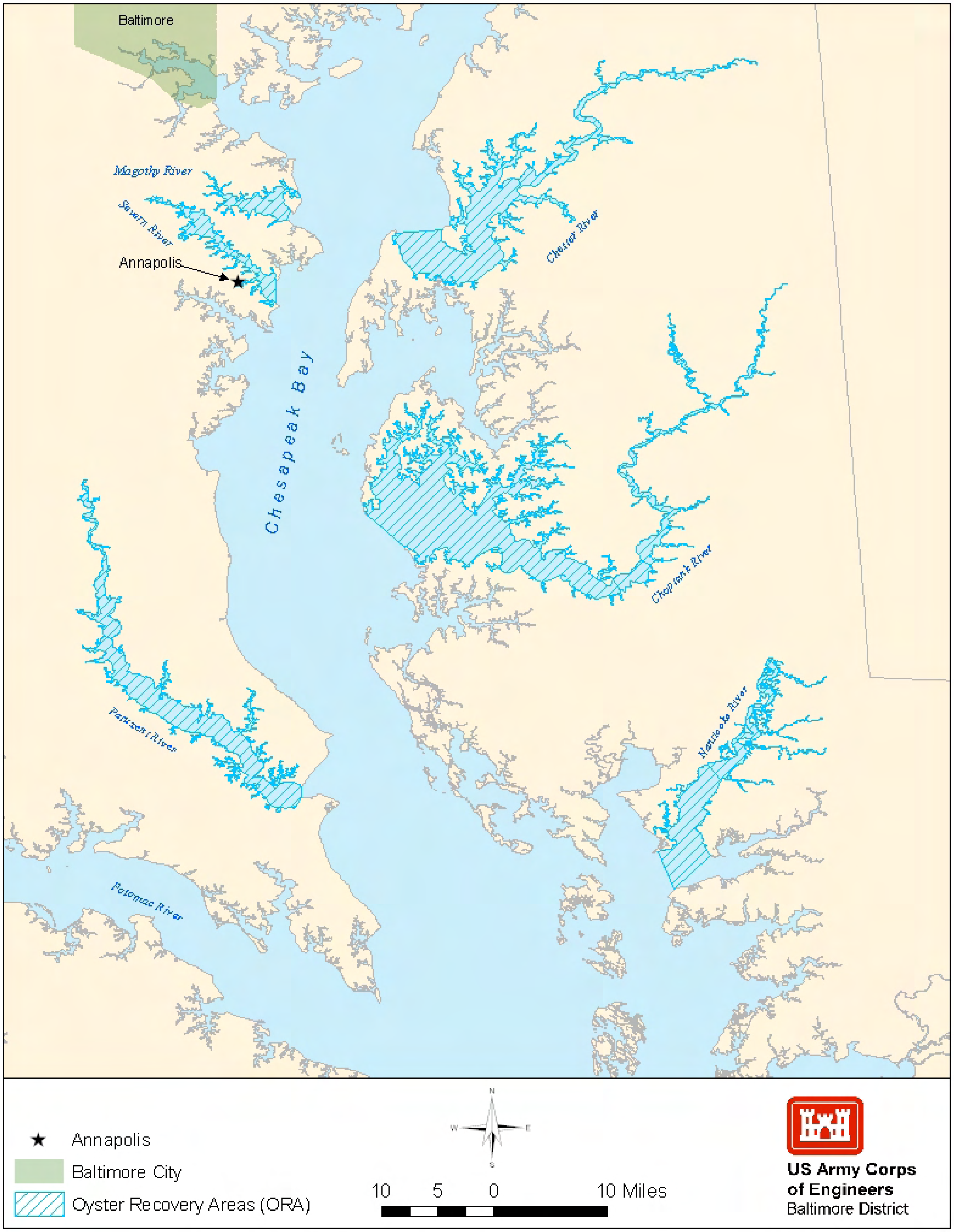
**Figure 1. Chesapeake Bay Oyster Recovery Areas**



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# APPENDIX C

# Agency Coordination

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## AGENCY COORDINATION

Coordination for the following applicable Federal Laws, Regulations, and Executive Orders was performed:

(1) Fish and Wildlife Coordination Act requires coordination with the USFWS,
(2) Endangered Species Act requires coordination with USFWS, MD DNR, and NMFS,
(3) Magnuson-Stevens Act (MS), as amended, requires coordination with NMFS on EFH,
(4) National Historic Preservation Act requires coordination with MHT (SHPO),
(5) Clean Water Act, as amended requires coordination with MDE,
(6) Clean Air Act, as amended requires coordination with MDE, and
(7) Coastal Zone Management Act, as amended requires coordination with MDE

**22 December 2008** Public notice initiating study published notifying interested parties of USACE's intent to prepare an Environmental Assessment evaluating the use of alternate (non-oyster shell) substrate for oyster reef restoration.

**22 December 2008** Coordination letter from USACE to John Nichols at NMFS initiating coordination for compliance with the provisions of the Magnuson-Stevens Fishery Conservation and Management Act, as amended and requesting information to support development of an Essential Fish Habitat (EFH) assessment.

**22 December 2008** Coordination letter from USACE to Bob Zepp at USFWS initiating coordination for compliance with the Fish and Wildlife Coordination Act and requesting information on the presence of Federally protected species in the project area listed by Section 7 of the Endangered Species Act (ESA).

**8 January 2009** Letter received from Maryland Department of Planning informing USACE that the Public Notice was received by the State Clearinghouse Review Process and that the following agencies were forwarded a copy of the Public Notice for review: Maryland Department of the Environment, Maryland Department of Transportation, Maryland Department of Natural Resources, and the Maryland Department of Planning including the Maryland Historical Trust (SHPO).

**27 January 2009** Letter received from Maryland Department of the Environment (MDE) informing USACE that the Public Notice was received by the State Clearinghouse Review Process and that this project is consistent with MDE's plans, programs, and objectives.

**9 February 2009** Email received from John Nichols at NMFS communicating NMFS's support for using alternate substrates and identifying EFH species of concern.

**10 February 2009** Letter from USFWS to USACE communicating USFWS recommendations and issues to consider when using artificial substrates. The letter was followed up by an email sent 12 February 2009 to George Ruddy at USFWS from USACE requesting additional information on ESA species and confirmation of compliance with Fish and Wildlife Coordination Act. These issues were not mentioned in letter received from USACE.

**12 February 2009** Email received from George Ruddy at USFWS confirming that letter dated 10 February 2009 fulfilled ESA and Fish and Wildlife Coordination Act requirements.

**25 February 2009** Dr. Roland Limpert, MD DNR was contacted via phone and was asked if there are any State listed rare or threatened species that could be affected by the placement of alternate substrate at the oyster bars in the project areas. He said a review was undertaken for the State's permit application and it was determined that there are no listed species in the area the USACE is considering.

**12 March 2009** Email received from Julie Crocker at NFMS confirming that there is no indication that the proposal to use alternate substrate as opposed to shell for the proposed oyster rehabilitation project would negatively impact any RTE species. This conclusion is consistent with the determinations made by USACE and NMFS for other similar projects (i.e., the Lynnhaven River oyster rehab project in VA and the Potomac River fisheries commission project).

**13 April 2009** A public notice released announcing the availability of the draft document. The public review period ended on 13 May 2009.

**28 April 2009** Letter received from Maryland Department of Planning informing USACE that the EA was received by the State

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| | Clearinghouse Review Process and that the following agencies were forwarded a copy of the document for review: the Counties of Calvert, Caroline, Charles, Dorchester, Wicomico, Anne Arundel, Prince George's, Queen Anne's, Somerset, St. Mary's, and Talbot; the Maryland Department of Planning including the Maryland Department of the Environment, Maryland Department of Transportation, Maryland Department of Natural Resources, and the Maryland Historical Trust (SHPO). |
| **5 May 2009** | Email received from Brian Hug at MDE confirming that the emission's created from the USACE air quality analysis fall below the current de minimis thresholds for general conformity. |
| **11 May 2009** | A memo was received from John Nichols at NMFS confirming that the agency is in support of the proposed activities. NMFS recommended the placement of some of the substrate as “mounds” to provide some vertical relief for Essential Fish Habitat (EFH) conservation. NMFS suggests mounds of 5-6 feet in areas that are prone to silt accumulation that are not subject to commercial harvest activities. A follow-up conversation with Mr. Nichols occurred on May 13, 2009 clarifying that substrate placement will occur on existing hard bottom habitat that often has a vertical height (above bay bottom) already as shown by MGS Bathymetry data. Mr. Nichols changed his recommendation to from 5-6 to 3-6 feet "mounds." USACE provided a written response confirming that recommendations will be adopted into the alternate substrate placement plan. |
| **12 May 2009** | A memo was received from Ms. Joane Mueller at MDE. MDE recommended that unless the source and specific composition is known, actual batches of alternate substrate should be tested to assure that there are no unexpected contaminants that would not be a problem in air but could leach into water. USACE provided a written response confirming that recommendations will be adopted into the alternate substrate placement plan. |
| **22 May 2009** | A letter was received from MDE stating that MDE concurs with USACE findings of impacts and that the project is consistent with the federal Coastal Zone Management Act |
| **5 June 2009** | A public notice released announcing the availability of the singed Finding of No Significant Impact Statement. |

**Included for reference: Original Oyster Recovery Project MHT coordination**

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| **26 October 1995** | Letter from MHT to USACE communicating MHT recommendations to conduct a Phase I underwater survey before work can proceed and requesting maps to look at specific areas to aid in determination. |
| **2 December 1995** | Letter from MHT to USACE communicating that MHT compared the maps, provided by USACE of natural and legal oyster bars in a number of Maryland rivers with their records of submerged cultural resources and listed potential areas that may be impacted by the oyster recovery project that should be avoided. |

*Planning Division*

US Army Corps of Engineers
Baltimore District

# PUBLIC NOTICE
# CHESAPEAKE BAY OYSTER RECOVERY PROJECT, MARYLAND

ALL INTERESTED PARTIES: DEC 02 2008

The U.S. Army Corps of Engineers, Baltimore District (USACE) Chesapeake Bay Oyster Recovery Project is preparing an Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA). The EA addresses the use of artificial (non-oyster shell) substrate in Maryland waters.

The USACE has authority to construct oyster habitat under Section 704(b) of the Water Resources Development Act of 1986 (amended recently by Section 5021 of the Water Resources Development Act (WRDA) of 2007), which authorizes the construction of alternative or beneficially modified habitats for indigenous fish and wildlife, including man-made reefs for fish habitat in the Maryland portion of the Chesapeake Bay. In 1996, USACE completed a report, the Chesapeake Bay Oyster Recovery Project, which documents the plan formulation conducted by USACE and the non-Federal sponsor, Maryland Department of Natural Resources (MDNR). Implementation of the recommendations made by this plan began in 1997 and is ongoing, but is restricted to using only oyster shell for substrate. Areas addressed in the 1996 report are designated Oyster Recovery Areas (ORA's) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers, and near Smith and James Islands. A supplemental report/EA was also prepared in 2002 that evaluated the cost effectiveness of USACE-led oyster restoration.

In order for USACE to construct and cost share oyster reef restoration using alternative (non-oyster shell) substrates, as was authorized by the Water Resources Development Act of 2007, USACE is undertaking the preparation of an EA. Construction using alternative substrates rather than oyster shell is targeted to begin in spring 2009. Potential alternate substrates for construction include clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be planted would be free of building debris such as wiring, pipes and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e. reef balls).

On 13 August 2008, USACE (Baltimore Operations Division) signed a Finding of No Significant Impact (FONSI) in response to a Permit Evaluation and Decision Document (EA) to permit MDNR to use alternative materials to construct oyster sanctuaries and harvest reserves (CENAB-OP-RMN (MDNR/Alternate Material) 2007-03659-M24). The proposed action is the USACE-led equivalent of the permitted MDNR action.

Sincerely,

Amy M. Guise

Amy M. Guise
Chief, Civil Project Development Branch
Planning Division

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

REPLY TO
ATTENTION OF

Planning Division

22 December 2008

Mr. Bob Zepp
Chesapeake Bay Field Office
U.S. Fish & Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21401

Dear Mr. Zepp:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District (USACE) Chesapeake Bay Oyster Recovery Project, Maryland. USACE currently has authority to construct oyster habitat under Section 704(b) of the Water Resources Development Act of 1986 (amended recently by WRDA 2007, Section 5021) which authorizes the construction of alternative or beneficially modified habitats for indigenous fish and wildlife, including man-made reefs for fish habitat in the Maryland portion of the Chesapeake Bay. In 1996, USACE completed a report, the Chesapeake Bay Oyster Recovery Project, which documents the plan formulation conducted by USACE and the non-Federal sponsor, Maryland Department of Natural Resources (MDNR). Implementation of the recommendations made by this plan began in 1997 and is ongoing, but is restricted to using only oyster shell for substrate. Actions are not limited to, but have been focused in designated Oyster Recovery Areas (ORAs) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers, and near Smith and James Islands. A supplemental report/Environmental Assessment (EA) was also prepared in 2002.

In order for USACE to construct and cost share oyster reef restoration using alternative (non-oyster shell) substrates, as was authorized by the Water Resources Development Act of 2007, USACE is undertaking the preparation of an EA. Construction using alternative substrates rather than oyster shell is targeted to begin in spring 2009.

On 13 August 2008, USACE (Baltimore Operations Division) signed a Finding of No Significant Impact (FONSI) in response to a Permit Evaluation and Decision Document (EA) to permit MDNR to use alternative materials to construct oyster sanctuaries and harvest reserves (CENAB-OP-RMN (MDNR/Alternate Material) 2007-03659-M24). The proposed action is the USACE-led equivalent of the permitted MDNR action.

The purpose of this letter is to initiate coordination for compliance with all requirements of the Fish and Wildlife Coordination Act. USACE is also requesting any information your office may have on the presence of and potential impacts you foresee to federally protected species listed under Section 7 of the Endangered Species Act (ESA) from the use of alternative substrates in oyster restoration. Please provide this office with any preliminary comments for this project by 30 January 2009.

If you have any questions regarding this matter, please contact Ms. Angie Sowers, Ph. D., at 410-962-7440.

Sincerely,

Amy Guise

Amy Guise, Chief
Civil Project Development Branch

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

REPLY TO
ATTENTION OF

Planning Division

Mr. John Nichols
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Chesapeake Bay Field Office
410 Severn Avenue, Suite 107A
Annapolis, MD 21403

22 December 2008

Dear Mr. Nichols:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District (USACE) Chesapeake Bay Oyster Recovery Project, Maryland. USACE currently has authority to construct oyster habitat under Section 704(b) of the Water Resources Development Act of 1986 (amended recently by WRDA 2007, Section 5021) which authorizes the construction of alternative or beneficially modified habitats for indigenous fish and wildlife, including man-made reefs for fish habitat in the Maryland portion of the Chesapeake Bay. In 1996, USACE completed a report, the Chesapeake Bay Oyster Recovery Project, which documents the plan formulation conducted by USACE and the non-Federal sponsor, Maryland Department of Natural Resources (MDNR). Implementation of the recommendations made by this plan began in 1997 and is ongoing, but is restricted to using only oyster shell for substrate. Actions are not limited to, but have been focused in designated Oyster Recovery Areas (ORAs) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers, and near Smith and James Islands. A supplemental report/Environmental Assessment (EA) was also prepared in 2002.

In order for USACE to construct and cost share oyster reef restoration using alternative (non-oyster shell) substrates, as was authorized by the Water Resources Development Act of 2007, USACE is undertaking the preparation of an EA. Construction using alternative substrates rather than oyster shell is targeted to begin in spring 2009.

On 13 August 2008, USACE (Baltimore Operations Division) signed a Finding of No Significant Impact (FONSI) in response to a Permit Evaluation and Decision Document (EA) to permit MDNR to use alternative materials to construct oyster sanctuaries and harvest reserves (CENAB-OP-RMN (MDNR/Alternate Material) 2007-03659-M24). The proposed action is the USACE-led equivalent of the permitted MDNR action.

The purpose of this letter is to initiate coordination for compliance with all requirements of the Magnuson-Stevenson Fishery Management and Conservation Act. USACE is requesting any information your office may have on the presence of and potential impacts you foresee to essential fish habitats from the use of alternative substrates in oyster restoration. Please provide this office with any preliminary comments for this project by 30 January 2009.

If you have any questions regarding this matter, please contact Ms. Angie Sowers, Ph. D., at 410-962-7440.

Sincerely,

Amy Guise

Amy Guise, Chief
Civil Project Development Branch

**Maryland Department of Planning**

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary
Matthew J. Power
Deputy Secretary

January 8, 2009

Ms. Amy M. Guise
Chief, Civil Project Development Branch, Planning Division
U.S. Army Corp of Engineers, Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715

**STATE CLEARINGHOUSE REVIEW PROCESS**
**State Application Identifier: MD20090107-0010**
**Reviewer Comments Due By:** February 4, 2009
**Project Description:** EA: Chesapeake Bay Oyster Recovery Project: to allow use of artificial (non-oyster) substrate in the State's waters: per Public Notice 2007-03659-M24; FONSI signed on 8/13/08
**Project Location:** Maryland
**Clearinghouse Contact:** Bob Rosenbush

Dear Ms. Guise:

Thank you for submitting your project for intergovernmental review. Participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps ensure project consistency with plans, programs, and objectives of State agencies and local governments. MIRC enhances opportunities for approval and/or funding and minimizes delays by resolving issues before project implementation.

The following agencies and/or jurisdictions have been forwarded a copy of your project for their review: the Maryland Departments of Natural Resources, the Environment, Transportation; and the Maryland Department of Planning; including the Maryland Historical Trust. They have been requested to contact your agency directly by **February 4, 2009** with any comments or concerns and to provide a copy of those comments to the State Clearinghouse for Intergovernmental Assistance. Please be assured that after **February 4, 2009** all MIRC requirements will have been met in accordance with Code of Maryland Regulations (COMAR 14.24.04). The project has been assigned a unique State Application Identifier that should be used on all documents and correspondence.

A "Project Survey" form is enclosed with this letter. Please complete and return it within 14 days of the date of this letter. If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Assistant Secretary
for Clearinghouse and Communications

LCJ:BR
Enclosure
cc: Beth Cole - MHT*
Greg Golden – DNR*
Nat Brown - MPA
Roland Limpert – DNR*
Joane Mueller – MDE*
Cindy Johnson – MDOT*
Tracey Gordy – MDPLL*
Steve Allan – MDPL*

09-0010_NDC.NEW.doc

MDP

Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary
Matthew J. Power
Deputy Secretary

# PROJECT SURVEY

Would you please take a few moments and tell us the source of information used by your agency to apply to the **U.S. Department of Defense (DOD/ARMY)** for this grant and/or service. Please complete this form and return it to the State Clearinghouse within 14 days of **January 8, 2009,** to the address or fax number noted below.

**TO:** **Maryland State Clearinghouse**
Maryland Department of Planning
301 West Preston Street
Room 1104
Baltimore, MD 21201-2305

**DATE:** ____________________
(Date form completed)

**FROM:** ______________________________
(Name of person completing this form.)

**PHONE:** _____-_____-________
(Area Code & Phone number)

**RE: State Application Identifier: MD20090107-0010**
**Project Description:** EA: Chesapeake Bay Oyster Recovery Project: to allow use of artificial (non-oyster) substrate in the State's waters: per Public Notice 2007-03659-M24; FONSI signed on 8/13/08

| | | |
|---|---|---|
| ☐ Chronicle of Philanthropy | ☐ GrantsNet | ☐ Nonprofit Organization Website |
| ☐ Commerce Business Daily | ☐ Health Grants and Contracts Weekly | ☐ Previous Grantee |
| ☐ Community Health Funding Report | ☐ LISTSERV | ☐ Red Book (Catalog of State Assistance) |
| ☐ E-Mail Automatic Notification | ☐ Local/State Funding Report and Grant Alert | ☐ Seminar or Workshop Attended |
| ☐ Federal Agency Website | ☐ Maryland Department of Planning Website | ☐ State Agency Website |
| ☐ Federal Assistance Monitor | ☐ Maryland Grants (MD Grants) | ☐ The Catalog of Federal Domestic Assistance (CFDA) |
| ☐ Federal Grants and Contracts Weekly | ☐ Maryland Register | ☐ The Foundation Center |
| ☐ Federal Register | ☐ NIH Guide for Grants and Contracts | ☐ Grants.Gov |
| ☐ Please Identify Other Source(s) Not Listed Above: | | |

Thank you.

Sowers returned call to Rosenbush on 22 Jan 09
Agreed this is not applicable to us +
I clarified that 8/13/08 FONSI was separate action.

MDPCH-1K

**MARYLAND DEPARTMENT OF THE ENVIRONMENT**
1800 Washington Boulevard • Baltimore, Maryland 21230
410-537-3000 • 1-800-633-6101 • http://www.mde.state.md.us

MDE



January 27, 2009

Ms. Amy M. Guise
Chief, Civil Project Development Branch
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203

RE: State Application Identifier: MD20090107-0010
Project: Chesapeake Bay Oyster Recovery Project

Dear Ms. Guise:

Thank you for providing the Maryland Department of the Environment (MDE) with the opportunity to comment on the above-referenced project. Copies of the documents were circulated throughout MDE for review, and it has been determined that this project is consistent with MDE's plans, programs and objectives.

Again, thank you for giving MDE the opportunity to review this project. If you have any questions or need additional information, please feel free to call me at (410) 537-4120.

Sincerely,

Joane D. Mueller

Joane D. Mueller
MDE Clearinghouse Coordinator
Science Services Administration

cc: Bob Rosenbush, State Clearinghouse

From: John Nichols [John.Nichols@noaa.gov]
Sent: Monday, February 09, 2009 3:17 PM
To: Sowers, Angela NAB02
Subject: COE Oyster Recovery Project

Angie:
This pertains to your letter, dated December 22, 2008, concerning issues on the proposed modifications to the Corps of Engineers, Baltimore District, Chesapeake Bay Oyster Recovery Project. Modifications include use of alternative (non-oyster shell) substrates for modifying habitats for indigenous fish in the Maryland portion of the Bay.

NOAA Fisheries had no objections to the Maryland Department of Natural Resources proposed placement of alternative cultch materials for oyster recovery purposes. Similarly, we do not object to the Corps' use of alterative non-shell materials for enhancing fish habitat.

We understand that your agency is preparing as Essential Fish Habitat Assessment for the proposed modification to this project. As was done doing your previous EFH consultation on this project, your assessment should address impacts to the same federally managed species and life stages, listed below.

bluefish (juvenile and adult stages)
summer flounder (juvenile and adult stages) windowpane (juvenile and adult stages)
cobia, red drum, Spanish mackerel, King mackerel (all life stages for each)

Based on ecological and salinity tolerance parameters for each species, we anticipate that only bluefish (juveniles and adults), summer flounder (juveniles and adults), and red drum (juveniles) will be affected by this project.

# United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575


February 10, 2009

Amy Guise
Chief, Civil Project Development Branch
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Attn: Angie Sowers

*Re: Chesapeake Bay Oyster Recovery Project*

Dear Ms. Guise:

This responds to your letter dated December 22, 2008, requesting comments on your proposal to use alternative (i.e., non-oyster shell) substrates to construct oyster reefs in numerous areas of the Maryland portion of the Chesapeake Bay and tributaries. Your letter did not describe the types of alternative substrates that are being considered, but a subsequent discussion with Angie Sowers on February 2 revealed the existence of an undated Public Notice which described the material as consisting of clam shell, marl, concrete rubble (must be free of wiring, pipes, and protruding rebar), stone, slag, brick, cinderblock, and preformed products such as reef balls.

We believe these materials are suitable to use in the Bay for establishing human-made reef habitat. They appear to be free of pollutants and the non-shell products are generally dense enough to resist being moved about by waves and currents. We expect that there would be no impacts to federally listed or proposed endangered or threatened species under our jurisdiction.

However, the alternative substrate materials have some noteworthy shortcomings in their ability to replace oyster shell in oyster reef restoration efforts. While oysters can be expected to attach to any of the identified hard substrates, studies have indicated that the degree to which they do so will vary, and none are expected to be as attractive as oyster shell (Haven et al. 1987; Mann et al. 1990; Haywood et al. 1999). In contrast to oyster shell, the alternative materials would not provide the abundant small interstices where oysters can set and be more protected from predation (Haven et al. 1987; Bartol and Mann 1999; O'Beirn 2000). Therefore, the best use of the alternative substrates may be as core material that supports an outer layer of oyster shell and living oysters above the surrounding bottom.

All substrates tend to become colonized by fouling organisms that successfully compete with oysters for space and by organisms that may be direct predators of oysters (e.g., bay anemone predation on larval oysters). Sedimentation on the hard substrates is also a progressive problem that greatly diminishes the likelihood of a good spat set. Management actions such as the use of bagless dredging to resuspend sediment and expose clean cultch on the reef would be precluded or made less effective with the non-shell substrates. The harvesting of oysters for the purpose of replanting seed, removing diseased oysters, or accomplishing commercial profit (from the harvest reserves) would be more difficult on reefs developed on many of the alternative substrates.

We encourage you to consider these shortcomings as you decide how to best utilize these alternative materials in your oyster restoration effort. If there are any questions, please contact George Ruddy at (410) 573-4528.

Sincerely,

Leopoldo Miranda
Field Office Supervisor

Citations:

Bartol, I.K. and R. Mann. 1999. Small-scale patterns of recruitment on a constructed intertidal reef: the role of spatial refugia. Pp. 159-170 in M. Luckenbach, R. Mann, and J. Wesson (eds) Oyster reef habitat restoration: a synopsis and synthesis of approaches; proceeding from the symposium, Williamsburg, VA April 1995.

Haven, D.S., J.M. Zeigler, J.T. Dealteris, and J.P. Whitcomb. 1987. Comparative attachment, growth and mortalities of oyster (*Crassotrea virginica*) spat on slate and oyster shell in the James River, Virginia. Journal of Shellfish Research 6(2): 45-48.

Haywood, E.L., III, T.M. Soniat, and R.C. Broadhurst, III. 1999. Alternatives to clam and oyster shell as cultch for eastern oysters. Pp. 295-304 in M. Luckenbach, R. Mann, and J. Wesson (eds) Oyster reef habitat restoration: a synopsis and synthesis of approaches; proceeding from the symposium, Williamsburg, VA April 1995.

Mann, R., B.J. Barber, J.P. Whitcomb, and K.S. Walker. 1990. Settlement of oysters, *Crassostrea virginica* (Gmelin 1791), on oyster shell, expanded shale and tire chips in the James River, Virginia. Journal of Shellfish Research 9(1): 173-175.

O'Beirn, R.X., M.W. Luckenbach, J.A. Nestlerode, and G.M. Coates. 2000. Toward design criteria in constructed oyster reefs: oyster recruitment as a function of substrate type and tidal height. Journal of Shellfish Research 19(1): 387-395.

From: George_Ruddy@fws.gov
Sent: Thursday, February 12, 2009 11:59 AM
To: Sowers, Angela NAB02
Cc: Bob_Zepp@fws.gov
Subject: RE: Proposal for Use of Alternative Oyster Substrates

Angie: As stated in the letter, we expect that there will be no effect on T&E Federally listed species under our jurisdiction. You should check with NMFS for their opinion on possible effects to sturgeon and sea turtles. In the past some have suggested that the Eastern oyster should be listed, but of course this has not happened. I suppose that if the Asian oyster is introduced, the possibility of listing the Eastern oyster might be revisited. Our letter can be taken as an acknowledgment of your coordination and compliance with the ESA and the FWCA. However, your letter was quite general and did not give me a good impression of the scale and precise use of the alternative substrates. I trust that the oyster restoration program includes adaptive management provisions to determine how well the alternative substrate material is functioning. --George

"Sowers, Angela
NAB02"
<Angela.Sowers@us
ace.army.mil>

02/12/2009 10:22
AM

To
<George_Ruddy@fws.gov>
cc

Subject
RE: Proposal for Use of Alternative
Oyster Substrates

Thanks George. Did you want to identify any RTE species that we should discuss in our evaluations. Can I state that this response covers coordination for both ESA and the Fish and Wildlife Coordination Act?

Thanks,
Angie

-----Original Message-----
From: George_Ruddy@fws.gov [mailto:George_Ruddy@fws.gov]
Sent: Thursday, February 12, 2009 10:18 AM
To: Sowers, Angela NAB02
Subject: Proposal for Use of Alternative Oyster Substrates

Angie: I am attaching a copy of our response letter which has been signed and mailed. --George (See attached file: oyster substrates.doc)

From Mark Mendelsohn (CENAB-PL)
To: Anna Compton (CENAB-PL)
February 25, 2009

Phone conversation with Mr. Roland Limpert, Heritage Program, Maryland Department of Natural Resources on February 25, 2009.

I asked Dr. Limpert if there are any state listed rare or threatened species that could be impacted by the placement of alternative substrate at the oyster bars in the project areas. He said a review was undertaken for the State's permit application and it was determined that there are no listed species in the area the Corps is considering.

Prepared by

Mark Mendelsohn
Biologist

USACE-CENAB-PL

PHONE CONVERSATION RECORD

SUBJECT: Oyster Project Essential Fish Habitat
CONTACT: John Nichols at National Marine Fisheries Service (NMFS)
DATE: March 9, 2009

I called Mr. Nichols to ask about species and essential fish habitat (EFH). He said that as far as EFH the species of concern are: Summer Flounder, Bluefish, Window Pane Flounder, Cobia, King Mackerel, Spanish Mackerel and Red Drum. He said the ones of primary concern are Summer Flounder, Bluefish, and Red Drum.

Prepared by

Mark Mendelsohn
Biologist
USACE -PL

## Compton, Anna M NAB

| | |
|---|---|
| **From:** | Mendelsohn, Mark NAB02 |
| **Sent:** | Thursday, March 12, 2009 3:44 PM |
| **To:** | Sowers, Angela NAB02; Compton, Anna M NAB |
| **Subject:** | FW: Oyste rEA |
| **Attachments:** | Julie_Crocker.vcf |

Some good news!

---

**From:** Julie Crocker [mailto:Julie.Crocker@Noaa.Gov]
**Sent:** Thursday, March 12, 2009 2:33 PM
**To:** Mendelsohn, Mark NAB02
**Subject:** Re: Oyste rEA

Hi Mark.

As you know, several species listed by NMFS as threatened or endangered occur in the project area (sea turtles and shortnose sturgeon). Based upon the information you provided in your 3-9-09 email, there is no indication that the proposal to use alternative substrate as opposed to shell for the proposed oyster rehabilitation project would negatively impact any of these species. This conclusion is consistent with the determinations made by ACOE and NMFS for other similar projects (i.e., the Lynnhaven River oyster rehab project in VA and the Potomac River fisheries commission project).

Julie

Mendelsohn, Mark NAB02 wrote:
Dear Ms. Crocker:

The Baltimore District, USACE, has determined that oyster reef construction using alternative substrate is not likely to impact any of the endangered species under your purview. We are requesting your concurrence. Project information is enclosed. Please contact me if you need further information.

Thank You.

Mark Mendelsohn
Biologist
Baltimore District
USACE-PL
(410) 962-9499

## Compton, Anna M NAB

**From:** Sowers, Angela NAB02
**Sent:** Thursday, March 19, 2009 3:04 PM
**To:** Gomez, Michele NAB02; Compton, Anna M NAB
**Subject:** Summary of phone conversation with George Ruddy on 17 Mar 2009

All,
I had a phone conversation with George Ruddy on Tuesday, March 17, 2009 regarding the alternative substrate EA for oysters restoration. We discussed any specific ideas he had for monitoring sites restored using alternative substrates. I told George that typically we monitor growth, density, and disease. Recently we have also looked at mapping the extent and profile of reefs. He raised some ideas in designing the reefs. He suggested we vary profile and relief, but highlighted that he wouldn't expect the orientation of the reef to be that significant in Maryland since these tributaries experience much weaker currents than Virginia waters. We discussed how to control placement of the material to achieve the desired profiles. Our recent monitoring has shown that earlier placement of materials did not usually achieve the even distribution across the targeted area, but rather tracked the course of the boat. So, we realize the difficulty with achieving precise geometry, but should still include plans to look at different profiles and relief. The other issue we discussed was since the alternative substrates are likely heavier and denser than natural oyster shell, there could be some issue with settlement into the bottom. That is, how well will the bottom support the heavier materials? I think the profile mapping Ken Paynter has been doing for us could assess any settlement issues. George proposed that we look at ecological benefits. That is, do reefs constructed with alternative substrates provide habitat for the same reef community that uses reefs constructed of oyster shell? There is the possibility that not all the critters that attach to natural shell would attach to alternative substrates. Now, this can get complicated and affect some species possitively and some negatively- I won't get into that in an email, but he had been thinking there could only be negative consequences and I think I convinced him that there would be some trade-offs in the food web. We discussed whether the alternative substrate would provide sufficient reef characteristics for oysters or whether a veneer of shell would need to be placed on top of the alternative substrate. I explained to George that we always seed our reefs with spat on shell. He did not know this. I think he thought we just put the substrate out and we looking for it to catch a natural spat set. Given that we seed, I don't think this is as big an issue anymore, but is still worth doing some comparisons of reefs constructed with alt. substrate and then seeded with those constructed with alt. substrate, a shell veneer, and then seeded. One final point we discussed monitoring is how well does spat placed cover the artificial substrate.

Overall, he is satisfied with our coordination up to this point and was open to us continuing the coordination as we go through the design and construction phases and into monitoring. I requested an email stating this, but am not sure we will get one since I haven't seen anything yet.

In summary, points to include in a monitoring plan
-density
-growth
-disease
-WQ
-profile, placement, settlement
-ecological community and use
-coverage of spat on substrate used for base
-include comparison of reefs constructed only of alternative substrate with spat on shell with reefs that also hold a veneer of oyster shell on top of the alternative substrate

I am planning on pulling together a page or two for Claire describing a basic monitoring plan.

Thanks,
Angie

Angie Sowers, Ph.D.
U.S. Army Corps of Engineers
Baltimore District- Planning Division
Civil Project Development Branch
Biologist

MARYLAND
HISTORICAL
TRUST

Archaeology Office

Parris N. Glendeni
Gover

Patricia J. Payn
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 <u>Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines</u> (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

MARYLAND
HISTORICAL
TRUST

Archaeology Office



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

US Army Corps of Engineers
Baltimore District

# Notice of Availability

APR 13 2009

# CHESAPEAKE BAY OYSTER RESTORATION USING ALTERNATE (NON-OYSTER SHELL) SUBSTRATE

## CHESAPEAKE BAY OYSTER RECOVERY PROJECT, MARYLAND

**ALL INTERESTED PARTIES:** In accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the U.S. Army Corps of Engineers, Baltimore District (USACE) has prepared an Environmental Assessment (EA) for the use of alternate substrates including, but not limited to clam shell, marl, concrete, stone, slag, brick, and cinderblock, as part of the Chesapeake Bay Oyster Recovery Project, Maryland. This project is being conducted under the authority of Section 704(b) of the Water Resources Development Act (WRDA) of 1986, as amended.

In conjunction with the ongoing Chesapeake Bay Oyster Recovery Project, an EA has been prepared for the actions relating to the placement of alternate (non-oyster shell) substrate in designated Oyster Recovery Areas (ORA's) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers (see attached Figure). Oyster restoration activities have occurred in these areas since 1996 as part of the Chesapeake Bay Oyster Recovery Project with oyster shell only, and are expected to continue annually, as funding allows.

Potential impacts were assessed with regard to the physical, chemical, and biological characteristics of the aquatic and terrestrial ecosystem; temporary construction impacts to water, air, navigation, and traffic; endangered and threatened species; hazardous and toxic materials; aesthetics and recreation; cultural resources; and the general needs and welfare of the public.

Any person who has an interest in the project may make comments and/or request a public hearing within 30 days of the date of publication of this notice. Comments must clearly set forth the interest that may be adversely affected by this proposed action and the manner in which the interest may be adversely affected.

USACE has determined that the proposed activity complies with and will be conducted in a manner consistent with Maryland's federally approved Coastal Zone Management Program. By copy of this public notice, the USACE is requesting the State's concurrence with this determination.

Individuals wishing to obtain a copy of, or wanting more information about the EA or draft Finding of No Significant Impact, may write to the U.S. Army Corps of Engineers, Baltimore District, ATTN: Anna Compton, U.S. Army Corps of Engineers, Baltimore District, CENAB-PL-P, P.O. Box 1715, Baltimore, Maryland 21203-1715 or by electronic mail to Anna.M.Compton@usace.army.mil or by telephone at (410) 962-4633. The EA is available at the USACE website: http://www.nab.usace.army.mil/PN/CW/OysterEA_April2009.pdf. The EA will also be available at the following libraries:

Kent County Public Library, 408 High Street, Chestertown, MD, 21620

Wicomico County Free Library, 122 S. Division Street, Salisbury, MD, 21801

Somerset County Library, 11767 Beechwood Street, Princess Anne, MD 21853

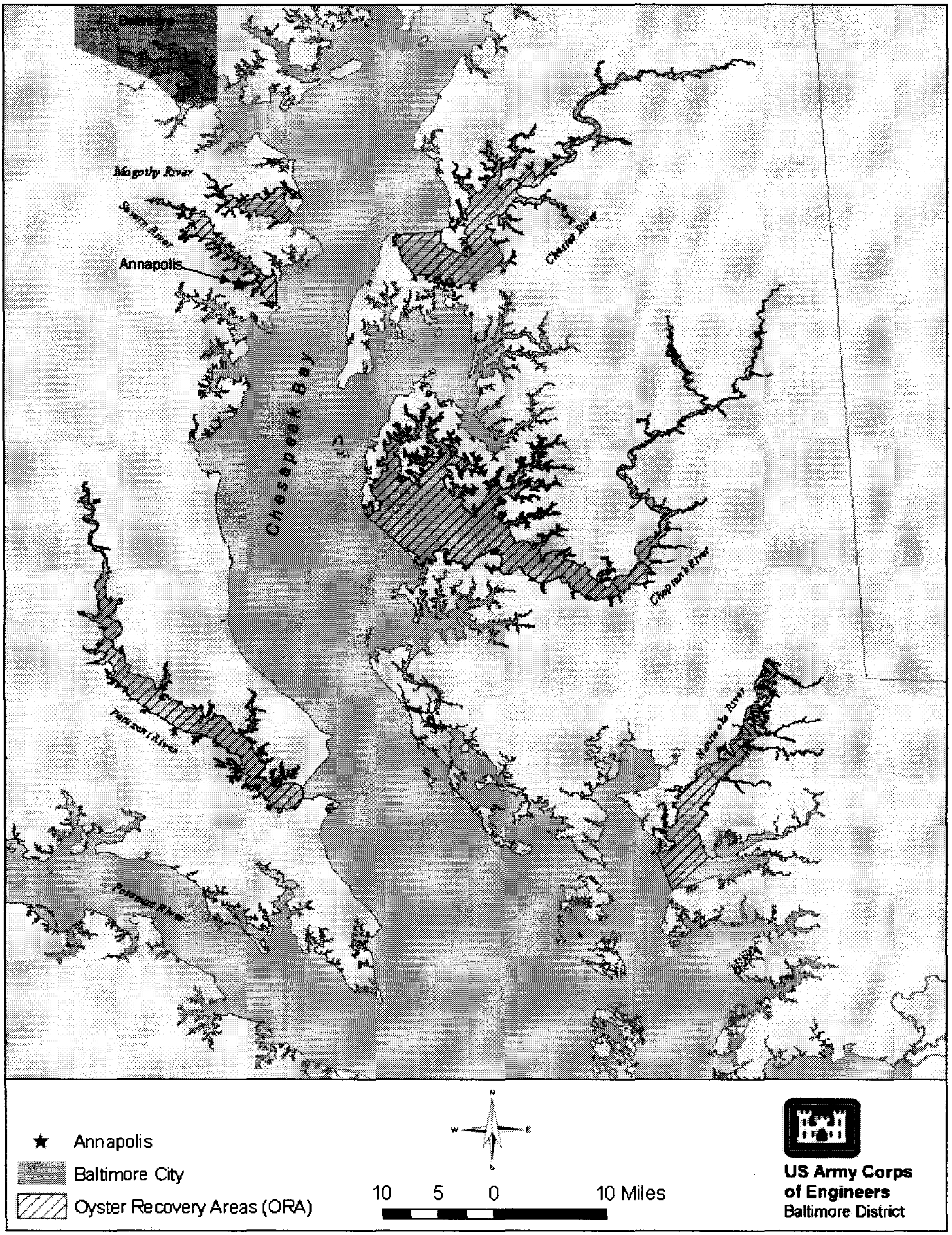
Calvert County Public Library, 20 Duke Street, Prince Frederick, MD 20678

Dorchester County Public Library, 303 Gay Street, Cambridge, MD 21613

Anne Arundel County Public Library, 1410 West Street, Annapolis, MD 21401

Amy M. Guise
Chief, Civil Project Development Branch
Planning Division

**Figure 1. Chesapeake Bay Oyster Recovery Areas**



## Compton, Anna M NAB

**From:** Brian Hug [bhug@mde.state.md.us]
**Sent:** Tuesday, May 05, 2009 1:37 PM
**To:** Compton, Anna M NAB
**Cc:** Gomez, Michele NAB02
**Subject:** Re: Draft EA-Oyster Alternate Substrate

We did and MDE concurs that the emission's created from this analysis fall below the current de minimis thresholds for general conformity

one correction - the current de mimimis levels for MD are 50 tons for VOC, 100 for NOx, SO2 and PM2.5

Brian J. Hug
Deputy Program Manager
Air Quality Planning Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
410-537-4125

>>> "Compton, Anna M NAB" <Anna.M.Compton@usace.army.mil> 5/5/2009 1:14
>>> PM >>>
Brian-

I just wanted to confirm that you received the Draft EA-Chesapeake Bay Oyster Restoration using Alternate Substrate which was distributed on April 13 for a 30-day public review and comment period. Please let me know if you received the document and if you concur with USACE findings regarding the Air Quality Conformity Analysis.

Please let me know of any questions or comments.

Thanks,

Anna Compton
Study Manager, Planning Division
Baltimore District, Corps of Engineers
10 South Howard Street
Baltimore, MD 21201
Phone: (410) 962-4633
Fax: (410) 962-4698

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

Northeast Region
Habitat Conservation Division
410 Severn Avenue, Suite 107A
Annapolis, MD 21403
Commercial Phone: (410) 267-5675
FAX#: (410) ~~267-5666~~ (410)295-3154

FAX TRANSMITTAL

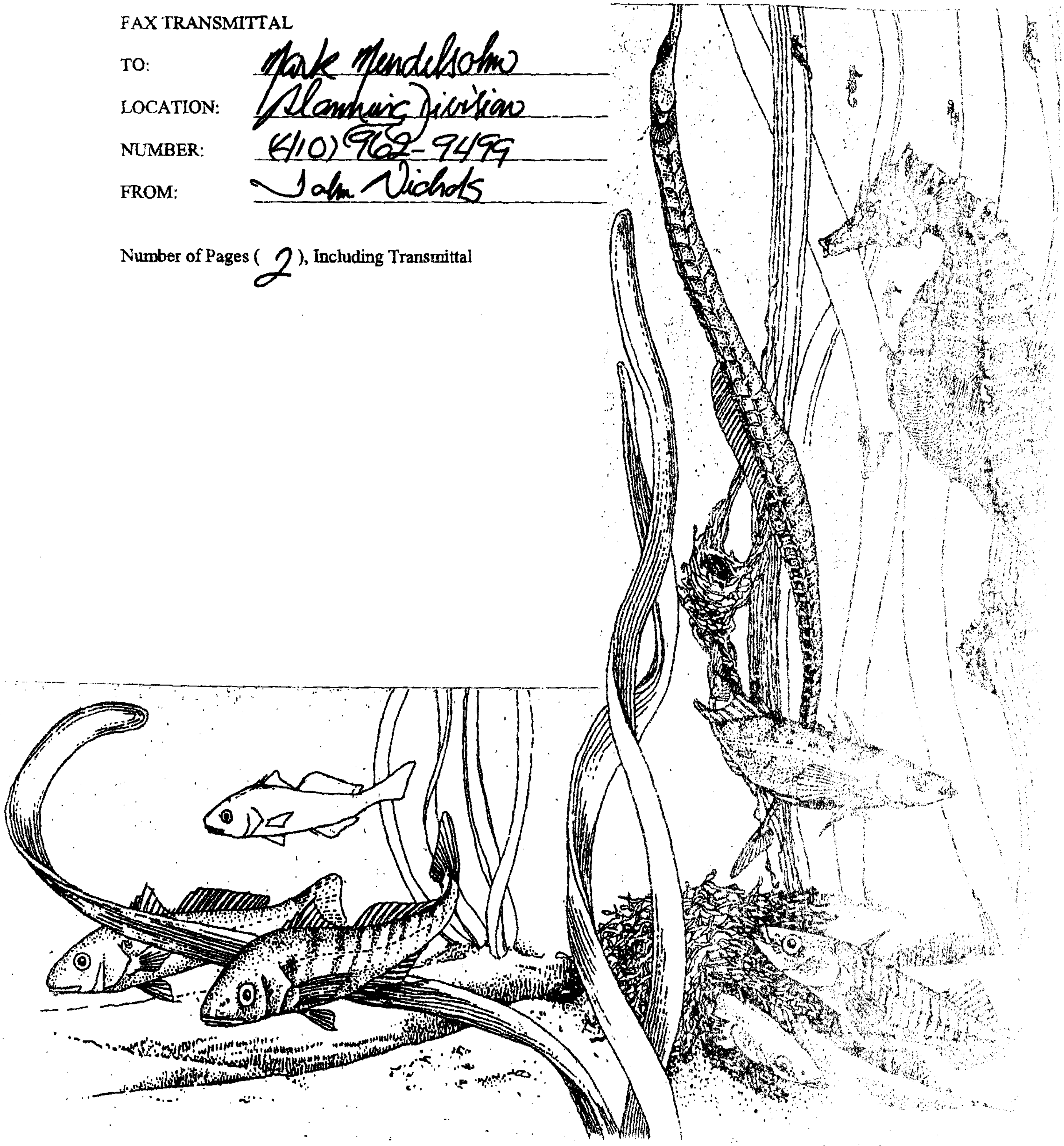
TO: Mark Mendelsohn

LOCATION: Planning Division

NUMBER: (410) 962-9499

FROM: John Nichols

Number of Pages ( 2 ), Including Transmittal



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
Chesapeake Bay Program Office
410 Severn Ave., Suite 107A
Annapolis, Maryland 21403

May 7, 2009

MEMORANDUM TO: Amy M. Guise
Chief, Civil Project Development Branch, Planning Division
Baltimore District, Corps of Engineers

FROM: John Nichols

SUBJECT: Chesapeake Bay Oyster Restoration Using Alternative Substrate

National Marine Fisheries Service (NMFS) has reviewed the draft Environmental Assessment & Finding of No Significant Impact, and Essential Fish Habitat Assessment, dated April 2009, for the proposed Chesapeake Bay Oyster Restoration Using Alternative Substrate, Maryland.

NMFS has been an advocate of using alternative substrate materials as oyster cultch, to replace dwindling fossil shell supplies. Therefore, we are supportive of this proposal.

As discussed in your EFH Assessment, oyster cultch, including alternative materials, provides finfish habitat enhancement in the way of improved shelter and forage opportunities. The way in which cultch is deployed on the bottom also affects the degree of fish habitat use. For example, mounding of cultch increases surface area of and interstitial pockets within the material for fouling community development and fish shelter. Mounded cultch, similar to that of materials used for fish reefs, also structurally diversifies the bottom, providing cover for fish over a broad area adjacent to and between mounds.

In accordance with Section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation & Management Act (MSA), we provide the following EFH Conservation Recommendation.

1. For deployment of alternative materials by mechanical means other than use of water cannon, mounding of materials on the oyster bar bottom should be practiced in some locations. Mounds should be approximately 5 – 6 feet in height above the bottom surface, especially in areas prone to silt accumulation, to elevate the cultch above the bottom silt layer. Mounding of cultch materials may be most appropriate on bars not subject to commercial harvest activities (e.g., oyster sanctuaries).

Section 305(b)(4)(B) of the MSA requires the Corps of Engineers to provide NMFS with a detailed written response to these EFH Conservation Recommendations, including a description of measures adopted for mitigating project impacts. In the case of a response that is inconsistent with NMFS' recommendation, your agency must explain its reasons for not following the recommendation. Included in such reasoning would be the scientific justification for any disagreement with NMFS over the anticipated effects of the proposed action and measures needed to mitigate such effects [50 CFR 600.920(k).

If you have any questions, please contact me at (410) 267-5675.

**MDP**
*Maryland Department of Planning*

*Martin O'Malley*
*Governor*
*Anthony G. Brown*
*Lt. Governor*

*Richard Eberhart Hall*
*Secretary*
*Matthew J. Power*
*Deputy Secretary*

April 28, 2009

Ms. Amy Guise, Chief, Civil Projects Development Branch
U.S. Army Corps of Engineers, Baltimore District
CENAB-PL-P
P.O. Box 1715
Baltimore, MD 21203-1715

**STATE CLEARINGHOUSE REVIEW PROCESS**
**State Application Identifier: MD20090422-0447**
**Reviewer Comments Due By:** May 10, 2009
**Project Description:** Draft Environmental Assessment and FONSI: Chesapeake Bay Oyster Restoration Using Alternate Substrate: completed Water Quality Certification and Department of Army's Permit Evaluation and Decision Document (see MD20090107-0010)
**Project Location:** Maryland
**Clearinghouse Contact:** Bob Rosenbush

Dear Ms. Guise:

Thank you for submitting your project for intergovernmental review. Participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps ensure project consistency with plans, programs, and objectives of State agencies and local governments. MIRC enhances opportunities for approval and/or funding and minimizes delays by resolving issues before project implementation.

The following agencies and/or jurisdictions have been forwarded a copy of your project for their review: the Maryland Departments of Transportation; the Counties of Calvert, Caroline, Charles, Dorchester, Wicomico, Anne Arundel, Prince George's, Queen Anne's, Somerset, St. Mary's, and Talbot; the Maryland Department of Planning including the Maryland Historical Trust. They have been requested to contact your agency directly by **May 10, 2009** with any comments or concerns and to provide a copy of those comments to the State Clearinghouse for Intergovernmental Assistance. Please be assured that after **May 10, 2009** all MIRC requirements will have been met in accordance with Code of Maryland Regulations (COMAR 14.24.04). The project has been assigned a unique State Application Identifier that should be used on all documents and correspondence.

A "Project Survey" form is enclosed with this letter. Please complete and return it within 14 days of the date of this letter. If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Assistant Secretary
for Clearinghouse and Communications

LCJ:BR
Enclosure
cc: Beth Cole – MHT*
*09-0447_NDC.NEW.doc*
Greg Golden – DNR
Cindy Johnson – MDOT*
Gregory Bowen – CLVT*
Katheleen Freeman – CRLN*
Joane Mueller – MDE*
Reed Faasen – CHAS*
Steven Dodd – DRCH*
Gary Pusey – WCMC*
John Dodds – ANARP*
Beverly Warfield – PGEO*
J. Steven Cohoon – QANN*
Samuel Boston – SMST*
John Savich – STMA*
Stacey Dahlstrom – TLBT*

MDP
Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary
Matthew J. Power
Deputy Secretary

# PROJECT SURVEY

Would you please take a few moments and tell us the source of information used by your agency to apply to the **U.S. Department of Defense (DOD/ARMY)** for this grant and/or service. Please complete this form and return it to the State Clearinghouse within 14 days of **April 28, 2009,** to the address or fax number noted below.

**TO:** **Maryland State Clearinghouse**
Maryland Department of Planning
301 West Preston Street
Room 1104
Baltimore, MD 21201-2305

**DATE:** ____________________
(Date form completed)

**FROM:** ____________________________
(Name of person completing this form.)

**PHONE:** _____-_____-________
(Area Code & Phone number)

**RE: State Application Identifier: MD20090422-0447**
**Project Description:** Draft Environmental Assessment and FONSI: Chesapeake Bay Oyster Restoration Using Alternate Substrate: completed Water Quality Certification and Department of Army's Permit Evaluation and Decision Document (see MD20090107-0010)

| | | |
|---|---|---|
| ☐ Chronicle of Philanthropy | ☐ GrantsNet | ☐ Nonprofit Organization Website |
| ☐ Commerce Business Daily | ☐ Health Grants and Contracts Weekly | ☐ Previous Grantee |
| ☐ Community Health Funding Report | ☐ LISTSERV | ☐ Red Book (Catalog of State Assistance) |
| ☐ E-Mail Automatic Notification | ☐ Local/State Funding Report and Grant Alert | ☐ Seminar or Workshop Attended |
| ☐ Federal Agency Website | ☐ Maryland Department of Planning Website | ☐ State Agency Website |
| ☐ Federal Assistance Monitor | ☐ Maryland Grants (MD Grants) | ☐ The Catalog of Federal Domestic Assistance (CFDA) |
| ☐ Federal Grants and Contracts Weekly | ☐ Maryland Register | ☐ The Foundation Center |
| ☐ Federal Register | ☐ NIH Guide for Grants and Contracts | ☐ Grants.Gov |
| ☐ Please Identify Other Source(s) Not Listed Above: | | |

Thank you.

COMPTON spoke with Rita Wallace on 12-May2009 and she confirmed this form does not need to be filled out

MDPCH-1K

MDE

# MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Baltimore, Maryland 21230
410-537-3000 • 1-800-633-6101 • http://www.mde.state.md.us

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

May 12, 2009

Ms. Amy Guise
U.S. Army Corps of Engineers, Baltimore District
CENAB-PL-P
P.O. Box 1715
Baltimore, MD 21203

RE: State Application Identifier: MD20090422-0447
Project: Chesapeake Bay Oyster Restoration Using Alternate Substrate

Dear Ms. Guise:

Thank you for the opportunity to review the above referenced project. The document was circulated throughout the Maryland Department of the Environment (MDE) for review, and the following comment is offered for your consideration.

1. Unless the source and specific composition is known, actual batches of alternate substrate should be tested to assure that there are no unexpected contaminants that would not be a problem in air but could leach into water.

Again, thank you for giving MDE the opportunity to review this project. If you have any questions, please feel free to call me at (410) 537-4120.

Sincerely,

Joane DM

Joane D. Mueller
Clearinghouse Coordinator

cc: Bob Rosenbush, State Clearinghouse

**DEPARTMENT OF THE ARMY**
**BALTIMORE DISTRICT, CORPS OF ENGINEERS**
**P. O. BOX 1715**
**BALTIMORE, MARYLAND 21203-1715**

Planning Division

Ms. Joane Mueller
Maryland Department of the Environment,
1800 Washington Blvd
Baltimore, MD 21230

JUN 4 2009

Dear Ms. Mueller:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District (USACE) Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate, Draft Environmental Assessment (EA).

USACE received a comment on May 12, 2009 (Maryland Department of the Environment State Application Identifier: MD20090422-0447) from your agency. The comment provided is as follows:

"Unless the source and specific composition is known, actual batches of alternate substrate should be tested to assure that there are no unexpected contaminants that would not be a problem in air but could leach into water."

USACE will follow MDE's recommendation to test actual batches of alternate substrate, if materials from an unknown source are used, to ensure that no unexpected contaminants leach into the air or water. USACE intends to utilize clean material, free of contaminants and hazardous materials that are suitable for disposal within State waters as alternate substrate for oyster restoration. Additionally, USACE intends to use only material in which the source and specific composition is known. All material will be examined for foreign material prior to placement.

If you have any questions or comments regarding this matter, please contact Ms. Anna Compton, at (410) 962-4633, or email Anna.M.Compton@usace.army.mil.

Sincerely,

Amy M. Guise, Chief
Civil Project Development Branch

**MARYLAND DEPARTMENT OF THE ENVIRONMENT**
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

May 22, 2009

Anna Compton
Study Manager, Planning Division
Baltimore District, Corps of Engineers
10 South Howard Street
Baltimore, MD 21201

RE: Chesapeake Bay Oyster Restoration Using Alternate Substrate

Dear Ms. Compton:

I am responding to the Corps of Engineers' (Corps) request for a Federal Consistency determination, pursuant to Section 307 of the Federal Coastal Zone Management Act of 1972, as amended (CZMA), for the referenced project. The Maryland Department of the Environment (MDE) has reviewed the Draft Environmental Assessment (EA) and Finding of No Significant Impact, Chesapeake Bay Oyster Restoration Using Alternate Substrate, Maryland, released by the Corps in April, 2009. The non-Federal sponsor of the project is the Maryland Department of Natural Resources (DNR).

The Draft EA evaluates the proposed use of alternate substrate in addition to oyster shell to construct oyster bars and reefs within the Maryland portion of the Chesapeake Bay and its tidal tributaries. The use of alternate substrate has become necessary due to the dwindling supply of oyster shell.

Construction using alternate substrate rather than, or in addition to, oyster shell is scheduled to begin in spring/summer 2009 and continue thereafter in annual placement cycles subject to the availability of funds. Potential alternate substrate includes, but is not limited to, clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be placed would be free of building debris such as wiring, pipes and other debris. No protruding re-bar would be allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e., reef balls). It is also noted that the Corps and the State issued authorizations to DNR in 2008 for the use of alternate substrate to construct oyster sanctuaries and harvest reserves.

The document assesses the overall effects of the use of alternate substrate and finds that there will be minor, temporary impacts during construction to benthic organisms, local turbidity, recreational and commercial fishermen, and fish (eggs, larval, and

Ms. Anna Compton
May 22, 2009
Page 2

juvenile stages). It concludes that there will be a long-term beneficial impact to the aquatic environment and no long-term adverse impacts associated with the project.

MDE concurs with the findings and conclusions of the Draft EA. Accordingly, the proposed action is consistent with the Maryland Coastal Zone Management Program, as required by Section 307 of the CZMA. In addition, MDE issued a Section 401 Water Quality Certification (WQC) for the Oyster Restoration Project on April 15, 2005, which does not specify the type of substrate (WQC # 05-WQ-001). The WQC remains in effect until April 15, 2010. Please note that the Corps must request an extension of the WQC prior to the expiration date.

If you have any questions, please contact me at (410) 537-3763 or by e-mail at eghigiarelli@mde.state.md.us.

Sincerely,

Elder A. Ghigiarelli

Elder Ghigiarelli, Jr.
Deputy Administrator
Federal Consistency Coordinator
Wetlands and Waterways Program

US Army Corps of Engineers
Baltimore District

# PUBLIC NOTICE

JUN 4 2009

## FINDING OF NO SIGNIFICANT IMPACT
## CHESAPEAKE BAY OYSTER RESTORATION USING ALTERNATE (NON-OYSTER SHELL) SUBSTRATE, MD

**ALL INTERESTED PARTIES:**

In accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the U.S. Army Corps of Engineers, Baltimore District (USACE) prepared an Environmental Assessment (EA) for the use of alternate substrates including, but not limited to clam shell, marl, concrete, stone, slag, brick, and cinderblock, as part of the Chesapeake Bay Oyster Recovery Project, Maryland. This project is being conducted under the authority of Section 704(b) of the Water Resources Development Act (WRDA) of 1986, as amended.

In conjunction with the ongoing Chesapeake Bay Oyster Recovery Project, an EA was prepared for the actions relating to the placement of alternate (non-oyster shell) substrate in designated Oyster Recovery Areas (ORA's) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers (see attached Figure). Oyster restoration activities have occurred in these areas since 1996 as part of the Chesapeake Bay Oyster Recovery Project with oyster shell only, and are expected to continue annually, as funding allows.

The Draft EA was made available for a 30-day public review period on April 13, 2009 which ended on May 13, 2009. The EA found that the potential negative impacts to benthic and open water habitat associated with the implementation of the project will occur over a small area and will be short-term. The project will produce a net beneficial impact to the environment through the restoration of habitat for oysters and other species associated with oyster communities and does not constitute a major Federal action significantly affecting the quality of the human environment. Based upon this finding, preparation of an Environmental Impact Statement (EIS) was not required and the USACE Baltimore District Engineer signed a Finding of No Significant Impact (FONSI) on May 29, 2009.

Should you have any questions, you may write to the U.S. Army Corps of Engineers, Baltimore District, ATTN: Anna Compton, U.S. Army Corps of Engineers, Baltimore District, CENAB-PL-P, P.O. Box 1715, Baltimore, Maryland 21203-1715 or by electronic mail to anna.m.compton@usace.army.mil or by telephone at (410) 962-4633.

Amy M. Guise

Amy M. Guise, Chief
Civil Project Development Branch

**DEPARTMENT OF THE ARMY**
**BALTIMORE DISTRICT, CORPS OF ENGINEERS**
**P. O. BOX 1715**
**BALTIMORE, MARYLAND 21203-1715**

Planning Division

JUN 8 2009

Mr. John Nichols
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Chesapeake Bay Field Office
410 Severn Avenue, Suite 107A
Annapolis, MD 21403

Dear Mr. Nichols:

This letter is in reference to the U.S. Army Corps of Engineers, Baltimore District (USACE) Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate, Draft Environmental Assessment (EA).

USACE received written comments on May 7, 2009, from you which stated that your agency, National Marine Fisheries Service (NMFS), is in support of the proposed activities and included the recommendation of "…mounding of materials on the oyster bar bottom in some locations." The recommended height was 5 to 6 feet. In a telephone conversation with Ms. Anna Compton from my office on May 12, 2009, you provided a final recommendation of 3 to 6 feet due to the fact that the substrate placement will occur on existing hard bottom habitat that often has a vertical height (above bay bottom) as shown by Maryland Geological Survey bathymetry data.

In response to your letter, USACE will follow NMFS recommendation to place substrate in a few locations that will bring the area to a height of 3 to 6 feet above soft bottom bay floor. The "mounds" will be incorporated into the site design to provide heterogeneity and varying vertical relief to constructed oyster habitat.

In accordance with Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act, USACE is required to provide NMFS with a detailed written response to Essential Fish Habitat (EFH) Conservation recommendations, including a description of measures adopted for mitigating project impacts. This letter provides the required response and is consistent with NMFS recommendations.

If you have any questions or comments regarding this matter, please contact Ms. Anna Compton, at (410) 962-4633, or email Anna.M.Compton@usace.army.mil.

Sincerely,

Amy M. Guise

Amy M. Guise, Chief
Civil Project Development Branch

20090272

US Army Corps of Engineers
Baltimore District

# Notice of Availability

APR 13 2009

F
COE
BAS

## CHESAPEAKE BAY OYSTER RESTORATION USING ALTERNATE (NON-OYSTER SHELL) SUBSTRATE

RECEIVED
APR 17 2009
By

The Maryland Historical Trust has determined that this undertaking will have no adverse effect on historic properties.
Date 5/21/09

## CHESAPEAKE BAY OYSTER RECOVERY PROJECT, MARYLAND

**ALL INTERESTED PARTIES:** In accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the U.S. Army Corps of Engineers, Baltimore District (USACE) has prepared an Environmental Assessment (EA) for the use of alternate substrates including, but not limited to clam shell, marl, concrete, stone, slag, brick, and cinderblock, as part of the Chesapeake Bay Oyster Recovery Project, Maryland. This project is being conducted under the authority of Section 704(b) of the Water Resources Development Act (WRDA) of 1986, as amended.

In conjunction with the ongoing Chesapeake Bay Oyster Recovery Project, an EA has been prepared for the actions relating to the placement of alternate (non-oyster shell) substrate in designated Oyster Recovery Areas (ORA's) of the following tributaries: Patuxent, Severn, Magothy, Chester, Choptank and Nanticoke Rivers (see attached Figure). Oyster restoration activities have occurred in these areas since 1996 as part of the Chesapeake Bay Oyster Recovery Project with oyster shell only, and are expected to continue annually, as funding allows.

Potential impacts were assessed with regard to the physical, chemical, and biological characteristics of the aquatic and terrestrial ecosystem; temporary construction impacts to water, air, navigation, and traffic; endangered and threatened species; hazardous and toxic materials; aesthetics and recreation; cultural resources; and the general needs and welfare of the public.

Any person who has an interest in the project may make comments and/or request a public hearing within 30 days of the date of publication of this notice. Comments must clearly set forth the interest that may be adversely affected by this proposed action and the manner in which the interest may be adversely affected.

USACE has determined that the proposed activity complies with and will be conducted in a manner consistent with Maryland's federally approved Coastal Zone Management Program. By copy of this public notice, the USACE is requesting the State's concurrence with this determination.

Individuals wishing to obtain a copy of, or wanting more information about the EA or draft Finding of No Significant Impact, may write to the U.S. Army Corps of Engineers, Baltimore District, ATTN: Anna Compton, U.S. Army Corps of Engineers, Baltimore District, CENAB-PL-P, P.O. Box 1715, Baltimore, Maryland 21203-1715 or by electronic mail to Anna.M.Compton@usace.army.mil or by telephone at (410) 962-4633. The EA is available at the USACE website: http://www.nab.usace.army.mil/PN/CW/OysterEA_April2009.pdf. The EA will also be available at the following libraries:

Kent County Public Library, 408 High Street, Chestertown, MD, 21620

# APPENDIX D:

# Air Quality Conformity Calculations

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**Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate**

**Chesapeake Bay Oyster Recovery Project, Maryland**

**General Conformity Review and Emission Inventory**

**May 2009**

The 1990 Clean Air Act Amendments include the provision of Federal Conformity, which is a regulation that ensures that Federal Actions conform to a nonattainment area's State Implementation Plan (SIP) thus not adversely impacting the area's progress toward attaining the National Ambient Air Quality Standards (NAAQS).

In the case of the *Chesapeake Bay Oyster Restoration Using Alternate (Non-Oyster Shell) Substrate*, Maryland, the Federal action is to place alternate substrate such as clam shell, concrete, and rubble on existing oyster beds (25-40 acres) at several locations in Maryland portions of the Chesapeake Bay on an annual basis, subject to availability of funding. The U.S. Army Corps of Engineers, Baltimore District would be responsible for construction.

There are two types of Federal Conformity: Transportation Conformity (TC) and General Conformity (GC). TC does not apply to this project because the project would not be funded with Federal Highway Administration money and it does not impact the on-road transportation system because all project activities will be on the water. GC however is applicable. The oyster restoration activities would be subject to detailed conformity determinations unless these actions are clearly considered *de minimus* emissions; use of these thresholds assures that the conformity rule covers only major federal actions. The Baltimore region and D.C. metropolitan region are in non-attainment status for particulate matter 2.5 (PM2.5) per EPA final rule of January 5, 2005. On July 17 2006, EPA published a direct final rule (71 FR 40420) establishing a 100 tons per year (TPY) *de minimis* levels for PM2.5,SO2 and NOX, 50 TPY for VOCs.

On March 29, 2007 the EPA published specific guidance on requirements for states to update SIPS to meet the new federal PM 2.5 standard. This rule is general in nature and does not change the requirements of the July, 2006 direct rule. It simply provides direction on the approach states must follow to consistency with federal requirements. State plans must be completed by April 2008. Compliance with the new ambient PM2.5 standard is required by 2010.

Jim Matters of Langenfelder Marine (contractor that has performed shell placement for USACE since 1996) was contacted to provide guidance on assumptions for equipment, hours of operation, and engine size for this project. In general it is assumed that the project will be 15, 10-hour workdays, and a water cannon will be used 2 hours out of the work day. The tug boat and water pump engines would be 800 hp. Calculations for air emissions and fuel consumption expected from project activities are shown in Table 1 and total emission rates from project activities are shown in Table 2.

**Conclusions**

The total estimated emissions that would result from this project construction are 1.26 tons of NOx 0.022 tons of VOCs, 0.216 tons of SO2 and 0.029 tons of PM 2.5. These emissions are below the GC trigger levels of 100 tons per year. The estimates from project construction represent only 1% of the annual limit for NOx, less than 1% of the annual limit for VOCs, SO2 and PM 2.5. Although construction activities would result in short-term, increased air emissions, these emissions would be less than the *de minimus* thresholds. Because projected emissions are below threshold levels, the action is exempt from further Conformity analysis.

**Table 1 Marine Engine Emission Factor and Fuel Consumption Algorithms (in g/kW-hr for all marine engines)**

| Pollutant | Exponent(x) | Intercept (b) | Coefficient (a) |
|---|---|---|---|
| PM | 1.5 | 0.2551 | 0.0059 |
| NOx | 1.5 | 10.4496 | 0.1255 |
| NO2 | 1.5 | 15.5247 | 0.18865 |
| SO2 | 0 | 0 | 2.3735 |
| CO | 1 | 0 | 0.8378 |
| HC | 1.5 | 0 | 0.0667 |
| CO2 | 1 | 648.6 | 44.1 |

1 All regression but SO2 are in the form of:
Emissions Rate (g/kW-hr) = a (fractional load)-x + b

2 Fractional load is equal to actual engine output divided by rated engine output

3 The SO2 regression is the form of:
Emissions rate (g/kW-hr) = a(fuel sulfur flow in g/kW-hr) + b

4 Fuel Consumption (g/kW-hr) = 14.12/(fractional load) + 205.717

5 n/a means not applicable, n/s means not statistically significant

| | | | |
|---|---|---|---|
| | Fuel Sulfur Concentration | 3300 | ppm |
| | Fuel consumption | 233.957 | g/kW-hr |
| Assuming Load Factor of | | 50% | |

**Table 2 Marine Engine Emission Rate based on Table 1**

| Pollutant | Emission Rate (g/kW-hr) | **lb/hp-hr** | |
|---|---|---|---|
| PM | 0.272 | **0.0004** | **assume all PM is PM 2.5** |
| NOx | 10.805 | 0.0175 | |
| NO2 | 16.058 | 0.026 | |
| SO2 | 1.832 | 0.003 | |
| CO | 1.676 | 0.0027 | |
| VOC | 0.189 | 0.0003 | |

| | | lbs | Tons |
|---|---|---|---|
| **For marine tug (800 hp) PM 2.5 emissions would be :** | **800 hp x 0.0004 X 10 hrs/day x 15 days =** | **48** | **.024** |
| **For water cannon (800 hp) PM 2.5 emissions would be :** | **800 hp x 0.0004 X 2 hrs/day x 15 days =** | **9.6** | **.005** |
| | **Total PM 2.5** | | **.029** |
| **For marine tug (800 hp) NOX emissions would be :** | **800 hp x 0.0175 X 10 hrs/day x 15 days =** | **2100** | **1.05** |
| **For water cannon (800 hp) NOX emissions would be :** | **800 hp x 0.0175 X 2 hrs/day x 15 days =** | **420** | **.21** |
| | **Total NOX** | | **1.26** |
| **For marine tug (800 hp) NO2 emissions would be :** | **800 hp x 0.026 X 10 hrs/day x 15 days =** | **3120** | **1.56** |
| **For water cannon (800 hp) NO2 emissions would be :** | **800 hp x 0.026 X 2 hrs/day x 15 days =** | **624** | **.312** |
| | **Total NO2** | | **1.872** |
| **For marine tug (800 hp) SO2 emissions would be :** | **800 hp x 0.003 X 10 hrs/day x 15 days =** | **360** | **.18** |
| **For water cannon (800 hp) SO2 emissions would be :** | **800 hp x 0.003 X 2 hrs/day x 15 days =** | **72** | **.036** |
| | **Total SO2** | | **.216** |
| **For marine tug (800 hp) CO emissions would be :** | **800 hp x 0.0027 X 10 hrs/day x 15 days =** | **324** | **.162** |
| **For water cannon (800 hp) CO emissions would be :** | **800 hp x 0.0027 X 2 hrs/day x 15 days =** | **64.8** | **.032** |
| | **Total CO** | | **.194** |
| **For marine tug (800 hp) VOC emissions would be :** | **800 hp x 0.0003 X 10 hrs/day x 15 days =** | **36** | **.018** |
| **For water cannon (800 hp) VOC emissions would be :** | **800 hp x 0.0003 X 2 hrs/day x 15 days =** | **7.2** | **.004** |
| | **Total VOC** | | **.022** |

# APPENDIX E:

# Department of the Army Permit Evaluation and Decision Document: MD DNR Alternate Material Placement

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**Department of the Army Permit Evaluation and Decision Document**

APPLICATION NUMBER: CENAB-OP-RMN (MD DNR/Alternate Material)2007-03659-M24

This document constitutes my Environmental Assessment, Statement of Findings, and review and compliance determination according to the 404(b)(1) Guidelines for the proposed work (applicant's preferred alternative) described in the enclosed public notice.

MEMORANDUM FOR RECORD

SUBJECT: Department of the Army Environmental Assessment and Statement of Finding for Above-Numbered Permit Application.

## I. Applicant:

Maryland Department of Natural Resources
Fisheries Service
580 Taylor Avenue B-2
Annapolis, MD 21401

## II. Location, Existing Site Conditions, Project Description, Changes to Project:

*A.* *Location*: The proposed project is located in the Chesapeake Bay and its tidal tributaries in Maryland and Maryland's Coastal Bays (See attached drawings.)

B. *Existing Site Conditions*: The project sites are open water with hard shell bottom, portions of which have been previously dredged over the past 40+ years for oyster restoration efforts. The plantings of alternate material will predominantly take place on charted Natural Oyster Bars and Historic Oyster Bars in the Chesapeake Bay, but may also occur in the Maryland Coastal Bays, where the oyster bars have not been mapped. Alternate materials will be placed in harvest, reserve and sanctuary areas.

*C.* *Project Description*: This project will permit the Maryland Department of Natural Resources (MD DNR) to plant alternate (non-oyster shell) materials within Maryland charted oyster bars in the Chesapeake Bay for the purpose of rehabilitating oyster bar habitat to work towards the re-establishment of an abundant and self-sustaining oyster population in support of the Chesapeake Bay Program 2000 Agreement and 2005 Oyster Management Plan.

<u>Permit Time Period</u>: A 10-year period from 2008 through 2017 is being requested.

<u>Location of Alternate Material Plantings</u>: Alternate material plantings will be made in the Maryland Chesapeake Bay and its tributaries upon charted oyster bars as mapped on the legal oyster bar charts maintained by the Department.

The identification of alternate material planting areas will be coordinated on an annual basis with the Oyster Advisory Commission, the Tidewater Oyster Committees composed of harvesters, and other interested parties, and will be consistent with the guidelines provided in the Chesapeake Bay Program Oyster Management Plan.

Alternate material plantings may occur within the following oyster bar management designations: sanctuaries, harvest reserves and open harvest areas.

<u>Type of Alternate Materials</u>: This permit will approve the planting of the following alternate (non-oyster shell) materials: clam shell, marl, concrete, stone, slag, brick, and cinderblock. Any concrete rubble to be planted would be free of building debris such as wiring, pipes, and other debris. No protruding re-bar is allowed. Concrete may also include man-made products formed into various shapes to provide benthic habitat (i.e. reef balls).

<u>Sizes of Alternate Materials</u>: The size of individual pieces of material used will vary with the material type and project purpose. For example, a harvest bar would be planted with smaller sized material (1" to 3" estimated) that would not interfere with harvest gear, while a sanctuary area could use larger materials to provide relief for the benthic population. No materials will be utilized larger than 12" in size.

Note that even in low setting areas, these materials are important as habitat to prepare a base for the planting of hatchery seed. If other types of materials become available, MD DNR will present the new information to the regulatory agencies, Oyster Advisory Commission and the Tidewater Oyster Committees for review to determine if the planting of this material could be approved through an amendment to this permit, or if a new permit application would be required.

<u>Amount & Acreage of Alternate Material</u>: Authorization is requested for the planting of up to 1.5 million cubic yards of alternate material from 2008-2018. This volume can create about 1,600 acres of habitat at a planting thickness of approximately 6" per acre. Some sites will be planted less than 6" thick and others higher, therefore the value of 1,600 acres is a reasonable estimate for this program.

The amount of material to be planted on an annual basis will be based upon the objectives and strategies of Maryland's oyster recovery program as well as the availability of the materials and funding. Based upon current cost projections for the procurement, transportation, and planting of alternate materials, it is estimated that approximately 25 acres of material could be planted per million dollars of available funding (assumes average planting thickness of 6-inches).

<u>Planting Methods</u>: Alternate materials will be planted primarily by tugboat and barge but may also be planted using large workboats. With either barges or large workboats, the material will be washed overboard using high pressure water hoses or cannons, with the vessel moving continuously through the planting area to control the thickness and acreage of the planting. Alternate materials may also be planted using a crane/excavator or front-end loader to place material on the oyster bar. To date, the majority of alternate material plantings have been less than one foot in height off of the bottom.

Additional Planting Restrictions:

- *Minimum water column clearance:* The planting of alternate materials will maintain a minimum eight feet of clearance in the water column at mean low water.
- *Protection of submerged aquatic vegetation:* The planting of alternate materials will not be permitted within 300 feet of submerged aquatic vegetation as mapped and reported annually by the Virginia Institute of Marine Sciences in coordination with the MD DNR Resource Assessment Service.

D. *Changes to Project*: In a letter dated April 28, 2008, the Maryland Historic Trust (MHT) has determined that the planting of alternate materials seed will have no adverse effect on historical or archeological properties in a majority of the oyster bars within the original "area of review." However, MHT has requested that the Corps defer approval for the 246 oyster bars that are in proximity to historic and/or archeological sites. MHT provided a list of these 246 oyster bars and as a result, MD DNR has eliminated those 246 oyster bars from the project area.

## III. Project Purpose:

A. *Basic*: To deposit alternate material on charted oyster bars in attempts to reestablish an abundant and self-sustaining oyster population within the Chesapeake Bay.

B. *Overall*: The overall purpose of the proposed projects is to enhance oyster propagation efforts in the Chesapeake Bay, Coastal Bays and its tributaries in Maryland. The planting of alternate material is an essential component in attempts to reestablish an abundant and self-sustaining oyster population within the Chesapeake Bay. The alternate materials may be seeded with native oysters.

## IV. Scope of Analysis:

A. Department of the Army authorization is required for this work and the degree of Corps discretion over this project relates to its impact on navigable waters of the United States under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

B. There has been no Federal financial aid given to this project.

C. The overall Federal involvement with this project is not sufficient to turn this private action into a Federal action.

D. The extent of cumulative Federal control and responsibility relates to evaluation of the DA permit application pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

**V. Statutory Authority:** These applications for DA authorization were reviewed pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

## VI. Other Federal, State, and Local Authorizations Obtained or Required and Pending:

A. *State water quality certification (WQC)*: Since it has been over six months since the project was advertised on public notice, WQC is considered waived.

B. *Coastal Zone Management (CZM) consistency determination:* Since it has been over six months since the project was advertised on public notice, CZM is considered waived.

C. *Other authorizations:* A tidal Wetlands License for the proposed work is required from the Maryland Department of the Environment (MDE), however the license has not been issued, to date. There are no previous Corps authorizations for alternate material placement bay wide, but there was a permit issued for a 5 acre site in the Upper Bay for rubble and concrete structures (2002-61637).

## VII. Date of Public Notice and Summary of Comments:

A. The alternate materials application was received on July 16, 2007. This application was initially reviewed on July 18, 2007, additional information was requested on July 18, 2007, and considered complete on December 14, 2007. A public notice was issued on December 26, 2007, and sent to all interested parties including appropriate State and Federal agencies. All comments received on this application have been reviewed and are summarized below:

(1) *U.S. Environmental Protection Agency (EPA)*: No written comments were received. Therefore, it is assumed they have no objections to the proposed work.

(2) *U.S. Fish and Wildlife Service (USFWS)*: No written comments were received. Therefore, it is assumed they have no objections to the proposed work.

(3) *National Marine Fisheries Service (NMFS):* NMFS concurs with measures discussed in the EFH Assessment for: 1) Requiring the applicant to survey planting areas for SAV prior to placing material; and, 2) and restricting planting within 300' of documented SAV.

(4) *State Historic Preservation Officer (SHPO)*: The Maryland Historic Trust *(MHT)* requested additional information and detailed mapping in a letter dated August 3, 2007. In a letter dated May 15, 2008, MHT stated, "Out of the 1105 distinct historic oyster bars (HOB) sent to the Trust, it is our opinion that 954 will have *no effect* on submerged historic properties". Out of the 326 distinct natural oyster bars (NOB), 245 will have *no effect* on submerged historic properties. Activities cited under this permit *may impact* historic or archeological resources located on or in proximity to 151 HOBs, 81 NOBs, and an additional 15 NOBs that were supplied in AutoCadd by another division in DNR. Therefore, MHT has requested that the Corps restrict its permit to those activities which will have no effect on submerged historic properties, and should defer approval for the 246 bars listed until the agencies have successfully concluded the Section 106 consultation on the 246 oyster bars.

(5) *State and Local Agencies*: MDE has taken no formal action on this proposal.

(6) *Organizations*: This office received no comments on the proposed project from organizations.

(7) *Individuals*: This office received one comment on the proposed project from a private individual concerning potential ammonia nitrogen release during bottom disturbance associated with shell recovery.

(8) *United States Coast Guard (USCG)*: The USCG will require a 250 ft buffer zone around all federal aids to navigation and 75 ft buffer of designated channels. All proposed reef coordinates including minimum depth information must be forwarded to USCG three weeks in advance of the proposed placement date.

(9) *Others, Including Internal Coordination*: A meeting was held on August 6, 2007 with the applicant and the Maryland Department of the Environment to discuss permitting issues.

B. *Response to the comments*: MHT sent comments before the application was advertised by public notice. MHT comments of August 3, 2007 and October 23, 2007 were coordinated with the applicant on August 7, 2007 and October 29, 2007, respectively. The applicant responded to the comments in March, 2008 by providing the additional information to MHT. MHT sent a letter to the Corps pursuant to Section 106 of the National Historic Preservation Act of 1966, which was received by this office on May 28, 2008. These comments were sent to the applicant, and after several discussions, the applicant agreed to eliminate the 246 oyster bars that MHT determined may be adversely affected by the project.

## VIII. Alternatives:

A. *Avoidance (No action, uplands, availability of other sites)*: The “no action” alternative would avoid impacts to the aquatic environment, but would not meet the project purpose of restoring oyster habitat.

B. *Minimization (modified project designs, etc.)*: As a result of the permit review process, the applicants have eliminated oyster bars identified by MHT as potentially having adverse effects from the “area of review.” This involved the elimination of 246 oyster bars.

C. *Project as Proposed (Outline impacts of project as proposed)*: The project as revised would impact less than 1600 acres of oyster bar over a ten-year period. The project impacts have been minimized to the most practicable extent possible (see minimization section above). This project has beneficial impacts to the aquatic environment.

D. *Conclusions of Alternatives Analysis*: The project as proposed is the least environmentally damaging practicable alternative that meets the project needs.

## IX. Evaluation of the 404(b)(1) Guidelines:

A. Restrictions on discharges:

(1) Alternatives (See paragraph VIII):

(a) The activity is located in a special aquatic site (wetlands, sanctuaries and refuges, mudflats, vegetated shallows, coral reefs, riffle and pool complexes, etc.)

Yes ☒ No ☐

(b) The activity needs to be located in a special aquatic site to fulfill its basic purpose.

Yes ☒ No ☐

(c) All practicable alternatives have been reviewed in paragraph VIII above. It has been demonstrated that the alternative with the fewest impacts on the aquatic ecosystem (least damaging alternative), has been identified.

Yes ☒ No ☐

(d) The least damaging alternative has no other significant environmental effects.

Yes ☒ No ☐

(2) Other program requirements:

(a) The proposed activity violates applicable State water quality standards or Section 307 prohibitions or effluent standards.

Yes ☐ No ☒

(b) The proposed activity jeopardizes the continued existence of federally listed threatened or endangered species or affects their critical habitat.

Yes ☐ No ☒

(c) The proposed activity violates the requirements of a federally designated marine sanctuary.

Yes ☐ No ☒

(3) The activity will cause or contribute to significant degradation of water of the United States, including adverse effects on human health; life stages of aquatic organisms; ecosystem diversity, productivity and stability; and recreational, esthetic, and economic values.

Yes ☐ No ☒

(4) Minimization of adverse effects:

(a) Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Yes ☒ No ☐

(b) Compensatory Mitigation (wetland enhancement, creation, etc.): No mitigation is proposed or required for impacts to shallow water habitat.

**X. Public Interest Review:**

A. All public interest factors have been reviewed, including but not limited to the effects the work might have on conservation, economics, esthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, land use, navigation, shore erosion and accretion, recreation, water quality, safety, and consideration of property ownership. It has been determined that the proposed work will not adversely impact any of the public interest factors.

(1) *Conservation*. The proposed project is expected to have a positive impact on the conservation of aquatic resources, since the purpose of rehabilitating oyster bar habitat is to work towards the re-establishment of an abundant and self-sustaining oyster population in support of the Chesapeake Bay Program 2000 Agreement and 2005 Oyster Management Plan.

(2) *Economics* (33CFR320.4(q)). The proposed project is expected to have temporary adverse impacts on recreational and commercial fishing of finfish and shellfish, which will be temporarily disrupted by the work. Upon completion of the work, however, it is likely that shellfish and finfish will return to the project areas. As a result of previous oyster projects, oyster populations in the Chesapeake Bay have increased, benefiting watermen harvesting oysters. A minor beneficial impact by providing employment for a marine contractor and employees will occur.

(3) *Aesthetics*. No detrimental or beneficial impacts to aesthetics are expected to occur as a result of the proposed projects. During construction the dredging equipment would be visible. However, the extent and perception of the aesthetic alteration would vary depending upon the nature of the surrounding area and the values of the public using the waterway.

(4) *General environmental concerns* (33CFR320.4(p)). General environmental concerns are addressed in my evaluation of the following public interest factors.

(5) *Wetlands* (33CFR320.4(b)). No detrimental or beneficial impacts are anticipated to wetlands as a result of the proposed project.

(6) *Historic and cultural resources* (33CFR320.4(e)). Since the applicant has eliminated 246 oyster bars that MHT had identified may impact submerged historic properties, the proposed project will have no detrimental or beneficial impacts on historic or cultural resources.

(7) *Fish and wildlife values* (33CFR320.4(c)).

(a) *Endangered or threatened species.* No endangered or threatened species or their identified critical habitats occur within the project area, therefore, there will be no detrimental or beneficial impacts to this resource.

(b) *Anadromous fish.* The proposed project has the potential to indirectly benefit anadromous fish, as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species and improve water quality.

(c) *Submerged aquatic vegetation (SAV).* SAV is an important component of the food chain, providing a food source for waterfowl, fish, and shellfish, as well as providing habitat and nursery areas for many species of fish and invertebrates. SAV also substantially contributes to maintaining water quality at the level necessary to support fisheries as it removes nitrogen, phosphorus, and suspended sediments from the water. The applicant is required to survey recovery/planting areas for SAV prior to dredging and planting. No alternate material placement will occur within 300 feet of SAV beds. Therefore, no adverse impacts to SAV are anticipated as a result of the proposed project.

(d) *Fish habitat and benthics.* The proposed project has the potential to indirectly benefit fish and wildlife values, as a result of rehabilitating oyster bar habitat, which provide valuable habitat for fish, blue crabs and other aquatic species. Benthics should colonize the alternate material shortly after placement.

*(e) Essential Fish Habitat (EFH).* The project site lies in or adjacent to EFH as described under Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) for *Scopthalmus aquosos* (windowpane flounder) juvenile and adult; *Pomatomus saltatrix* (blue fish) juvenile and adult; *Paralicthys dentatus (summer flounder)* juvenile and adult; *Peprilis triacanthos* (Atlantic butterfish) eggs, larvae, juvenile and adult ; *Centropristus striata* (black sea bass) juvenile and adult; eggs, larvae, juvenile, and adult stages of *Sciaenops ocellatus* (red drum), *Scomberomorus cavalla* (king mackerel), *Scomberomorus maculatus* (spanish mackerel), and *Rachycentron canadum* (cobia), all managed species under the MSFCMA. NMFS concurred with the measures discussed in our EFH Assessment, which include 1) Requiring the applicant to survey recovery/planting areas for SAV prior to placing material; and, 2) restricting planting within 300' of documented SAV. The project has the potential to beneficially impact forage and/or shelter habitat since rehabilitated oyster bar habitat will provide a more productive area for forage and shelter for smaller species.

(8) *Flood hazards*. No detrimental or beneficial impacts are predicted for flood heights and drift as a result of the proposed work.

(9) *Floodplain values* (33 CFR 320.4(l)). No detrimental or beneficial impacts are predicted for floodplain values as a result of the proposed work.

(10) *Land use*. No detrimental or beneficial impacts are predicted for land use in the area as a result of the proposed work as the project is compatible with current land use in the area and additional shoreline development is not anticipated as a result of the project.

(11) *Navigation* (33 CFR 320.4(o)). A temporary minor detrimental impact to navigation is anticipated to occur during the actual work as boat traffic may be temporarily impacted due to the presence of work boats/barges in the area. The Coast Guard requires a 250 foot buffer zone around all federal aid to navigation and a 75 foot buffer of designated channels.

(12) *Shore erosion and accretion*. No detrimental or beneficial impacts to shore erosion or accretion are anticipated as a result of the proposed project. Normal shoreline processes would influence erosion and accretion much more than the minimal depth changes proposed for this project; any minimal impacts the proposed project may have on shore erosion or accretion may not be discernable from normal waterway evolution.

(13) *Recreation*. No impact on recreation is anticipated to occur.

(14) *Water supply* (33 CFR 320.4(m)). No detrimental or beneficial impacts to water supply and conservation are expected as a result of the project as the project site is within a marine water system that is not a source of potable water.

(15) *Water quality* (33 CFR 320.4(d)). A temporary minor detrimental impact to water quality is anticipated as a result of the proposed project. A temporary increase in turbidity within the water column is expected during placement of alternate material. However, oysters have a positive impact of water quality due to their ability to filter water at a rate of about two gallons per hour per oyster. In abundance, oysters help clarify the water, which allows bay grasses to receive more sunlight. Then in turn, plentiful grasses increase oxygen levels, reduce wave energy and shoreline loss, and habitat for aquatic life.

(16) *Energy needs* (33 CFR 320.4(n)). No detrimental or beneficial impacts are anticipated on energy needs as a result of the proposed project.

(17) *Safety*. No detrimental or beneficial impacts are anticipated on safety as a result of the proposed project.

(18) *Food and fiber production*. Beneficial impacts are anticipated on food production, especially for oysters, as a result of the proposed project since the purpose is to increase oyster populations. The proposed project would not effect fiber production as the area is not used for fiber production.

(19) *Mineral needs*. No detrimental or beneficial impacts are anticipated on mineral needs as a result of the proposed project.

(20) *Considerations of property ownership*.

(a) *Public rights to navigation.* No impact is anticipated on public rights to navigation as a result of the proposed project.

(b) *Public interests in environmental protection.* The project is unlikely to be contrary to the public's interest in environmental protection as the purpose of the project is to rehabilitate oyster fisheries. Benthic organisms that are important to the aquatic food web will be temporarily impacted due to the project, but re-colonization will occur after placement is completed. Therefore, the impacts to living aquatic resources will be minimal.

(c) *Riparian rights.* This project will not affect riparian rights because the disturbance by the presence of work boats will be temporary.

(d) *Ownership rights.* Property owners along the waterway have an inherent right to reasonable private use of the waterway. This project will not affect private property owners because the disturbance by the presence of work boats will be temporary.

(e) *Public lands.* There are no public land issues associated with this project. The oyster seeding is proposed in natural or historic oyster bars in the Chesapeake Bay.

B. *Describe the relative extent of the public and private need for the proposed structure or work.* The project is proposed to benefit all citizens because oysters are economically and ecologically important.

C. *Describe the practicability of using reasonable alternative locations and methods to accomplish the objective of the purposed work where there are unresolved conflicts as to resource use*. There are no alternative locations for the proposed project that meet the purpose and need of the project. The projects will have minor to no permanent detrimental impacts on the aquatic environment, minor temporary detrimental impacts, and permanent beneficial impacts.

D. *Describe the extent and permanence of the beneficial and/or detrimental effects which the proposed work is likely to have on the public and private uses to which the area is suited*. The proposed project is unlikely to have permanent detrimental effects on public or private uses. The proposed project is expected to have permanent beneficial effects on public uses such as economics, fisheries and water quality of the Chesapeake Bay.

E. *Threatened or Endangered Species*. The proposed project will not jeopardize the continued existence or critical habitat of any threatened or endangered species.

F. *Corps wetland policy*. There are no wetland alterations associated with the proposed project. Therefore, the projects are in accordance with the Corps wetland policy.

G. *Cumulative and Secondary Impacts*: The proposed project is not likely to have more than minimal secondary, long-term impacts to the aquatic environment. The overall purpose of the proposed project is to enhance oyster propagation efforts in the Chesapeake Bay, Coastal Bays and its tributaries in Maryland. The placement of alternate material is an essential component in attempts to reestablish an abundant and self-sustaining oyster population within the Chesapeake Bay.

**XI. Public Hearing Evaluation:** There were no requests for a federal public hearing; therefore, a federal public hearing was not held for the projects.

**XII. Essential Fisheries Habitat (EFH):** The National Marine Fisheries Service (NMFS) did not request any EFH information in addition to that provided in the Pubic Notice. The Baltimore District's findings are that the proposed project will have negligible short or long-term detrimental impacts to EFH. NMFS concurs with measures discussed in the EFH Assessment for: 1) Requiring the applicant to survey recovery/planting areas for SAV prior to placing material; and, 2) restricting planting within 300' of documented SAV. Therefore, the proposed project is not expected to have substantial detrimental impacts to fish and wildlife resources or EFH.

**XII. Determinations:**

A. *Finding of No Significant Impact (FONSI)*. Having reviewed the information provided by the applicant and all interested parties and an assessment of the environmental impacts, I find that this permit action will not have a significant impact on the quality of the human environment. Therefore, an Environmental Impact Statement will not be required.

B. *Compliance with 404(b)(1) Guidelines*. Having completed the evaluation in paragraph VIII above, I have determined that the proposed discharge complies with the 404(b)(1) Guidelines.

C. *Section 176(c) of the Clean Air Act General Conformity Rule Review*. The proposed permit action has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the activities proposed under this permit will not exceed *de minimus* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps' continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons a conformity determination is not required for this permit action.

D. *Environmental Justice*. In accordance with Title III of the Civil Rights Act of 1964 and Executive Order 12898, each Federal agency must ensure that all programs that affect human health or the environment do not directly or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin. Each Federal Agency must analyze the environmental effects, human health effects, economic effects, and social effects of Federal actions, including effects on minority communities and low-income communities. The undertaking of the proposed projects is not expected to discriminate on the basis of race, color, or national origin, nor will they have a disproportionate effect on minority or low-income communities.

E. *Public Hearing Request*. There were no requests for a public hearing on this project; therefore, one was not scheduled.

F. *Public Interest Determination.* I find that issuance of a Department of the Army permit is not contrary to the public interest.

PREPARED BY: Mary Frazier DATE: 12 Aug 08
Mary Frazier
Regulatory Project Manager, Maryland Section Northern

REVIEWED BY: Joseph P. DaVia DATE: 8/13/08
Joseph P. DaVia
Chief, Maryland Section Northern

# APPENDIX F:

## USACE Oyster Decision Documents

Chesapeake Bay Oyster Recovery Project Report January, 1996.

Environmental Assessment for the Construction of Seed Bars in Eastern Bay as Part of the Chesapeake Bay Oyster Recovery Project, July, 1999.

Decision Document Chesapeake Bay Oyster Recovery Project, Maryland; dated May 2002.

Programmatic Environmental Impact Statements for Oyster restoration in Chesapeake Bay Including the Use of a native and/or Nonnative dated October 2008.

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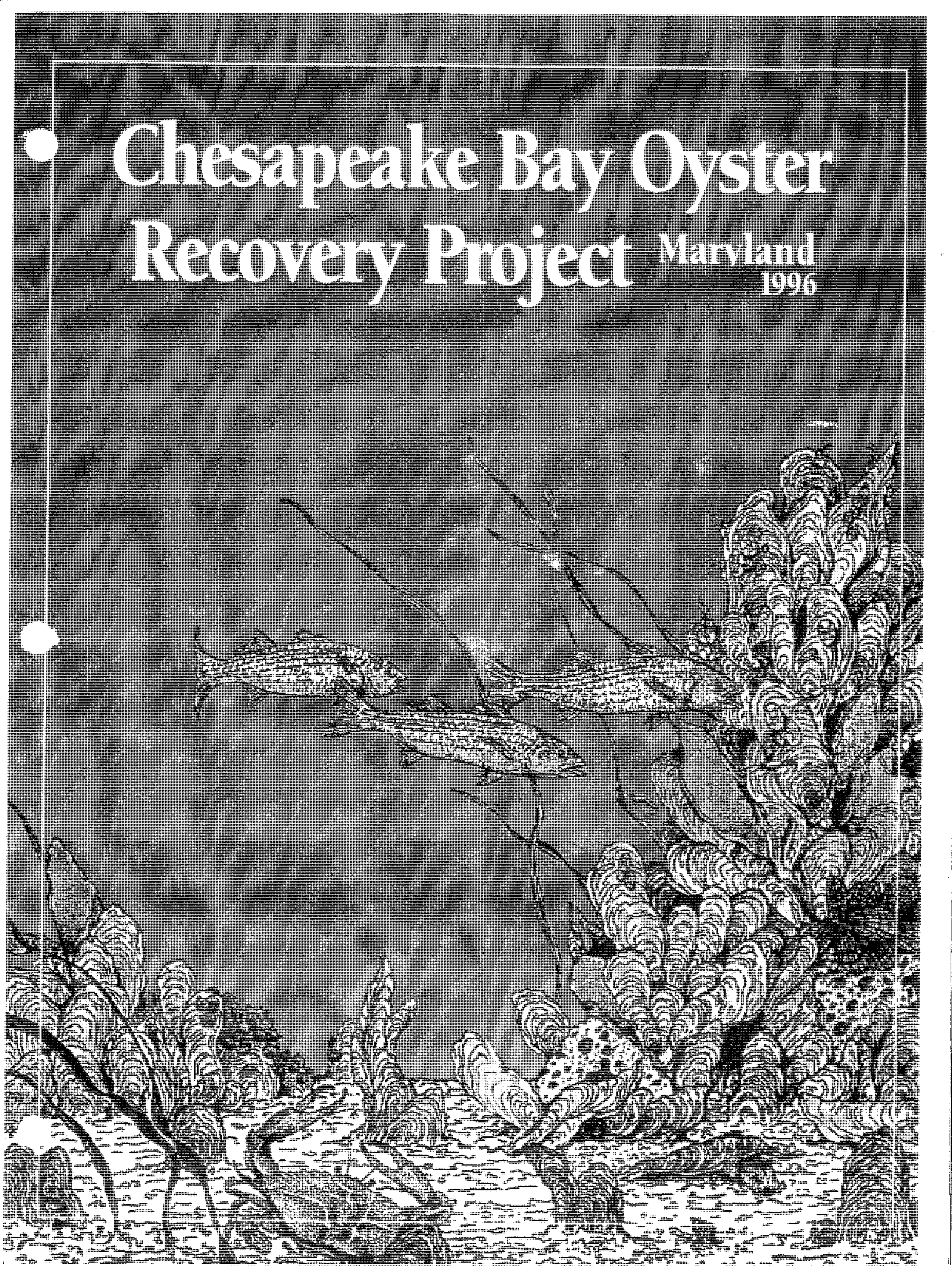
# Chesapeake Bay Oyster Recovery Project

Maryland
1996



# 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.

Randall R. Inouye P.E.
Colonel, Corps of Engineers
District Engineer

January 29, 1996

US Army Corps
of Engineers
Baltimore District

# SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

# FOR THE CONSTRUCTION OF SEED BARS IN EASTERN BAY AS PART OF THE CHESAPEAKE BAY OYSTER RECOVERY PROJECT, MARYLAND

**Prepared By:**
**Baltimore District**
**U.S. Army Corps of Engineers**
**Baltimore, Maryland 21203-1715**

**July 1999**

# FINDING OF NO SIGNIFICANT IMPACT

## CONSTRUCTION OF SEED BARS IN EASTERN BAY AS PART OF THE CHESAPEAKE BAY OYSTER RECOVERY PROJECT PROJECT, MARYLAND

The Baltimore District, U.S. Army Corps of Engineers, in cooperation with the Maryland Department of Natural Resources, is constructing approximately 18 acres of seed bars in Eastern Bay in Queen Anne's County. This supplemental environmental assessment (EA) identifies and assesses the potential environmental impacts associated with the construction of these seed bars in Eastern Bay as part of the Chesapeake Bay Oyster Recovery Project in Maryland which was begun in 1997. Project activities were planned in 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 Chesapeake Bay Oyster Recovery Project in Maryland is authorized under Section 704(b) of the Water Resources Development Act of 1986, which provides authority for the Corps to conduct projects for fish and wildlife, including but not limited to man-made reefs for fish. 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 supplemental 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.

Bruce A. Berwick P.E.
Colonel, Corps of Engineers
District Engineer

# DECISION DOCUMENT

# CHESAPEAKE BAY OYSTER RECOVERY PROJECT
# MARYLAND

**May 2002**

Baltimore District
U.S. Army Corps of Engineers

## XI. Recommendations

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

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

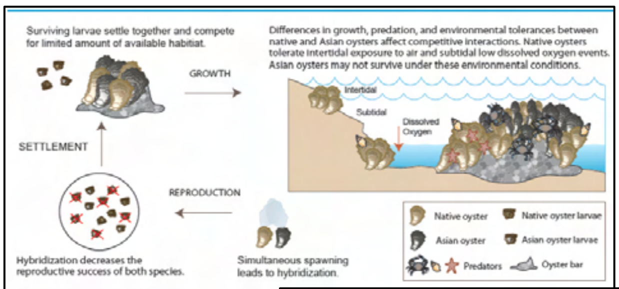
Therefore, I recommend that the oyster project be extended by two construction years with an associated cost increase of $3.4 million.

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

Date: 29 May 02

# Draft Programmatic Environmental Impact Statement for Oyster Restoration in Chesapeake Bay Including the Use of a Native and/or Nonnative Oyster

Volume 1




US Army Corps of Engineers

MARYLAND DEPARTMENT OF NATURAL RESOURCES

VIRGINIA MARINE RESOURCES COMMISSION

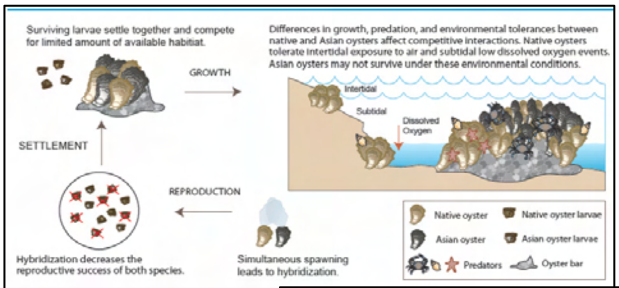
NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

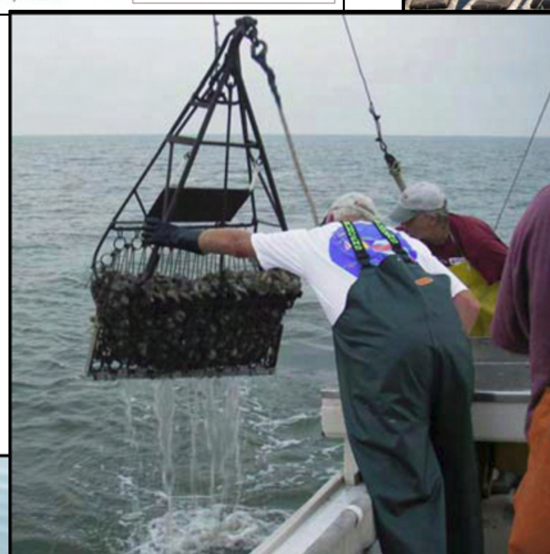
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

U.S. FISH & WILDLIFE SERVICE DEPARTMENT OF THE INTERIOR

# Draft Programmatic Environmental Impact Statement for Oyster Restoration in Chesapeake Bay Including the Use of a Native and/or Nonnative Oyster

**Volume 2**



US Army Corps of Engineers

MARYLAND DEPARTMENT OF NATURAL RESOURCES

VIRGINIA MARINE RESOURCES COMMISSION

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NOAA U.S. DEPARTMENT OF COMMERCE

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