DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR

RECREATIONAL SHELLFISHING AND SHELLFISH RESTORATION

RELATED TO THE

BUZZARDS BAY BOUCHARD BARGE-120 (B-120) OIL SPILL

SHORELINE, AQUATIC AND NATURAL RESOURCE USE INJURIES

MASSACHUSETTS AND RHODE ISLAND

May 2016

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1. Introduction

On April 27, 2003, the Bouchard Barge-120 (B-120), owned and operated by the Bouchard Transportation Company, Inc., struck a rocky shoal, soon after entering the western approach to Buzzards Bay. The grounding ruptured a 12-foot hole in the hull of the barge, releasing approximately 98,000 gallons of No. 6 fuel oil into the Bay. The oil spill in Buzzards Bay resulted in substantial natural resource injury and lost public uses, including lost recreational shellfishing due to extended closures of shellfishing areas. This triggered an environmental damage assessment and injury restoration process in accordance with the Oil Pollution Act of 1990 (OPA) (33 U.S.C. Section 2701, *et seq*.).

The purpose of restoration planning is to identify and evaluate a reasonable set of resource and resource use-specific restoration alternatives and to provide the public with an opportunity for review and comment on the proposed restoration alternatives. Restoration planning provides the link between resource injury and restoration. Through the Natural Resources Damages Assessment (NRDA) process, the Buzzards Bay Trustees (hereafter, "Trustees" including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), Massachusetts Executive Office of Energy and Environmental Affairs (MEOEEA) and Rhode Island Department of Environmental Management (RIDEM)) conducted restoration planning including a public solicitation of project ideas via release of a Draft Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill (RP/EA) for public comment (NOAA et al. 2014). The RP/EA was prepared in accordance with the National Environmental Policy Act (NEPA) to fully consider impacts from the proposed restoration alternatives. A Final Programmatic RP/EA was finalized in September 2014 and is available from NOAA at (https://casedocuments.darrp.noaa.gov/northeast/buzzard/pdf/B-120-Final-PRP-EA-and-FONSI-09-30-14.pdf). The purpose of restoration, as discussed in the Final PRP/EA, is to offset harm to the environment and to make the public "whole" for injuries resulting from the spill by implementing one or more restoration actions that return injured natural resources and natural resource services to baseline conditions and compensate for interim losses.

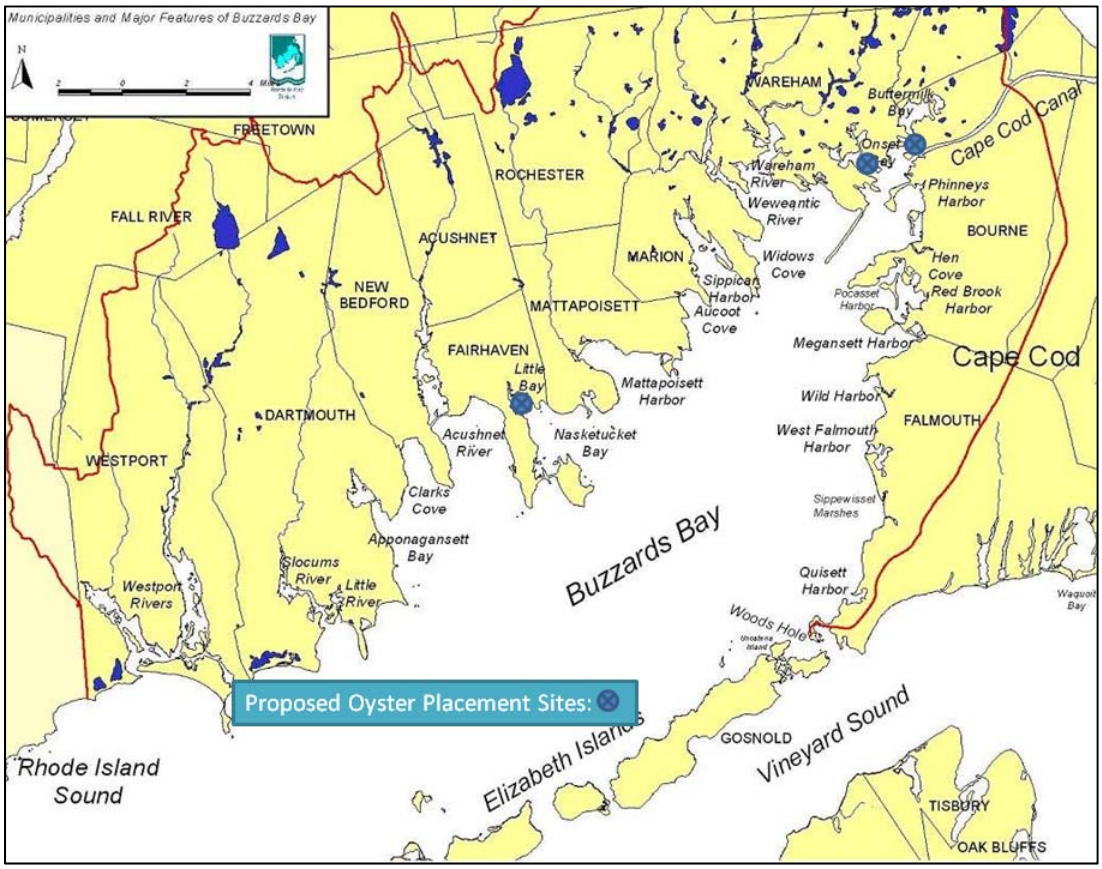
Based on comments received from the public, including recommendations of locations for actions to restore recreational shellfishing opportunities, the Trustees identified alternatives for restoring recreational shellfishing. This Draft Supplemental EA (SEA) has been prepared in accordance with the Council on Environmental Quality regulations (40 CFR 1508.28) to "tier off" of the Final PRP/EA in order to evaluate potential environmental impacts of the proposed site-specific alternatives identified since release of the Final PRP/EA, and to facilitate public input in the decision-making process for these projects.[1]

[1] The Final PRP/EA is incorporated by reference into this document to provide the background and analysis related to the programmatic aspects of the Trustees' deliberations. This Supplemental EA (SEA) addresses the site-specific elements related to the proposed actions. As needed, specific references to sections of the Final PRP/EA relevant to the analysis in this SEA will be provided.

1.1. Proposed Action

The damage caused by the B-120 oil spill, coupled with historic overfishing of shellfish resources and degradation of shellfish habitat due to pollution of the bay has significantly affected historic recreational shellfishing opportunities in Buzzards Bay. To address this impact, the Trustees are proposing to fund three oyster placement projects over a 4-year period, to be implemented by The Nature Conservancy (TNC), three municipalities, and other supporting project partners. The oyster restoration sites would be located in municipal waters of three Massachusetts towns: Little Bay in the Town of Fairhaven; Onset Bay near Onset Island in Wareham; and Taylor Point Cove in the Town of Bourne (Figure 1).

Figure 1. Location of Proposed Oyster Placement Projects, Buzzards Bay (Base Map Source: Buzzards Bay National Estuary Program)



1.2. Purpose and Need

Purpose: The purpose of the oyster restoration projects is to compensate the public for related injuries to shellfishing resources within the municipal waters of Buzzards Bay, MA from the B-120 oil spill (as described and evaluated in the above-referenced Final PRP/EA) This purpose is consistent with the Purpose and Need established in the Final PRP/EA.

Need: In order to achieve this purpose, the Trustees need to evaluate site-specific alternatives for oyster restoration in the Buzzards Bay area that will improve both functional habitat and sustainable public recreational shellfisheries.

1.3. Public Participation

The public has been afforded opportunities to comment on the RP/EA and to propose alternative projects related to the goals established by the Trustees in the RP/EA. These opportunities and the public comments received are documented in the Final PRP/EA in Section 1.4.3 (NOAA et al. 2014). TNC submitted a project idea (project idea SH-13 in the PRP/EA) identifying multiple restoration projects targeting oysters. The shellfish natural resource category was identified by the Trustees in the PRP/EA as a Tier 1-preferred project alternative. Public comments received that were specific to the oyster bed restoration actions were considered in this SEA as described in the Final PRP/EA in Appendix D (NOAA et al. 2014).

1.4. Scope of the NEPA Analysis

This SEA describes the potential impacts of the proposed action oyster restoration projects, as well as the No Action alternative. In particular, the SEA analyzes the potential direct, indirect, and cumulative ecological, social, and economic impacts associated with the two alternatives.

The following definitions were generally used to characterize the nature of the various impacts evaluated with this SEA:

Short-term or long-term impacts: These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.

Direct or indirect impacts: A 'direct' impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and may occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an 'indirect' impact of the same erosion might lead to lack of fish spawning habitat and result in lowered reproduction rates of native fish spawning in the downstream stream reach.

Minor, moderate, or major impacts: These relative terms are used to characterize the magnitude of an impact. 'Minor' impacts are generally those that may be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. 'Moderate' impacts are those that are more perceptible and, typically, more likely to be quantified or measured. 'Major' impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in Council on Environmental Quality (CEQ) regulations (40 CFR 1508.27), and thus, warrant

heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

Adverse or beneficial impacts: An 'adverse' impact is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single action may result in adverse impacts on one environmental resource and beneficial impacts on another resource.

Cumulative impacts: The CEQ regulations implementing NEPA define 'cumulative' impacts as the "impacts on the environment which result 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) Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time within a geographic area.

2. Project Alternatives

This section provides a summary of the NEPA alternatives that the Trustees have considered in this SEA. NEPA requires that any Federal agency proposing a major action consider reasonable alternatives to the proposed action. The evaluation of alternatives under NEPA assists the Secretary (Secretary of Commerce on behalf of NOAA, as lead Federal agency) in ensuring that any unnecessary impacts are avoided through an assessment of alternatives to achieve the underlying purpose of the project that may result in less environmental harm.

To warrant detailed evaluation by the Trustees, an alternative must be reasonable and meet the Secretary's purpose and need (see Section 1.2). Screening criteria are used to determine whether an alternative is reasonable. The following discussion identifies the screening criteria used in this SEA to evaluate whether an alternative is reasonable; evaluates various alternatives against the screening criteria (including the proposed measures) and identifies those alternatives found to be reasonable; identifies those alternatives found not to be reasonable; and for the later, the basis for this finding. Alternatives considered but found not to be reasonable are not evaluated in detail in this SEA.

Screening Criteria – As established in the Final PRP/EA to be considered "reasonable" for purposes of this SEA, an alternative must meet the High Importance screening criteria described in Section 4.3.3 of the PRP/EA. The implemented recreational shellfishing project will:

- Directly enhance sustainable recreational shellfishing opportunities for a large number of persons and diverse populations*;*
- Address the same or similar shellfish resource type injured*;*
- Provide or enhance ecological services that include multiple biological, physical and chemical processes*;* and

- Fulfill a regional need where shellfish species or habitat are functionally extirpated or in very low abundance in targeted area where once the shellfish were historically present and abundant.

In this SEA, the Trustees consider two alternatives for detailed analysis: 1) the proposed action (Preferred Alternative); and 2) No Action (or maintaining existing municipal management with no project implementation. The ecological, economic, and social impacts of the alternatives are discussed in Section 4.

2.1. Shellfish Bed Restoration Alternative (Preferred Alternative)

Through this alternative, proposed oyster restoration practices would include the transport and placement of weathered surf clam or other appropriate shell material as cultch from which oyster can attach and grow at each site location, and to be managed by each municipality. Each project is expected to be 1 acre in size. Free-swimming larvae will be raised in hatcheries until they have set on shell cultch ("spat on shell"). The proposed project sites will be seeded with certified, disease-free, spat-on-shell juvenile oysters at a rate of about 250,000 spat per acre. Cultch and spat-on-shell will be transported to the site on barges. Shell cultch will be placed in the selected sites during mid to late June, and seeded with juvenile oysters in mid-July to afford opportunity to enhance wild recruitment of oyster larvae in Buzzards Bay waters. The proposed schedule may be adjusted based on environmental conditions.

Each of the proposed restoration activities will be in compliance with the Massachusetts Division of Marine Fisheries' (MA DMF) Shellfish Planting Guidelines. Participating towns will be project proponents, and applicants for all federal, state and local permitting, including compliance with the U.S. Army Corps of Engineers' General Permit for Aquaculture. Each town will also obtain a Municipal Shellfish Propagation Permit from MA DMF.

Each municipal oyster placement site would be closed to shellfishing until the oyster population has matured to reach reproductive size and population recruitment is achieved. A sustainable recreational shellfishery is then expected to be opened and managed by the shellfish constable from each respective town. Each town is also responsible for monitoring the oyster restoration site and reporting to MA DMF and the Trustees on the conditions of each restoring oyster population.

2.2. No Action Alternative

Under the no action alternative, the Trustees would not use the funds made available through the oil spill settlement agreement and designated by the Trustees specifically for this restoration category. No actions specific to restoring recreational shellfishing for oysters would be undertaken, and restoration of recreational oyster fishing would be dependent on existing municipal management of town shellfish beds and natural restoration and recruitment in areas affected by the oil spill. As noted in the Final PRP/EA, natural recruitment of oyster populations supporting fishing opportunities may be limited due to multiple factors. Even if the natural

recruitment results in increased oyster abundance in the shellfish beds in the action area, this natural process would not likely fully compensate the public for the loss of recreational shellfish fisheries during the period between the spill and the successful regeneration of the beds as required by the OPA NRDA regulations. Therefore, the Trustees do not consider the No Action Alternative to meet the purpose and need identified in the Final PRP/EA and this SEA. However, NEPA requires evaluation to the No Action Alternative to establish a baseline for comparison with the proposed action. Therefore, the No Action Alternative will be carried forward for evaluation.

2.3. Other Alternatives Considered and Rejected

The Trustees worked cooperatively with federal and state agencies, municipalities, and non-governmental organizations as well as the general public that was affected by the oil spill to identify a broad range of restoration alternatives. This process and the alternatives selected are described in Sections 5.3 and 5.4 of the Final PRP/EA.

In addition, TNC, a key implementing partner for this action, completed a comprehensive Buzzards Bay-wide site prioritization exercise (TNC, 2015) under guidance of the Trustees and MA DMF to identify and rank potential oyster restoration sites. Potential sites in Buzzards Bay sites (e.g., Little Bay in Fairhaven) were evaluated based on multiple site-related criteria: geographic nexus to the spill injury; municipal engagement/capacity; and technical feasibility, which included ecological condition factors and regulatory considerations, as well as oyster disease presence and disease load. The three sites included in the Proposed Action were rated highest priorities by TNC. In turn, TNC recommended selection of the sites for consider of and approval by the Trustees. The TNC report on the site prioritization is included as Appendix A of this SEA.

Table 1. Summary of Environmental Impacts of Alternatives

Resource Area	Shellfish Restoration Alternative	No Action Alternative
Physical/Biological Impacts	Adverse, short-term, direct and minor Beneficial, long-term, direct and minor	No impacts
Essential Fish Habitat	Adverse, short-term, direct and minor Beneficial, long-term, direct and minor	No adverse, short-term No beneficial, long-term
Air Quality	Adverse, short-term, direct and minor	No impacts
Water Quality	Adverse, short-term, direct and minor Beneficial, long-term direct and indirect	No adverse short-term No beneficial long-term
Socioeconomic	Beneficial, long-term direct and indirect	No impacts

3. Existing Environment

Chapter 2 of the Final PRP/EA includes a detailed description of the existing environment of Buzzards Bay and the areas impacted by the oil spill. This section will present a brief description of the locations proposed for the oyster bed restoration actions.

Physical Environment: Buzzards Bay is a moderately large estuary that is approximately 28 miles (45 km) long, averages about 8 miles (13 km) in width and covers approximately 228 square miles (mi^2) (595 km^2) of tidal waters. There are approximately 280 miles (450 km) of shoreline in the Bay. The shoreline is comprised of a variety of physical settings and habitat types including sand, cobble and boulder beaches, rocky shores, salt marsh and tidal wetlands, and tidal flats. Approximately 5,107 acres of salt marsh are present along Buzzards Bay, comprising 8.6 percent of the wetlands in the watershed (Buzzards Bay National Estuary Program 2012). Most of the known eelgrass (*Zostera marina*) beds and shellfish stocks are located in nearshore waters and embayments less than 16 feet (5 m) deep. Approximately 3% of the Bay is comprised of intertidal flats. The Bay itself is relatively shallow with a mean depth of approximately 35 ft (11 m) and a relatively uniform basin (Howes and Goehringer 1996). Relative to air quality conditions, Fairhaven (Bristol County), Wareham (Plymouth County) and Bourne (Barnstable County) are in attainment for all Clean Air Act criteria pollutants (MADEP 2012).

Biological Environment: Buzzards Bay, with its many protected harbors and embayments, provides numerous suitable habitats for shellfish including the recreationally and commercially-important quahog (*Mercenaria mercenaria*) and soft-shelled clam (*Mya arenaria*). Buzzards Bay is also home to the epibenthic bay scallop (*Argopecten irradians*) and Eastern oyster (*Crassostrea virginica*), also species supporting highly-valued shellfisheries. Buzzards Bay, with its many coves, smaller embayments, salt marshes, and tidal flats, is a significant spawning ground for many Northwest Atlantic finfish species. Migratory species such as anadromous American shad (*Alosa sapidissima*), alewife, and blueback herring enter the Bay's tributaries during their spring migration to spawn. Juvenile shad and herring than spend a portion of the year in Buzzards Bay streams and rivers, before out-migrating to and intermixing in the Bay and other coastal waters such as the nearby Taunton River estuary and Narragansett Bay. Shad and river herring spend 3-5+ years in coastal and oceanic waters before returning to their natal rivers to spawn. American eel (*Anguilla rostrata*), a catadromous species, also migrates into streams and rivers in the Buzzards Bay watershed as elvers/juveniles ("yellow phase" eels) to spend up to 10 years in freshwaters of Buzzards Bay watershed before out-migrating (as "silver phase" adults) to spawn in oceanic waters. Collectively, these diadromous fish migrations (anadromous fishes plus the catadromous American eel) have provided a seasonally dependable source of fish for centuries of commercial and/or recreational harvest.

Conversely, the diadromous fish runs on many of the Buzzards Bay streams and rivers have been significantly affected by dams, water pollution, land-based and at-sea overharvesting, and other impacts (See the Migratory Fish Passage Restoration Action Plan 8 in the 2012 BBNEP

Comprehensive Conservation and Management Plan, http://buzzardsbay.org/newccmp-anadromous.htm).

Endangered Species: Species listed under the federal Endangered Species Act (ESA) of 1973 (16 U.S.C. §§1531, *et seq*.), are known to be present within Buzzards Bay and contiguous coastal areas. Federally-listed species found in the Buzzards Bay waters and nearby coastal areas area include: piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), dwarf wedgemussel (*Alasmidonta heterodon*), and the northern red-bellied cooter (*Pseudemys rubriventri*). In addition, in 2013, the USFWS proposed to list the rufa red knot (*Calidris canutus rufa*) as threatened (78 FR 60024) and the northern long-eared bat (*Myotis septentrionalis*) as endangered (78 FR 61046). Other species including alewife (*Alosa pseudoharengus*), blueback herring (*A. aestivalis*) and rainbow smelt (*Osmerus mordax*), which spawn in streams and rivers discharging to Buzzards Bay and spend part of their lives in Bay and other Northwest Atlantic marine waters, are federally-designated as Species of Concern. American eel are also designated by the U.S. Fish and Wildlife Service as a Species of Concern.

Socio-economy: The Buzzards Bay watershed encompasses all or portions of 21 municipalities, including two communities in Rhode Island. Eleven coastal communities encompass and share the bay in Massachusetts (City of New Bedford and Towns of Westport, Dartmouth, Acushnet, Fairhaven, Mattapoisett, Marion, Wareham, Bourne, Falmouth, and Gosnold (including the Elizabeth Islands and Cuttyhunk Island)). Two other municipalities in Rhode Island (Little Compton and New Shoreham (i.e., Block Island)) are located at or west of the entrance to Buzzards Bay.

Shellfishing: Shellfishing is a significant recreational and commercial activity in Buzzards Bay. Quahog (i.e., hard clam) is the principal species harvested in Buzzards Bay terms of poundage, while bay scallop, soft-shell clam, and eastern oyster remain highly valuable in terms of dollar value. In 2003, MADMF estimated the annual value of shellfish harvested from Buzzards Bay was $4 million, and applying a standard economic multiplier of 4.5, this catch contributed approximately $18 million to the local economy. Water quality degradation due to pathogen contamination remains a serious human health risk and an economic loss. Where shellfishing closures are present, remaining open areas often receive greater fishing pressure, and may have a significant impact on these local shellfish populations. According to the Buzzards Bay National Estuary Program, more than 180,000 acres of Buzzards Bay tidal waters are open to shellfishing (approved and conditionally approved), while in contrast as of 2011, approximately 6,000 acres remain permanently closed, with an additional 3,000 acres of seasonal shellfishing closures (See: 2012 BBNEP Comprehensive Conservation and Management Plan; http://buzzardsbay.org/newccmp/newccmp-shellfish.pdf). More than 87,000 acres of shellfish beds in Massachusetts were temporarily closed soon after the Bouchard B-120 oil spill, with some areas remaining closed for more than 6 months (B-120 LUTWG 2009; NOAA et al. 2014)).

The Eastern oyster has been harvested in New England for centuries, first by Native Peoples and later by European colonists. As the New England human population increased, so did the

demand for oysters. By the 1800s, oyster harvesting was no longer only a small boat or hand digging operation, with harvesting being later transformed using sailing vessels with bottom dredges to capture oysters for both food and as broodstock (T. Visel, unpublished manuscript). An estimated 85% of oyster ecosystems have been lost globally, and the majority of remaining natural oyster populations is in poor condition (Beck et al. 2011). In the United States, there has been an estimated 88% decline in oyster biomass and an estimated 63% decline in the spatial extent of oyster habitat over the past 100+ years, with oyster population declines being greatest in estuaries along the Atlantic Coast (zu Ermgassen et al. 2012). Overharvesting is a primary factor in the decline of populations, while other factors such as habitat loss and degradation due to development and pollution, as well as oyster disease have also contributed to estuarine- and regional-scale declines in oyster populations (e.g., Beck et al 2011; Wilberg et al. 2011).

4. Environmental Impacts

This section evaluates the potential environmental effects of the proposed action and alternatives described in Section 2. The direct, indirect, and cumulative effects on the physical, biological, social, and economic environments for each alternative are described below.

4.1. No Action Alternative

If the restoration projects are not undertaken, there would be no short-term impacts from placement of shell cultch to serve as bed material and subsequent seeding with spat-on-shell. However, in the identified municipal waters where local oyster populations are extremely low, and thus natural recruitment to the system is likely inadequate and/or clean substrates are insufficient to counter the effects of natural and/or shellfishing mortality, it is unlikely oysters will rebound on their own without placement of reproductive adults or broodstock and/or placement of suitable shell substrate material for oyster larvae to set. It is often beneficial to artificially increase the abundance and density of adult oysters in the population through stock enhancement. Releasing oyster seed in relatively high densities often improves the chances of successful spawning and reproductive success (Brumbaugh et al. 2000).

Short- and long-term, direct and indirect socioeconomic benefits would also not be realized. The short term beneficial impacts for the participating municipalities from the revenues received from the workforce wages and the long-term benefits from revitalized recreational shellfishing, including tourism expenditures, would not be realized.

4.2. Proposed Action Alternative (Preferred Alternative)

Physical/Biological Impacts: *Adverse impacts to benthic areas are expected to be short-term, direct and minor.* The placement of shell cultch using barge transport and barge spraying practices over three 1-acre areas will impact existing sub-tidal benthic habitats. The project sites were assessed by TNC and reviewed by the Trustees and MA DMF for multiple factors

including bottom habitat type and potential presence of sensitive resources including eelgrass (*Zostera marina*) (See Appendix A). The sites were selected where no eelgrass beds were identified during 2015 field reconnaissance surveys. The MA DMF will conduct follow-up springtime diver surveys to further assess and characterize the project sites to document any potential changes in eelgrass conditions. MA DMF biologists will document the presence and abundance of eelgrass, other submerged aquatic vegetation (SAV), or other resources such as hard clam within the project footprint and adjacent benthic habitat. If the diver survey identifies sensitive resources such as eelgrass, other SAVs or other species within the proposed project footprint, the project partners will use the field assessment results to modify the restoration site limits to avoid or minimize impacts to sensitive resources. Some non-mobile benthic fauna may be buried or crushed by the cultch placement. However, the benthic fauna in the designated restoration areas is expected to be common in the surrounding areas, and the area to be disturbed for restoration actions (three acres total) is relatively small in comparison of the similar bottom types in Buzzards Bay. No population level impacts are expected.

Essential Fish Habitat: *Adverse impacts to essential fish habitat (EFH) areas are expected to be short-term, direct and minor.* NOAA Restoration Center (RC) submitted an EFH consultation to NMFS' Office of Habitat Conservation (OHC) to consider potential adverse effects on EFH (See Appendix B). OHC indicated no EFH conservation recommendations are warranted for these projects at this time. Should SAVs be identified during the MA DMF surveys, OHC would recommend a 25-foot buffer from any identified eelgrass beds. Projects will be authorized by the U.S. Army Corps of Engineers' General Permit process, at which time, the results of the MA DMF surveys of each site will be used in implementing any buffer setbacks for project implementation.

Air Quality: *Short-term, adverse air quality impacts would result from the emissions generated by the tugs or self-propelled barges used to transport the cultch and spat on shell to the restoration sites.* These emissions are expected to be minimal when compared to the daily commercial and recreational boating activities in the project area.

Water Quality: *Beneficial, long-term direct and indirect biological and water quality impacts are expected from the restoration actions.* Oyster restoration for remote setting and shell cultch placement projects are expected to directly increase recreational oyster harvesting opportunities for this culturally-prized species. In addition, because oyster beds and reefs provide foraging, spawning and sheltering locations for a variety of other shellfish and finfish, increased recreational fishing opportunities for other sought-after fish and invertebrates are expected. Oysters are also recognized to provide a valuable water filtering process, removing excess nutrients from the water column resulting in increases in ecological services provided by restored oyster populations.

Socio-economy: *Beneficial, long-term direct and indirect socioeconomic impacts are expected from the restoration actions.* The short term direct benefits would be the additional income for the workers conducting the restoration actions. Equipment, such as tug boats or barges used to transport the cultch and spat-on-shell to the sites is expected to come from local sources, and

the workforce in the area is sufficient to supply all labor and equipment needs without impacting local services. Long-term direct and indirect socioeconomic beneficial impacts would result from the restoration of recreational shellfish harvest and the increase in sport fishing. Local populations would benefit directly from the recreational activities and oyster consumption and indirectly from increases in fishing related tourism.

5. Cumulative Impacts

Past, present and reasonably foreseeable future projects in the Buzzards Bay area are documented in the final PRP/EA, in Section 6.4. Section 2.3 in the Final PRP/EA summarizes the injuries that resulted from the oil spill in 2003. The adverse cumulative impacts from historic practices also including overfishing, over use, and historic pollution of Buzzards Bay. These historic practices have been controlled by federal, state and local governance mechanisms in recent years, but the area is still in the process of recovery from these past actions.

Final PRP/EA, Section 6.4 also documents the currently active and reasonably foreseeable actions in the proposed action area. Specifically, few oyster restoration projects have been completed in Buzzards Bay in the past three decades. TNC, working collaboratively with the Buzzards Bay Coalition (BBC) and the Town of Fairhaven, completed an oyster placement in Little Bay in 2014. The Trustees' proposed Fairhaven oyster placement project would be in close proximity to the 2014 oyster restoration site (Figure 2). Collectively, two acres of oyster bed habitat will affect current sand-dominated benthic habitat, although substantial portions of both Little and Nasketucket Bays are characterized by this common benthic habitat type, so any adverse cumulative impact from this conversion in benthic type would be negligible. Oyster bed habitat is scarce due to past oyster disease occurrences and unmanaged overharvesting practices.

Conversely, it is expected that the Trustees' proposed oyster placement projects would have a cumulative net benefit to enhancing fishery resources, including species managed under the Magnuson-Stevens Act (e.g., winter and summer flounders, black sea bass). This cumulative benefit would be minor to moderate however, when considered at the regional or Buzzards Bay scale. Monitoring of each site (i.e., diver surveys, physical measurements) will be conducted over multiple years and will be compared to nearby control sites to evaluate the restoration and determine any benefits or negative effects on benthic habitats, SAVs, or other habitat, including EFH. Success of these projects could lead to additional planning for oyster bed restoration that could cumulatively provide additional beneficial impacts as described above, but would also result in similar minor negative temporary effects on benthic habitats with initial shell placement.

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Appendix A:
TNC Buzzards Bay B-120 Shellfish Restoration Site Prioritization

Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations

Prepared by

Reviewed and approved by the B-120 Shellfish Technical Advisory Committee, September 2015.

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Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations

Summary

In April of 2003 the grounding of the B-120 oil barge, owned and operated by the Bouchard Transportation Company, resulted in an estimated 98,000 gallon oil spill in Buzzards Bay. This incident caused natural resource and resource use injuries. Federal and state Trustee representatives are tasked, through an Oil Pollution Act settlement of injuries with the responsible party, with managing and supporting restoration of natural resource and resource use injuries. Natural resource and resource use restoration planning was completed and injuries to shellfish resources and the recreational shellfishery were among those addressed. The Nature Conservancy (TNC) was selected by the Trustees to implement restoration strategies. This document provides siting recommendations to the Trustees for shellfish restoration project work and details the process utilized to arrive at the recommendations.

Recommendations

Prioritized Recommendations to the Trustees for Oyster Restoration Work:

1st Fairhaven: Little Bay
2nd Wareham: Onset Bay
3rd Bourne: Cohasset Narrows
4th Falmouth: W. Falmouth Harbor
5th Marion: Inner Sippican Harbor (west side)

Prioritized Recommendations to the Trustees for Bay Scallop Restoration Work:

1st Bourne: Squeteague Harbor
2nd Falmouth: West Falmouth Harbor
3rd Wareham: Sunset Cove

Background

In April of 2003 the grounding of the B-120 oil barge, owned and operated by the Bouchard Transportation Company, resulted in an estimated 98,000 gallon oil spill in Buzzards Bay. A Trustee Council ("Trustees") was formed with representation from the National Oceanic

and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), the Commonwealth of Massachusetts through its Executive Office of Energy and Environmental Affairs (EEA) and oversight from its Department of Environmental Protection (MassDEP), and the State of Rhode Island through the Rhode Island Department of Environmental Management (RIDEM), in order to address the natural resource injuries resulting from the oil spill. Restoration planning was conducted by the Trustees, as is mandated by the Oil Pollution Act of 1990. The Trustees completed an Environmental Assessment in compliance with the National Environmental Policy Act to address potential impacts from proposed restoration project actions. The Trustees are responsible for restoring natural resources and resource services and uses injured by the spill.

The B-120 oil spill resulted in natural resource and resource use impacts in Buzzards Bay and the inclusive municipalities and municipal waters. Among the impacted resources and uses were shellfish such as hard clam (*Mercenaria mercenaria*), Eastern oyster (*Crassostrea virginica*), and bay scallop (*Argopectens irradians*) and recreational shellfisheries. As part of the restoration planning the Trustees solicited project ideas from the public and evaluated those ideas utilizing criteria specific to the shellfish natural resource category. The Nature Conservancy in Massachusetts (TNC) submitted an idea which identified multiple restoration projects targeting oysters and bay scallops. Ultimately the Trustees selected this Tier 1 shellfish restoration project work for implementation and have entered into a cooperative agreement, through NOAA, with TNC supported by a specific work plan (Appendix A) with a goal to restore impacted shellfish resources. As part of the work plan, TNC is tasked with convening and coordinating a Technical Advisory Committee (TAC) with the primary goal of prioritizing the locations of shellfish restoration in multiple towns. The TAC has been formed, developed its purpose and operating procedures, has met regularly, and through this document is recommending the priority municipalities and locations for shellfish restoration to the Trustees.

Overview of Scoring

The criteria used for site evaluation were the Nexus to the Injury, Municipal Engagement/Capacity, and Technical Feasibility which included ecological condition factors and regulatory considerations, as well as disease prevalence and load. Each category has a potential score range of 0 – 4. The nexus to injury category is weighted to represent one-half of the total score. Per the Trustee/TNC work plan at least three oyster restoration projects and one scallop restoration project are intended to be implemented. It should be noted that there are slight differences in the evaluating categories and overall scoring formula for oyster projects and scallop projects. The differences stem from less concern over disease prevalence and a discrete suite of ecological factors for scallop restoration projects.

To determine scores of the Nexus to Injury, documentation related to the B-120 injury assessment and restoration planning, specifically the Lost use Valuation Report prepared by the Technical Working Group (2009), was consulted. To determine scores for Municipal Engagement/Capacity, information was gathered and interviews were conducted by TNC staff with municipal shellfish constables over the phone, in person, and through email contact. General questionnaires as well as site specific follow up questionnaires were distributed, discussed, and completed as a way to standardize the outreach protocol. Technical feasibility, at the embayment scale level, was determined from information provided by shellfish constables, gathered through desktop analysis, and site visits. In general there is scant information related to disease prevalence and load in Buzzards Bay. Sources were identified and consulted with little useful site specific data available. Information was gathered on the process for conducting shellfish disease testing. Below are the results of the prioritization process with proposed recommendations to the trustees as well as details on methods and justification.

Oyster sites were scored using the compiled information with a numeric 0-24 scale (Formula 1). The 0-24 scoring is based on a summary of each evaluation category, each having a possible rank of 0-4. As is reflected in the B-120 Final Programmatic Restoration Plan/Environmental Assessment the Nexus to Injury criterion is more heavily weighted than the other evaluation categories and it represents one-half of the total score. Multiplying the score for Nexus to Injury by three, a maximum score of 12 is possible. The maximum score representing the sum of all other evaluation categories, all weighted equally, is 12. Therefore, the scoring scale is 0 - 24 with Nexus to Injury representing one-half of the score, and the remaining evaluation criteria representing the other half of the score.

Formula 1. Formula for scoring oyster restoration sites.

Total Score (Scale 0-24) = (Nexus to Injury)*3 + (Technical Feasibility, Ecological and Regulatory Parameters) + (Technical Feasibility, Disease Presence and Load) + (Municipal Engagement and Capacity)

The specific scoring criteria descriptions and numerical values are listed below.

A site receiving a higher total score was considered as a higher priority for project work recommendation than one with a lower total score. Sites with the highest scores have been determined as the sites that should be recommended by the TAC to the Trustees for technical consideration and funding. The results represent project areas that will ecologically and logistically support shellfish restoration, in municipalities that have the willingness/capacity to support project work, while considering the level of impact of the B-120 oil spill on recreational shellfishing resources. It should be noted that sites are defined to the embayment level. This is the feasible scale to effectively evaluate locations. Specific delineation of project work will be determined during the local, state, and federal permitting process.

Evaluation Criteria – Nexus to Injury

The relative impact of the oil spill on recreational shellfishing resources was an evaluative criterion to aid the TAC in the prioritization process. Municipalities that were more heavily affected by the spill in terms of recreational shellfishing resources were determined by investigating the extent of harvestable area closed to harvest due to contamination from the oil spill. Additionally, the duration of time that harvest area was prohibited due to the spill, was considered when determining a municipality's Nexus to the Injury. This information was obtained from the Lost Use Valuation Report prepared by the Bouchard B-120 Oil Spill Lost Use Technical Working Group (2009), the Final Programmatic Restoration Plan and Environmental Assessment, and municipal/state agency input.

1. ***Nexus to Injury*** – Identify the level to which municipal shellfishing resources were impacted by the B-120 oil spill.
    i. Spatial extent parameters to consider include relative area of 'approved' and/or 'conditionally approved' waters closed to recreational shellfishing due to oiling.
    ii. Duration of closure parameters to consider include the relative length of time recreational shellfishing was prohibited due to oiling.

    - 4: Severely High Impact
    - 3: High Impact
    - 2: Medium Impact
    - 1: Low Impact
    - 0: No Impact

The score is to be multiplied by three, per the scoring formula in Figure 1.

Evaluation Criteria – Municipal Engagement and Capacity

A municipality's willingness to participate in shellfish restoration was ascertained through an outreach protocol by TNC staff with support from the TAC. The willingness of a town to engage in the process of implementing a shellfish restoration project as proposed by the Trustee/TNC work plan was of critical concern. The ability of a municipality to undertake a restoration project, as determined by municipal shellfish capacities was also considered and was a factor in the site selection process. The willingness/ability of municipal involvement and capacity was determined through a standardized outreach program. TNC staff made contact with municipal shellfish representatives. TNC staff prepared and distributed a questionnaire to shellfish constables that requested pertinent material that informed the TAC as to the feasibility of a town's involvement (*Appendix B*). Once questionnaires were completed, follow-up interviews were conducted by TNC staff to further explore this evaluation. Capacity in the way of staffing levels and historic and current programs in each town helped distinguish

municipalities. Scoring of a municipality's willingness/ability to participate was influenced in part by the capacities available as well as the level of engagement in the process.

2. ***Municipal Engagement and Capacity*** – Identify municipalities that have the interest and ability to engage in the proposed methods of shellfish restoration.
    i. Municipal capacity parameters to consider include budget, staff, and equipment, as well as level of engagement in existing/historical programs such propagation, relays, aquaculture and ability to enforce and manage resources.
    ii. Municipal engagement and interest parameters to consider include level of engagement in TNC/TAC information gathering process, level of interest in supporting and managing restoration project work.

- 4: Municipality is engaged, willing, and able to carry out, support, and leverage restoration project work
- 3: Municipality is mostly willing and has capacity to undertake restoration project work
- 2: Municipality has limited interest and/or capacity to undertake restoration project work
- 1: Significant constraints exist in the form of municipal engagement and/or capacity
- 0: Municipality actively not interested in and/or unable to engage in restoration project work due to budgetary, staff capacities, or other constraints

Evaluation Criteria – Technical Feasibility

Reviewing ecological and regulatory requirements helped identify site specific conditions and factors that will support shellfish populations. These conditions and factors include such elements as water quality/chemistry, sub tidal water depth, and bottom substrate type. Other parameters considered were historic and current levels of shellfish populations, and prevalence of predators (e.g. oyster drills, sea stars). Shellfish disease is a major factor to consider when siting oyster restoration work. Through direct interactions with municipal shellfish department personnel and other local and state representatives, locations thought to be suitable for shellfish restoration were identified. Pertinent information including GIS produced maps were created and consulted (*Appendix C*). These maps were utilized as a cross reference tool in assessing site suitability. Through site visits and utilizing available date, areas were refined down to small embayments, portions of embayments, coves, and/or sections of estuaries, by TNC staff and TAC members working with shellfish constables and other appropriate local or state representatives. These coastal water areas were considered taking

into account ecological characteristics, regulatory and logistical factors that will support shellfish restoration project work.

3. ***Technical Feasibility*** – Identify areas that are ecologically suitable for the proposed method of shellfish restoration considering regulatory factors. This category contains two criteria. The first includes general ecological and regulatory parameters. The second includes disease prevalence and load for oyster siting consideration.

   i. Ecological and Regulatory Parameters

   A. Ecological parameters to consider include sub tidal depth, water chemistry and quality (for example: temperature, salinity, dissolved oxygen, availability of appropriate phytoplankton), hydrodynamics, evidence of existing or historic native shellfish populations, bottom/habitat characteristics, and predators.

   B. Regulatory parameters to consider include National Shellfish Sanitation Program water classification.

   - 4: Ecological and regulatory parameters of site are suitable for shellfish restoration
   - 3: Most of the environmental and regulatory factors necessary for restoration are present.
   - 2: Few of the environmental and regulatory factors necessary for restoration are present.
   - 1: Significant environmental and regulatory barriers exist for a successful restoration project.
   - 0: Environmental and regulatory parameters of site are in no way suitable for shellfish restoration.

   ii. Disease Prevalence and Load

   A. The presence or absence and/or level of shellfish disease such as Dermo, MSX, and JOD are critical factors in siting oyster restoration. Best available information including existing data and proxies will be utilized in determining scores.

   - 4: Shellfish disease is known to be absent from proposed site.
   - 3: Very low load of shellfish disease is present.
   - 2: Moderate levels of shellfish disease are known to be present.
   - 1: Level of shellfish disease load is a significant obstacle to restoration success
   - 0: Heavy load of shellfish disease is known at the site such that survivability of shellfish is extremely unlikely.

Findings/Justification - Oyster

The findings of the evaluation are laid out in order, first by those which were reviewed at the town level, followed by those at the site specific level. For example the Nexus to Injury and Municipal Engagement/Capacity are town level criteria and Technical Feasibility and Disease Prevalence and Load are site specific criteria.

As per the Trustee/TNC work plan, project work will take place in at least three Buzzards Bay towns. Therefore the top scoring towns were determined and the top scoring sites within those towns were selected as those to be recommended to the Trustees. The two highest scoring sites per town were identified with the second site representing an alternate. Presenting alternate sites allows flexibility for the TAC and Trustees, should new information become available particularly related to shellfish disease, unforeseen circumstances arise, or additional restoration project work become possible due to implementation cost savings and availability of funds.

Nexus to Injury - Oyster

The Nexus to Injury scores were determined by referencing the Lost Valuation Report. As per the agreed upon site prioritization process, the initial score would be multiplied by three to reflect one-half of the overall score.

Table 1: Nexus to Injury Score – Determined by Estimated Reduction in Shellfishing Trips

Municipality	Number of shellfishing trips 2003	Number of shellfishing trips 2004	Total reduction in shellfish trips	Raw Nexus to Injury Score (0-4)	Final Nexus to Injury Score (raw score*3)
Fairhaven	16,707	2,981	19,688	4	**12**
Wareham	6,808	2,998	9,806	3	**9**
Bourne	7,976	0	7,976	3	**9**
Mattapoisett	3,973	295	4,268	2	**6**
Marion	1,288	571	1,859	2	**6**
Falmouth	1,527	0	1,527	2	**6**
Dartmouth	688	395	1,083	2	**6**
Westport	594	305	899	1	**3**
New Bedford	194	0	194	1	**3**
Gosnold	-	-	-	0	**0**

Notes: Table 1 from Bouchard B-120 Oil Spill Buzzards Bay, MA Lost Valuation Report, Cooperatively prepared by the Bouchard B-120 Oil Spill Lost Use Technical Working Group (Edited: Sorted high to low, added Raw Score and Final Score for Nexus to Injury)

Municipal Engagement/Capacity - Oyster

This criterion was informed by the level of engagement of municipal officials in the site prioritization process as well as a determination of the capacity to support and manage shellfish restoration in each municipality. Engagement was measured by the timeliness, amount of time, and level of interaction municipal officials offered during the outreach protocol. Interest levels and willingness to take on additional management and project work were thoroughly

considered. Capacities were measured by evaluating town shellfish programs, staffing levels, equipment, resources, and previous shellfish restoration, relay, and stocking work. Additional factors considered include whether a municipality had submitted ideas to the Trustees during the initial restoration planning public solicitation period.

Table 2: Municipal Engagement/Capacity Score - Oyster

Town	Score (0-4)
Wareham	4
Fairhaven	4
Bourne	4
Falmouth	4
Marion	4
Gosnold	3
New Bedford	1
Dartmouth	1
Mattapoisett	0
Westport	0

Table 2: Score determined by TNC staff through interactions with municipal shellfish constables based on level of engagement in outreach protocol as well as evaluating municipal capacities.

Technical Feasibility - Oyster

Ecological and logistical information was gathered from the municipal shellfish constables through site visits and interviews. Desktop research was conducted to confirm and cross reference the primary data collected. Water chemistry data were provided by the Buzzards Bay Coalition, utilizing their extensive data set for Buzzards Bay coastal waters. Other reference materials were utilized from the Massachusetts Estuaries Project Reports. The parameters identified as important for receiving a high score include; the National Shellfish Sanitation Program (NSSP) designated growing area status being either Approved or Conditionally Approved; bottom characteristic of hard/firm; subtidal depth range considering feasible implementation, storm effects, and ice scouring; known presence of oysters or oyster larvae; salinity levels; and abundance of predators. Presence of oyster larvae in the system was of interest to evaluate if natural recruitment could be anticipated into a habitat limited area. Spat collection data were reviewed when available per an ongoing TNC study in multiple locations in Buzzards Bay including Fairhaven, Bourne, Gosnold, Marion, and Wareham. Salinity levels were of interest in the role that it plays regarding the likelihood of shellfish disease such as Dermo, which is generally more prevalent in moderate salinity conditions as well as prominent predators such as oyster drills which are less prevalent in low salinity conditions. Additional site specific factors considered were management/enforcement constraints such as public access and fishing pressure, and known presence of other shellfish species and/or

seagrass. What is shown here represents the ten highest scored sites in the five highest scored towns. There were a total of 27 proposed, considered, and scored areas bay-wide.

Table 3: Technical Feasibility of Oyster Sites

Municipality	Site Location	Feasibility
Fairhaven		
	Little Bay	4
	Stony Cove	3
Wareham		
	Onset Bay	4
	Cohasset Narrows	4
Bourne	Cohasset Narrows	4
	Scotch House Cove	3
Falmouth		
	West Falmouth Harbor	4
	Quissett Harbor	4
Marion		
	Inner Sippican Harbor	4
	Hammett Cove	3

Disease Prevalence and Load - Oyster

The presence and level of disease in a particular embayment is not easily quantified. There is a lack of available historical or current data to be used to compare sites against one another. As part of the municipal outreach protocol TNC staff ascertained if shellfish disease testing was conducted in each municipality. The town of Bourne was the only municipality that has recently conducted shellfish disease testing. It is important to note that data in Bourne municipal waters was not available for proposed restoration locations. Locations selected by the town to conduct disease testing were chosen based on potential areas for stock enhancement through the town propagation program. These areas however did not coincide with locations the town supported for restoration project work.

Characterization of shellfish disease levels in a particular area was determined through conversations with shellfish constables. This often came in the form of evidence through indicators. For example proposed sites were scrutinized utilizing constable's knowledge of; existing and historic oyster populations, freshwater inputs affecting salinity levels, and/or likely historic disease related loss of resource events. For example locations that currently support wild populations of oysters were considered as minimally impacted by disease loads. As some shellfish disease such as Dermo is more prevalent in moderate salinity conditions, data on salinity levels were evaluated. General site characterization including specifics on groundwater and river inputs was provided by constables and cross referenced with extensive data provided by the Buzzards Bay Coalition. In some cases constables recalled resource mortality events and linked these occurrences to disease prevalence. For example the constable in the Town of Bourne recalled 'flare ups' of Juvenile Oyster Disease (JOD) in a particular location. This information influenced initial screening and the proposed site in this example was therefore not considered further as a feasible location for project implementation. With an absence of scientific data related to disease prevalence affecting shellfish resources, the current and historic extent of shellfish populations and site characteristics were utilized as indicators of disease prevalence in site assessment.

Information on disease prevalence and load in Buzzards Bay was also sought from regional shellfish pathology testing laboratories. Some testing has been conducted at the request of the MA Division of Marine Fisheries prior to the movement or relay of shellfish, the Barnstable County Cooperative Extension as part of research efforts, and the private aquaculture industry. Solicitation for data from these entities and the two primary labs conducting testing yielded no usable data for particular embayments of interest in Buzzards Bay.

Currently, there is insufficient data to ascribe scores for this criterion though it has been left in the matrix. As more data becomes available it may be possible to assign scores for particular sites which will aid in the overall assessment and determination of project suitability. It is possible to obtain current shellfish disease prevalence and loading through pathology testing. These data will be produced through the collection of wild stock animals that will be sent to and evaluated by a reputable lab. TNC will coordinate logistics with local shellfish constables and the pathology lab to ensure, where possible that shellfish disease testing is conducted. Should the parameters required for testing such as availability of the size, indicating year class, and quantity of oysters, not be available for collection and testing, the existing ecological conditions may be used in making final site determinations. Any disease testing results will be made available to the TAC and Trustees for review, with the intention that it will be considered in final site selections.

In the event that a proposed site shows high levels of shellfish disease through testing, such that the outlook for project success is deemed limited, the alternate proposed site for that town will be further scrutinized for disease levels. If the alternate site is determined, through testing, to have levels of disease that would limit project success, then the next site on the prioritized recommendation list will be slated for implementation. (Please refer to Table 4: Overall Oyster Matrix, for detail). This sequence presents the most equitable system of project implementation while taking into account the existing level of data available for site prioritization.

Table 4: Overall Oyster Matrix – reference map (Appendix D)

Municipality	Site Location	Nexus to Injury	Engagement/ Capacity	Feasibility	Disease	Overall Score
Fairhaven						
Priority	**Little Bay**	12	4	4	-	**20**
Alternate	Stony Cove	12	4	3	-	**19**
Wareham						
Priority	**Onset Bay**	9	4	4	-	**17**
Alternate	Cohasset Narrows	9	4	4	-	**17**
Bourne						
Priority	**Cohasset Narrows**	9	4	4	-	**17**
Alternate	Scotch House Cove	9	4	3	-	**16**
Falmouth						
Priority	**West Falmouth Harbor**	6	4	4	-	**14**
Alternate	Quissett Harbor	6	4	4	-	**14**
Marion						
Priority	**Inner Sippican Harbor**	6	4	4	-	**14**
Alternate	**Hammett Cove**	6	4	3	-	**13**

Final Prioritization - Oyster:

In some cases proposed restoration locations in different municipalities received the same score. In order to arrive at a fully prioritized list for the Trustees to review, the collected information was scrutinized to recommend project work at a particular site with a higher

priority than another site receiving the same score. The information used to arrive at this determination is explained below for these cases.

Wareham and Bourne have sites that score equally. Wareham was determined to rank higher in the priority list due to the slightly higher level of engagement, support, and likelihood for project success. Wareham has significant resources in capacity, equipment, and project experience. This is evident from the constable supporting the TAC as the municipal representative for all of Buzzards Bay, as well as in the form of in-kind project implementation in similar restoration work in other towns. These two reasons lead to differentiation between sites receiving the same overall scores in different municipalities.

In another case, Falmouth and Marion have sites that score equally. Falmouth was determined to be prioritized ahead of Marion for the following reasons. The town of Falmouth has shown significant interest and investment in this type of shellfish restoration work ahead of this prioritization process. The town has invested in their own oyster reef restoration site feasibility assessments. Beyond that, implementation of restoration work has begun in municipal waters. There are significant town resources dedicated to oyster and shellfish research in town which may be leveraged to support proposed B-120 restoration work. These reasons lead to the differentiation between sites receiving the same overall scores in different municipalities.

Findings/Justification - Scallop

The same process for determining oyster project work was followed for the ranking of scallop restoration sites. Nexus to injury, municipal engagement /capacity, and technical feasibility were determined at the town and site specific level. There are slight variations in the scallop site prioritization process in relation to the methods used to determine oyster siting scores. One difference stems from the omission of the disease category. In order to weight the Nexus to Injury criterion as one-half of the overall score, the raw Nexus to Injury score was multiplied by two (Formula 2). There were also different responses from municipal representatives as to the level of interest in supporting a scallop restoration project. That fact coupled with the more limiting ecological requirements to increase the likelihood of a successful scallop project led to many fewer potential suitable sites for project work, as opposed to oyster restoration siting.

Formula 2. Formula for scoring scallop restoration sites.

Total Score (Scale 0-16) = (Nexus to Injury)*2 + (Technical Feasibility, Ecological and Regulatory Parameters) + (Municipal Engagement and Capacity)

Nexus to Injury - Scallop

Refer to Nexus to Injury raw scores as determined above. Raw Nexus scores remain the same with final scores determined by multiplying the raw score by two which results in the Nexus to Injury score representing one-half of the overall score.

Municipal engagement/capacity - Scallop

The same methodology to determine a municipality's level of engagement and capacity to support scallop project work was employed to determine the scores for this criterion. The results of this category are shown below, note that there are differences between some municipality's willingness to participate in scallop vs oyster work. The main differences are shown in that the Town of Fairhaven and Marion were less interested in pursuing this type of work which resulted in lower overall scores.

Table 5: Municipal Engagement/Capacity - Scallop

Municipality	Score
Wareham	4
Bourne	4
Falmouth	4
Gosnold	4
Fairhaven	1
Marion	1
Dartmouth	1
New Bedford	1
Mattapoisett	0
Westport	0

Technical feasibility - Scallop

Parameters considered when investigating project locations for scallop restoration included; a mostly enclosed embayment, size of embayment, presence of hard bottom and/or seagrass, and water quality. Smaller embayments, with hard sandy/gravely bottom characteristics, with seagrasses and lower nutrient inputs scored higher. These were determined through discussion with municipal shellfish constables, site visits, and desktop research.

Table 6: Technical feasibility scores for Scallop Restoration.

Town	Site	Score
Falmouth	West Falmouth Harbor	**4**
Gosnold	Cuttyhunk Harbor	**4**
Bourne	Squeteague Harbor	**3**
Bourne	Buttermilk Bay	**2**
Wareham	Sunset Cove	**2**

Table 6. Embayments that are mostly enclosed, with presence of seagrass within or in vicinity, with not heavily degraded water quality.

Table 7: Overall Scallop Matrix – reference map (Appendix D)

Municipality	Raw nexus	Nexus final	engagement	feasibility	overall
Bourne	3	6	4	3	13
Wareham	3	6	4	2	12
Falmouth	2	4	4	4	12
Fairhaven	4	8	1	0	9
Gosnold	0	0	4	4	8
Dartmouth	2	4	1	1	6
Marion	2	4	1	0	5
Mattapoisett	2	4	0	0	4
Westport	1	2	0	2	4
New Bedford	1	2	1	0	3

Table 8: Final Scallop Site Scores Prioritized for Recommendation.

Town	Site	Raw Nexus to Injury	Final Nexus to Injury	Municipal Engagement	Technical Feasibility	Overall
Bourne	Squeteague Harbor	3	6	4	3	**13**
Falmouth	West Falmouth Harbor	2	4	4	4	**12**
Wareham	Sunset Cove	3	6	4	2	**12**

Final Prioritization

Two sites in different municipalities received the same overall score. The scores were determined using the agreed upon criteria and methodology. West Falmouth Harbor in Falmouth and Sunset Cove in Wareham received the same overall score. To arrive at a fully prioritized list for the Trustees to review one site was selected as more likely to result in a successful outcome. There were environmental factors that resulted in a higher prioritization in

Falmouth such as the presence of seagrass particularly in the outer portion of West Falmouth Harbor as well as the potential for larval retention in the system leading to greater monitoring success.

Conclusions

The aforementioned recommendations are meant to provide a basis for the B-120 Buzzards Bay Trustees to support and implement municipal shellfish restoration as described in the Trustee/TNC work plan. Information was methodically gathered, analyzed, and reviewed by TNC staff and TAC members to arrive at the prioritized list of locations for oyster and scallop restoration project work.

Appendix A – Municipal Questionnaire and Follow up

_____(Municipality) _____(Name, Position)

This questionnaire is meant to gain a general understanding of the willingness/ability of a municipality to undertake shellfish restoration.

1. Environmental Factors:
    a. What shellfish species are present in your municipality?
    _____
    b. Can you generally characterize the water quality in your municipality?
    Choose One: 1.Good 2. Fair 3. Poor (Comment_____)
    c. What is the rough percentage of 'open' vs 'closed' waters? _____
    Rain closures? (yes/no) _____
    d. Are there areas of significant coastal erosion in your municipality?_____
    e. Has there been a recent history of shellfish disease in your municipality and if so:
    What/Where?_____

2. Municipal shellfish program
    a. List/describe shellfish program in town: (For example: Species, Relay, Propagation, Aquaculture)_____
    _____
    _____
    b. Number of recreational permit holders. _____How much recreational shellfishing activity? What species?_____
    c. Number of commercial permits holders._____How much commercial shellfishing activity? What species?_____
    d. Did your town submit proposal/s to B-120 Trustees for shellfish restoration?_____ If yes, which proposal?_____

3. Municipal Resources:
    a. Shellfish/Natural Resources budget_____
    b. Staff
        i. Year Round_____
        ii. Seasonal_____
    c. Equipment, please list (boats, barges, upwellers, growout gear, etc.)
    _____
    _____
    _____

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CONTINUE ON NEXT PAGE

4. Level of Interest (0 = no interest, 5 = extremely interested)
    - **a.** How interested are you/your municipality in building oyster reefs for ecosystem service purposes? (Water quality improvement, habitat creation, erosion control)
      Please Circle One 0 1 2 3 4 5
    - **b.** How interested are you/your municipality in building oyster reefs for fisheries enhancement?
      Please Circle One 0 1 2 3 4 5
    - **c.** How interested are you/your municipality in deploying caged scallops as a spawner population?
      Please Circle One 0 1 2 3 4 5
    - **d.** How interested are you in managing restored shellfish areas resource in restoration areas for extended periods? (For example, 5 years or greater?)
      Please Circle One 0 1 2 3 4 5

5. Other:
    a. Please feel free to provide other comments that you think important to discuss or not covered in this questionnaire. (For example: political realities in my municipality limit the chance of this type of work because the selectmen are totally opposed.)

    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____

Please contact me with questions. I plan on reaching out to you to follow up, preferably in person to discuss your responses. Thank you.

Respectfully,

Steve Kirk Costal Restoration Ecologist

The Nature Conservancy – MA

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FOLLOW UP QUESTIONNAIRE

Municipality_____ Oyster

Site Location _____

NSSP Designated Growing Area number :_____ (Approved, Conditional, Restricted, Prohibited)

Average depth at mlw _____

Bottom characteristic: (soft/medium/hard), Sediment Type: (Mud/Sand/gravel/cobble)

Wave energy level: (Low Med High) Direction of greatest exposure to wind _____ Fetch _____

Presence adult oysters (Yes/No) Presence Juvenile Oysters (Yes/No) Presence Oyster Larvae (Yes/No)

Historical Presence of Oysters (Yes/No) Evidence_____

Nearby shoreside habitat (marsh, wooded, agriculture, suburban, heavily developed)

Known presence of other shellfish species (Yes/No)_____

Known presence of submerged aquatic vegetation i.e. eelgrass (Yes/No)

Open to harvest: (Yes/No) (Commercial/Recreational)

Shellfish relayed into area: (Yes/No) Shellfish relayed out of area (Yes/No)

Nearest public access point_____

Does your town conduct shellfish disease testing? (Yes/No) In this area? (Yes/No)

Assessing Shellfish Restoration Opportunities and Constraints in Massachusetts Using GIS-based Mapping

Objective

The objective of assessing shellfish in Massachusetts, and relevant parameters related to their lifecycles, is to better understand the current opportunities and constraints that exist for siting shellfish restoration projects. The Nature Conservancy is interested in restoring/enhancing native shellfish beds in an effort to recognize the ecological services they provide (water quality, habitat, nutrient cycling, and potentially storm protection). The focus of this shellfish mapping exercise is to identify, display and analyze existing data that are pertinent to the siting of shellfish restoration projects in near coastal municipal waters.

The mapping products in this document offer a planning tool for the potential siting of shellfish restoration projects, realizing that some areas considered for restoration may turn out to be impractical based on other user needs, on-the-ground conditions, and subsequent discussions with local, state and private interests. Distribution of the maps is intended for municipal shellfish wardens and/or harbormasters with responsibilities for shellfish resources as well as other individuals and organizations interested in restoration.

Intent

The following considerations were used to create the attached shellfish restoration assessment maps:

- For habitat suitability (species specific areas) we have focused only on two habitat-building species: American oysters and blue mussels. Habitat suitability site selection considers historic and current population of shellfish as well as the necessary ecological enabling conditions that support opportunities for their restoration such as hard bottom areas and appropriate range of water depth.

- The intent of this work is to provide assessment information for avoiding conflicts with public health related shellfish closure areas, public recreational and commercial shellfishing activities, aquaculture growing areas, and any other unidentified existing or future uses.

- A better understanding of opportunities and constraints for siting shellfish restoration in municipal waters within the Commonwealth to result in more successful projects, for both ecological and social benefits.

Assessment Criteria

While there is a plethora of data available for accessing shellfish restoration opportunities, the following six data layers are readily available for this effort.

Sediment Characteristics:

This layer is based on state MassGIS office data showing bottom grab samples throughout near coastal waters in Massachusetts. The maps provide samples of both hard bottom areas conducive to oyster and blue mussel restoration work and a category for all other bottom sample types. This will allow for determining the areas that might naturally have habitat building shellfish beds (oysters and mussels), particularly the hard bottom areas such as gravel and rock sediment types.

Shellfish Water Classification (Shellfish Growing Areas):

These data are provided by the Massachusetts Division of Marine Fisheries (MA DMF) in order to reduce the risk of pathogens getting into shellfish for human consumption. The categories include approved (open), conditionally approved, conditionally restricted, prohibited (closed), restricted, and management closure. This layer is important for understanding current growing/fishing activities as well as limitations on planting for ecological services. (Note: this publication includes a static look at a particular point in time for the various water quality classifications. Since growing areas are updated regularly you must consult the MA DMF and/or the municipality of interest for official up-to-date information.)

Shellfish Suitability Areas:

These layers are provided by the MA DMF in an effort to capture both historic and current populations of various commercial shellfish species (includes blue mussels, quahogs, razor clams, oysters, softshell clams, scallops, and surf clams). This information also helps develop a foundation for site selection that incorporates known or existing native shellfish areas.

Municipal Shellfish Activities:

This layer was developed by The Nature Conservancy (TNC) using data assembled from municipal shellfish constable, harbor masters or other individuals responsible for shellfish regulation at the municipal level. Since shellfish management in Massachusetts is undertaken with an integrated state management and local implementation approach, ecological restoration activities will need to be in concert with local and state shellfish management requirements.

Municipal Shellfish Permits

These data are provided by the MA DMF pertaining to the number of shellfish permits granted in each town for both recreational and commercial fishing activities. This is a measure of the degree of shellfishing activity within each municipality.

Aquaculture Licenses:

Licenses for shellfish aquaculture activities data are provided by MA DMF. This information quantifies the number of licenses by municipality. While a spatial layer of such activities is not available at a state or municipal level, this information provided guidance for seeking more specific information from individual municipalities as needed.

Bathymetry (Bottom Depth):

Bathymetry data is assembled from two sources. The state MassGIS office provides bathymetry for all Massachusetts state waters. Actual water depth survey information is also available from the National Oceanic and Atmospheric Administration (NOAA) nautical charts for Massachusetts waters. Both sources of bathymetric data provide insight into shellfish growing enabling conditions based on each shellfish species preferred habitat types and associated water depths.

Final Mapping Products

The attached shellfish restoration siting maps include the data layers as identified above. These layers are displayed either independently or in composite with other data depending upon the scale and/or relevance of the specific data. This process is not intended to create a prioritized list of potential shellfish restoration locations since each possible location will require additional analysis and consultation as well as permitting discussions with municipalities and state resource managers before any investment is considered.

Some of the layers are more appropriately viewed at a statewide level to understand where shellfish resources, as well as associated enabling conditions, are concentrated within the Commonwealth. State level maps include the following:

- Designated Shellfish Growing Areas—open, prohibited, etc.
- Shellfish Habitat Suitability Areas—all shellfish species
- Seafloor Sediment Composition—grab sample points
- Habitat Suitability—bottom type, shellfish suitability (oyster and blue mussel), and bathymetry
- Habitat Suitability and Designated Growing Areas—bottom type, and shellfish suitability
- Recreational Shellfish Licenses—number of licenses by municipality

- Commercial Shellfish Licenses—number of licenses by municipality
- Shellfish Aquaculture Leased Areas—number of licenses by municipality
- Municipal Shellfish Restoration Opportunity—level of shellfish activity by municipality

In an effort to provide examples of finer resolution data analysis, maps have been developed for "zoomed in" areas within the Commonwealth. These regions include the North Shore, Boston Harbor, South Shore, Cape Cod, Buzzards Bay and the Islands. We hope to eventually upload these data into an online viewer that would allow the user to zoom in to any coastal location to further assess restoration potential wherever it is desired. Each map for the region's specific locations include seafloor sediment composition, designated shellfish growing areas, shellfish habitat suitability areas, and seagrass mapping. The following maps are available:

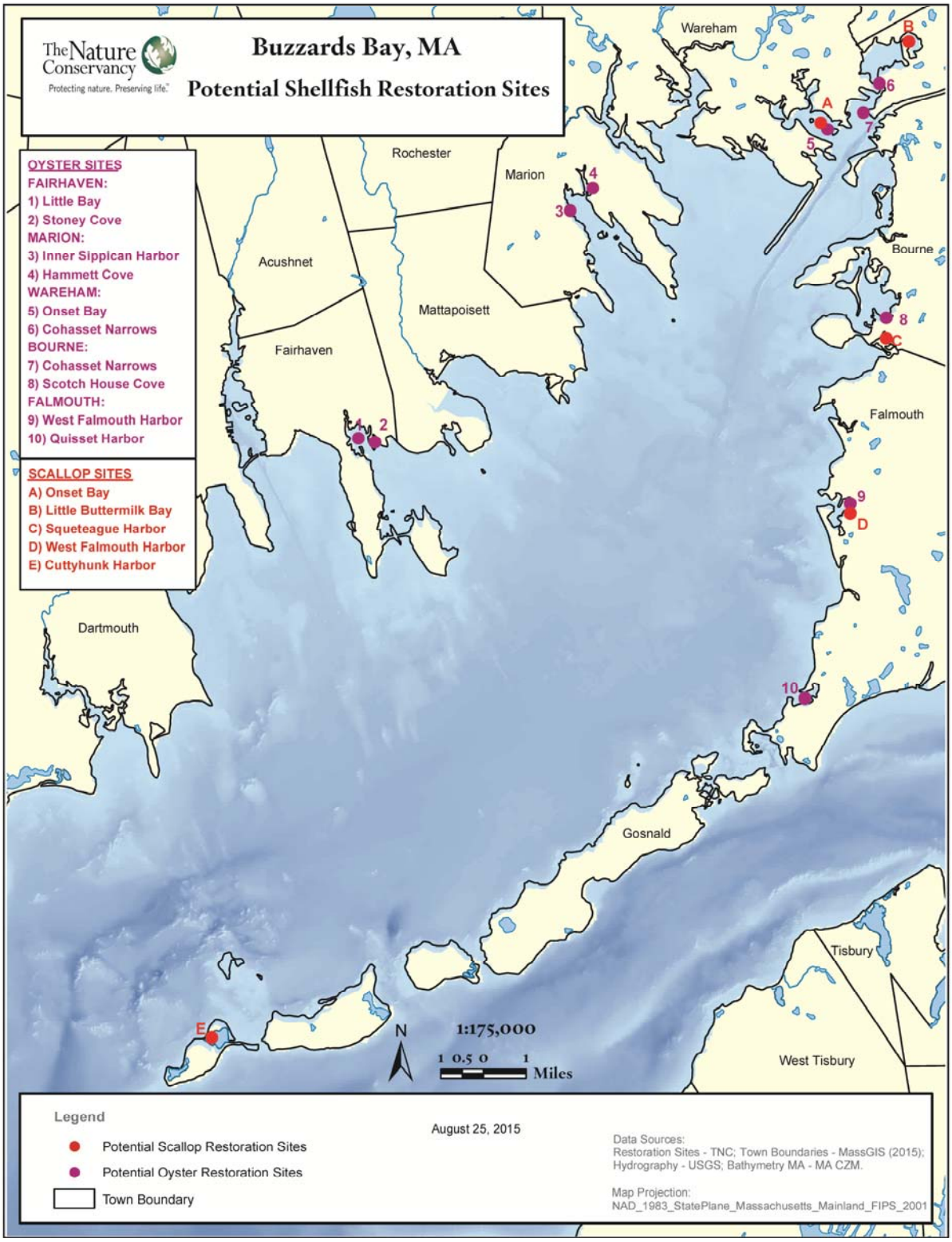
- Parker River—Newbury/Rowely/Ipswich
- Boston Harbor--Boston
- North River—Marshfield
- Plymouth Harbor 1 and 2--Plymouth
- Great Neck—Wareham
- Sconticut Neck—Fairhaven
- Bass and Swan Pond Rivers—Dennis
- Also, all Buzzards Bay Towns

For additional information please see:
http://www.conservationgateway.org/ConservationPractices/Marine/HabitatProtectionandRestoration/Pages/MA-shellfish-restoration.aspx

Contact:

Steve Kirk
Coastal Restoration Ecologist
The Nature Conservancy
Stephen.kirk@tnc.org
508.274.0775

Appendix C – Buzzards Bay Reference Map



Appendix B:
Essential Fish Habitat Consultation Documentation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Narragansett Laboratory
Restoration Center
28 Tarzwell Drive
Narragansett, RI 02882
Phone: +1 401-782-3338
Fax: +1 401-782-3201

February 25, 2016

Susan Tuxbury
National Marine Fisheries Service
Office of Habitat Conservation
55 Great Republic Drive
Gloucester, MA 01930

Dear Ms. Tuxbury:

The National Oceanic and Atmospheric Administration (NOAA) is submitting these materials on behalf of the B-120 Buzzards Bay Trustees, seeking Essential Fish Habitat (EFH) consultation on three proposed oyster restoration projects to address shellfish and recreational shellfishing injuries resulting from the 2003 Buzzards Bay oil spill. The Trustees, including NOAA, U.S. Fish and Wildlife Service (USFWS), Commonwealth of Massachusetts and State of Rhode Island completed and released a Final Programmatic Restoration Plan and Environmental Assessment (PRP/EA) and Finding of No Significant Impact (FONSI) in September 2014, identifying multiple Tier 1-preferred restoration projects, including oyster restoration. The proposed Tier 1 oyster restoration projects were designated as Readiness Category II projects in the PRP/EA, as specific sites had not yet been determined for implementation, and thus, further site-specific information would be needed to conclude a federal agency determination under the National Environmental Policy Act (NEPA). Since the release of the Final PRP/EA, the Trustees have worked diligently with The Nature Conservancy (TNC), the Massachusetts Division of Marine Fisheries (MA DMF), and shellfish constables from the Buzzards Bay region towns (collectively, the "project partners") to complete a site prioritization in ranking and selecting the highest-priority sites based on multiple evaluation criteria. This prioritization is included in this correspondence for your review.

The Trustees seek to complete NEPA responsibilities by addressing EFH for the proposed oyster restoration projects. The enclosed materials include EFH assessment worksheets for the projects proposed in the towns of Fairhaven, Wareham, and Bourne. These materials include project narratives, figures with proposed project location coordinates, and EFH species information for each proposed project location. As you will note, the Fairhaven site is scheduled for implementation in 2016, with field assessment work to be completed by MA DMF this spring.

We anticipate that these oyster restoration projects will qualify under the U.S. Army Corps of Engineers' General Permits for Massachusetts, #22 for Habitat Restoration, Establishment and Enhancement Activities. Based on compiled and assessed project information, the project partners have identified sites where potential adverse effects on EFH will be minimal, including avoidance or minimization of impacts to submerged aquatic vegetation. The long-term benefits associated with restoring oyster bed habitat are expected to outweigh short-term negative impacts associated with project implementation. The permanent changes to bottom substrate (from hard benthic substrate to oyster bed) will be beneficial to a broad estuarine and marine fish assemblage, and thus this project is expected to result in a net enhancement of EFH at each project site.

The Trustees appreciate your timely review of and response on these materials. Please do not hesitate to contact me, should you have questions or seek additional information for completing the EFH consultation and recommendations.

Sincerely,

James G. Turek
Restoration Ecologist
NOAA Restoration Center

cc:

M. Garcia-Seranno, K. Pelto – MA DEP
M. Sperduto – USFWS
J. Catena, C. Boelke, J. Shenot, D. Landsman - NMFS

NOAA FISHERIES
NORTHEAST REGIONAL OFFICE
EFH ASSESSMENT WORKSHEET FOR
FEDERAL AGENCIES
(modified 08/04)

Introduction

The Magnuson-Stevens Fishery Conservation and Management Act mandates that federal agencies conduct an EFH consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect essential fish habitat (EFH). An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist Federal agencies in determining whether an EFH consultation is necessary, and developing the needed information should a consultation be required. This worksheet will lead you through a series of questions that will provide an initial screening to determine if an EFH consultation is necessary, and help you assemble the needed information for determining the extent of the consultation required. The information provided in this worksheet may also be used to develop the required EFH Assessment.

Consultation through NOAA Fisheries regarding other NOAA-trust resources may also be necessary if a proposed action results in adverse impacts. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, consultation with NOAA Fisheries may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Northeast Regional Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use

An EFH Assessment must be submitted by a Federal agency to NOAA Fisheries as part of the EFH consultation. An EFH Assessment must include the following information:

1. A description of the proposed action.
2. An analysis of the potential adverse effects of the action on EFH, and the managed species.
3. The Federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation if applicable.

In some cases, this worksheet can be used as an EFH Assessment. If the Federal agency determines that the action will not cause substantial impacts to EFH, then this worksheet may suffice. If the action may cause substantial adverse effects on EFH, then a more thorough discussion of the action and its impacts in a separate EFH Assessment will be necessary. The completed worksheet should be forwarded to NOAA Fisheries Northeast Regional Office, Habitat Conservation Division (HCD) for review.

The information contained on the HCD website (http://www.nero.noaa.gov/hcd/) will assist you in completing this worksheet. The HCD web site contains information regarding: the EFH consultation

process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Essential Fish Habitat Mapper

The Office of Habitat Conservation (OHC) maintains and Essential Fish Habitat Mapper tool which can be found at: http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/index_GIS.htm.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES

PROJECT NAME: Fairhaven Oyster Restoration Project DATE: February 2016

PROJECT NO.: _____ LOCATION: Fairhaven, Little Bay, MA

PREPARER: B-120 Buzzards Bay Trustees

Project Description

Historically, oyster beds were widespread along the U.S. Atlantic Coast. Eastern oysters (*Crassostrea virginica*) are a keystone species that provide a wide range of beneficial ecological services such as improving water quality and providing habitat for many other species. Oyster bed restoration is a practice well recognized for contributing significant ecological services, and organizations including the National Oceanic and Atmospheric Administration (NOAA) have had a long-standing commitment to restoring oyster beds throughout the historical range of the species (NOAA Restoration Center, 2015; Takacs et al., 2005). The subject oyster restoration site is situated in Little Bay, MA within the jurisdiction of the Town of Fairhaven, MA (Little Bay is a sub-embayment of Nasketucket Bay, and which is directly connected to Buzzards Bay).

The B-120 Buzzards Bay Trustees (NOAA, U.S. Department of the Interior (DOI) [acting through the U.S. Fish and Wildlife Service (USFWS)], the Commonwealth of Massachusetts [acting through the Executive Office of Energy and Environmental Affairs (EEA)], and the State of Rhode Island) included oyster bed restoration in their Final Programmatic Restoration Plan (RP) to address natural resource injuries and lost uses, including lost recreational shell fishing, resulting from the 2003 oil spill (NOAA et al., 2014). As described in the RP, the proposed oyster projects include placing oyster spat on shell strategically in multiple Buzzards Bay locations to increase local oyster populations and serve as spawning areas. Oyster beds are expected to be managed by the respective municipalities for sustainable recreational oyster harvesting. The specific project described here for the Fairhaven site is one of three proposed sites that will comprise the Bouchard B-120 Buzzards Bay oyster restoration projects.

The Nature Conservancy (TNC), a key implementing partner for this project, completed a comprehensive Buzzards Bay-wide site prioritization exercise (TNC, 2015) to identify potential oyster restoration sites. Potential sites in Buzzards Bay (including Little Bay) were evaluated based on a number of criteria: nexus to the spill injury; municipal engagement/capacity; and technical feasibility, which included ecological condition factors and regulatory considerations, as well as oyster disease presence and load. The Fairhaven site (Figure 1) was identified as the highest priority site for oyster restoration. The Massachusetts Division of Marine Fisheries (MA DMF) will conduct diver surveys in spring 2016 to further assess and characterize the project site. DMF biologists will document the presence and abundance of eelgrass (*Zostera marina*), other submerged aquatic vegetation (SAV), or other resources such as hard clam (*Mercenaria mercenaria*) within the project footprint and adjacent benthic habitat. If the diver survey identifies sensitive resources such as eelgrass, other SAVs or other species within the proposed project footprint, the project partners will use the field assessment results to modify the restoration site limits to avoid or minimize impacts to sensitive resources.

The specific site proposed for restoration was determined in conjunction with the Fairhaven shellfish and harbormaster departments to ensure appropriate water quality and substrate types, and to avoid potential interference with navigation or existing fisheries. The proposed area features relatively shallow waters (which will facilitate implementation, monitoring, and maintenance) and existing nearby oyster populations (which can help in oyster recruitment). A substantial portion of Little Bay's watershed has

been protected, helping to protect high water quality at the project site. Since work is planned in waters that the MA DMF classifies as “conditionally open” for shellfish propagation, the site is suitable for oyster restoration from a regulatory perspective.

Restoration of oysters will be a two-step process. First, appropriate cultch material, such as surf clam shells that have aged for at least one year, or other appropriate shell material will be placed at the designated location in municipal waters near Fairhaven, MA. The proposed project area is approximately 1 acre in size. Shell material will be placed on the site bottom during mid- to late June 2016. Second, the site will be seeded with disease-free, certified spat-on-shell juvenile oysters at an estimated rate of 250,000 spat per acre. Remote set oysters will be placed in the fall of 2016, likely September or October. Timing of releases may be adjusted according to prevalent environmental conditions. All of the proposed restoration activities will be in compliance with the MA DMF Shellfish Planting Guidelines. The oyster planting guidelines are designed to ensure that projects protect human health, minimize conflict related to access, enable shellfish resources to develop, avoid impacts to other marine resources, and encourage research to improve understanding of shellfish and their habitat (Hickey et al., 2015). Baggett et al. (2014) provides additional useful information about project design, implementation, and monitoring that the TNC and the Trustees may rely upon when designing and implementing oyster restoration projects.

The Town of Fairhaven will serve as the project proponent and will apply for all permits and other approvals, including compliance with the approval process to obtain a Municipal Shellfish Propagation Permit from MA DMF for planned oyster restoration activities.

Success of these oyster restoration projects will depend on a favorable combination of all of the factors that influence oyster population sustainability, including appropriate benthic substrate composition, potential for larval recruitment and retention, tidal current velocities affecting the site, water quality conditions, planktonic food availability for oysters, sedimentation rates affecting oyster survival and growth, and the presence of oyster diseases that may affect local populations. The B-120 Buzzards Bay Trustees support the project, including selecting the favorable Fairhaven, Little Bay site. The goal is to increase oyster set, recruitment, survivorship, and growth in areas where appropriate substrate for oyster cultch is currently limited. Recreational oyster harvesting is anticipated at the project site once a self-sustaining oyster population has been achieved.

Oyster restoration monitoring metrics are well-described in the Oyster Habitat Restoration Monitoring and Assessment Handbook (Baggett et al., 2014). TNC will coordinate and participate in at least two years of monitoring of the restoration and control sites and will extend the proposed monitoring period if funding resources are available. Each oyster restoration project will include a Before-After-Control-Impact (BACI) design, with a nearby site serving as a control. Data from other New England sources (both previously implemented projects and from literature) will be used to develop performance metrics for the restored oyster bed areas, which is generally agreed-upon to be densities of 50+ oysters per square meter in New England coastal waters.

Figure 1. B-120 Buzzards Bay Trustee oyster restoration project location and approximate project footprint. The project site is located in Little Bay, MA. The 2014 site was implemented by TNC and the Town of Fairhaven.

Step 1. Use the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. Attach that list to the worksheet because it will be used in later steps. Make a preliminary determination on the need to conduct an EFH Consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs?	**X**	
Is the action located in or adjacent to EFH designated for larvae?	**X**	
Is the action located in or adjacent to EFH designated for juveniles?	**X**	
Is the action located in or adjacent to EFH designated for adults?	**X**	
Is the action located in or adjacent to EFH designated for spawning adults?	**X**	
If you answered no to all questions above, then EFH consultation is not required -go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

Step 2. In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts.

2. SITE CHARACTERISTICS	
Site characteristics	**Description**
Is the site intertidal, sub-tidal, or water column?	The proposed project site is sub-tidal, located in Fairhaven, Little Bay. The area includes historic oyster habitat.
What are the sediment characteristics?	Sediment conditions are uniform hard sand throughout the proposed project location.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so what type, size, characteristics?	There is no HAPC in the project area. The closest HAPC is designated for Atlantic cod and is located in the Atlantic Ocean, approximately 300 km from the proposed project location.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the spatial extent.	According to the Massachusetts online mapping tool, there is no SAV present in the Little Bay of Buzzards Bay, including in the proposed project area (State of Massachusetts Online Mapping Tool, 2015). Field reconnaissance by TNC confirms these conditions, and the MA DMF will conduct follow-up diver reconnaissance in April-May 2016 to determine resource presence and/or absence, including presence/absence of SAV.
What is typical salinity and temperature regime/range?	According to the National Wetlands Inventory (NWI) dataset describing Buzzards Bay, salinity exceeds 30 ppt for much of the year. Water temperatures are typically 5–20°C.
What is the normal frequency of site disturbance, both natural and man-made?	We are not aware of any site disturbance, either natural or man-made, within the project footprint that is different than natural disturbance levels present throughout Little Bay, as a whole. Much of the nearby shoreline is protected; thus, human disturbances are expected to be negligible to low.
What is the area of proposed impact (work footprint & far afield)?	The proposed oyster restoration project site is approximately 1 acre.

Step 3. This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS			
Impacts	**Y**	**N**	**Description**
Nature and duration of activity(s)			Activities will include placing ~100 cubic yards of weathered surf clam (*Spisula solidissima)* material, aged at least one year, on the Little Bay benthic substrate. The restored substrate will be seeded with certified, disease-free spat-on-shell juvenile oysters. Seeding density will be approximately 250,000 spat per acre. The shell rows will be approximately 10 feet wide and will be placed with a 20-foot buffer area between rows. Activities will take place over approximately one month in June-July 2016. The exact timing may change based on environmental conditions. Disturbance caused by restoring oyster beds will be localized and small relative to the total habitat area available: the project area is approximately 1 acre, while the total area of Little Bay is over 200 acres, so mobile species may avoid the area during the very brief construction period.
Will benthic community be disturbed?	X		Surface sediments and resident benthic community will be affected when oyster shells are placed. Long-term ecological conditions are expected to be improved over existing conditions once the oyster reef is established.
Will SAV be impacted?		X	SAV will not be impacted. Based on available information (State of Massachusetts Online Mapping Tool, 2015), no SAV is present in the proposed project location. This will be further assessed by MA DMF in spring 2016.
Will sediments be altered and/or sedimentation rates change?	X		Sediments in the project area will be altered by the placement of cultch material, but any negative impacts are expected to be minimal. The site was selected based on both current and historical conditions: current conditions consist primarily of hard, sand bottom, and historically oysters were present in the area. Long-term, the oyster reef will provide benefit to the bottom habitat and help stabilize sediment dynamics.
Will turbidity increase?	X		Turbidity will increase temporarily during oyster shell placement. The oyster reef is expected to reduce turbidity in the long-term due to the substantial filtering function of oysters.
Will water depth change?		X	Average depth at the project site is 3 feet, MLW. Placed shellfish and shell mounds will be approximately 0.3 ft high, thus there will be minimal change in mean water depth.
Will contaminants be released into sediments or water column?		X	No contamination is expected to be released. Oyster reef habitat will be restored using certified disease-free spat on shell. The proposed site will be tested for shellfish disease before the project is implemented. If disease is present at levels that would limit project success, then an alternate location will be selected.
Will tidal flow, currents or wave patterns be altered?		X	Due to the low profile of the material and the small footprint of the project area compared to the size of Little Bay, no changes to tidal flow, currents, or wave patterns are expected.
Will ambient salinity or temperature regime change?		X	No changes to ambient salinity or temperature regime are expected. Oyster reef projects do not influence these physical parameters.
Will water quality be altered?	X		Water quality (turbidity) may be negatively affected during initial shell-placement activities. In the long-term, beginning immediately following oyster shell placement, water quality will be improved due to the high-filtering function of the oysters.

Step 4. This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species from the EFH species list (generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.nero.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and values	**Y**	**N**	**Describe habitat type, species, and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			There is EFH for the following nine species for all life stages: Atlantic cod, Atlantic herring, Atlantic wolf fish, haddock, little skate, red hake, windowpane flounder, winter flounder, and winter skate. These life stages may use sand and gravel habitats at the depth, salinities, and temperatures that may be present at the project site.
Spawning	X		This project may impact sands and gravels used for spawning by some of the listed EFH species. In general, oyster reefs are known to provide fish spawning habitat, so the long-term effects on spawning habitat are expected to be positive.
Nursery	X		This project may impact sands and gravels used as nursery habitat by some of the listed EFH species. In general, oyster reefs are known to improve fish nursery habitat through providing additional cover opportunities, so the long-term effects on nursery habitat are expected to be positive.
Forage	X		This project may impact sands and gravels that some of the listed EFH species use for foraging. In general, oyster reefs are known to improve fish foraging habitat by increasing the productivity per unit area, so the long-term effects on foraging habitat are expected to be positive.
Shelter	X		This project may impact sands and gravels that some of the listed EFH species use for sheltering habitat. In general, oyster reefs are known to improve fish shelter habitat, through providing void space and additional three-dimensional cover opportunities, so the long-term effects for sheltering habitat are expected to be positive.
Will impacts be temporary or permanent?	X		Impacts will be permanent, assuming the restored oyster bed habitat is sustainable. Impacts are expected to be net positive over the lifetime of the project.
Will compensatory mitigation be used?		X	No compensatory mitigation is proposed. Adding oyster shell will enhance the existing hard-bottom habitat and will provide additional habitat functions, ecological services, and values. Historically, oyster beds were widespread along the Atlantic Coast and are a keystone species in coastal embayments. NOAA, TNC and other organizations have committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).

Step 5. This section provides the Federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

5. DETERMINATION OF IMPACT		
		Federal agency's EFH determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: (check the appropriate statement)		**There is no adverse effect on EFH** **EFH Consultation is not required**
	X	**The adverse effect on EFH is not substantial.** **This is a request for an abbreviated EFH consultation. This worksheet is being submitted to NMFS to satisfy the EFH Assessment requirement.**
		The adverse effect on EFH is substantial. **This is a request for an expanded EFH consultation. A detailed written EFH assessment will be submitted to NMFS expanding upon the impacts revealed in this worksheet.**

Step 6. Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats. Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat)**
alewife	Oyster reefs will improve water quality, habitat substrate, and fishery status in Buzzards Bay. The project is not expected to have any net negative impact on species present in the proposed project area. Oysters were historically widespread throughout the Atlantic Coast, are a keystone species, and provide numerous ecological services that benefit fisheries. NOAA, TNC, and many other organizations have committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).
blueback herring	
rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
blue mussel	
soft-shell clam	
quahog	
Other species: **black sea bass**	

References

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The Nature Conservancy (TNC). 2015. Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations. Reviewed and approved by the B-120 Shellfish Technical Advisory Committee, September.

Attachment 1

Species List generated using the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States, to generate the list of designated EFH for federally managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm) and the proposed project footprint. We evaluated species within the project footprint and within 5,000 meters of the proposed project area. For the Fairhaven Little Bay project location, there is no difference in EFH designations.

Table A1. EFH species and life-stages found within the proposed Fairhaven project footprint

Species	Life stages	Type	Fishery Management Council
Atlantic cod	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Atlantic herring	All, Adult, Juvenile	EFH	NEFMC
Atlantic wolf fish	All	EFH	NEFMC
Haddock	All, Eggs, Larvae	EFH	NEFMC
Little skate	All, Adult, Juvenile	EFH	NEFMC
Red hake	All, Adult, Juvenile	EFH	NEFMC
Windowpane flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter skate	All, Adult, Juvenile	EFH	NEFMC

NEFMC: New England Fishery Management Council.

NOAA FISHERIES
NORTHEAST REGIONAL OFFICE
EFH ASSESSMENT WORKSHEET FOR
FEDERAL AGENCIES
(modified 08/04)

Introduction

The Magnuson-Stevens Fishery Conservation and Management Act mandates that federal agencies conduct an EFH consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect essential fish habitat (EFH). An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist Federal agencies in determining whether an EFH consultation is necessary, and developing the needed information should a consultation be required. This worksheet will lead you through a series of questions that will provide an initial screening to determine if an EFH consultation is necessary, and help you assemble the needed information for determining the extent of the consultation required. The information provided in this worksheet may also be used to develop the required EFH Assessment.

Consultation through NOAA Fisheries regarding other NOAA-trust resources may also be necessary if a proposed action results in adverse impacts. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, consultation with NOAA Fisheries may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Northeast Regional Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use

An EFH Assessment must be submitted by a Federal agency to NOAA Fisheries as part of the EFH consultation. An EFH Assessment must include the following information:

1. A description of the proposed action.
2. An analysis of the potential adverse effects of the action on EFH, and the managed species.
3. The Federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation if applicable.

In some cases, this worksheet can be used as an EFH Assessment. If the Federal agency determines that the action will not cause substantial impacts to EFH, then this worksheet may suffice. If the action may cause substantial adverse effects on EFH, then a more thorough discussion of the action and its impacts in a separate EFH Assessment will be necessary. The completed worksheet should be forwarded to NOAA Fisheries Northeast Regional Office, Habitat Conservation Division (HCD) for review.

The information contained on the HCD website (http://www.nero.noaa.gov/hcd/) will assist you in completing this worksheet. The HCD web site contains information regarding: the EFH consultation

process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Essential Fish Habitat Mapper

The Office of Habitat Conservation (OHC) maintains and Essential Fish Habitat Mapper tool which can be found at: http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/index_GIS.htm.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES

PROJECT NAME: Wareham Oyster Restoration Project DATE: February 2016

PROJECT NO.: _____ LOCATION: Onset Bay, Wareham, MA

PREPARER: B-120 Buzzards Bay Trustees

Project Description

Historically, oyster beds were widespread along the Atlantic Coast of the United States. Eastern oysters (*Crassostrea virginica*) are a keystone species that provide a wide range of beneficial ecological services such as improving water quality and providing habitat for many other species. Oyster bed restoration is a practice well recognized for contributing significant ecological services, and organizations such as The Nature Conservancy (TNC) and the National Oceanic and Atmospheric Administration (NOAA) have had a long-standing commitment to restoring oyster beds throughout the historical range of the species (NOAA Restoration Center, 2015; Takacs et al., 2005). The subject oyster restoration site is Onset Bay which is located in Town of Wareham, MA waters and part of Buzzards Bay.

The B-120 Buzzards Bay Trustees (NOAA, U.S. Department of the Interior (DOI) [acting through the U.S. Fish and Wildlife Service (USFWS)], the Commonwealth of Massachusetts [acting through the Executive Office of Energy and Environmental Affairs (EEA)], and the State of Rhode Island) included oyster reef restoration in their Final Programmatic Restoration Plan (RP) to address natural resource injuries and lost uses, including recreational shell fishing, resulting from the 2003 oil spill (NOAA et al., 2014). The project described in that RP includes placing oyster spat on shell strategically in multiple Onset Bay locations to increase local oyster populations to serve as spawner areas. Oyster beds will be managed by Town of Wareham staff for sustainable recreational oyster harvesting. The specific project described here for the Onset Bay site is one of three proposed sites that will comprise the B-120 oyster reef restoration projects. The proposed project will be located near Onset Island in Onset Bay. The exact timing for this project has not been finalized, but TNC and the B-120 Buzzards Bay Trustees anticipate work on this project to begin in 2017.

TNC, a key implementing partner for this project, completed a comprehensive site prioritization exercise (TNC, 2015). Potential sites in Buzzards Bay were evaluated based on the nexus to the injury; municipal engagement/capacity; and technical feasibility, which included ecological condition factors and regulatory considerations, as well as disease prevalence and load. The Wareham site (Figure 1) was identified as the second highest priority site for oyster restoration. The Massachusetts Division of Marine Fisheries (MA DMF) will conduct diver surveys in spring 2017 to characterize the project site. MA DMF divers will document the presence and abundance of any eelgrass (*Zostera marina*), other submerged aquatic vegetation (SAV), or other resources such hard clam (*Mercenaria mercenaria*) within the project footprint and adjacent benthic habitat. If the diver survey identifies sensitive resources within a proposed project footprint, the project area will be modified to avoid or minimize impacts to those sensitive species.

Restoration of oysters will be a two-step process. First, appropriate cultch material, such as weathered surf clam shell that has aged for at least one year, or other appropriate shell material will be placed at the designated location in municipal waters near Onset Island. The project area is approximately 1 acre in size. Shell material will be placed on the site bottom, anticipated to begin in June 2017. Second, the site will be seeded with certified disease-free, spat-on-shell juvenile oysters at an estimated rate of 250,000 spat per acre. Remote set oysters will be placed in the fall of 2017, likely in September or October. All of the proposed restoration activities will be in compliance with the MA DMF Shellfish Planting Guidelines.

The oyster planting guidelines are designed to ensure that projects protect human health, minimize conflict related to access, enable shellfish resources to develop, avoid impact to other marine resources, and encourage research to improve understanding of shellfish and their habitat (Hickey et al., 2015). Baggett et al. (2014) provides additional useful information about project design, implementation, and monitoring that the Trustees may rely upon when designing and implementing oyster restoration projects.

The Town of Wareham Shellfish Warden and his staff will serve as the project lead and local proponent, and will apply for all permitting requirements, including compliance with the permitting process to obtain a Municipal Shellfish Propagation Permit from MA DMF for planned oyster restoration activities.

Success of the oyster restoration projects will depend on a favorable combination of all of the factors that influence oyster population sustainability, including appropriate benthic substrate composition, potential for larval recruitment and retention, tidal current velocities affecting the site, water quality conditions, planktonic food availability for oysters, sedimentation rates affecting oyster survival and growth, and the presence of oyster diseases that may affect local populations. The B-120 Buzzards Bay Trustees support the project, including selecting the ecologically-favorable Onset Bay site. The goal is to increase oyster set, survivorship, growth, and recruitment in areas where appropriate substrate for oyster cultch is currently limited. Recreational oyster harvesting is anticipated at the project site once self-sustaining oyster populations have developed.

Oyster restoration monitoring metrics are well-described in the Oyster Habitat Restoration Monitoring and Assessment Handbook (Baggett et al., 2014). TNC will coordinate and participate in at least two years of monitoring of the restoration and control sites and will extend the proposed monitoring period if funding resources are available. Each oyster restoration project will include a Before-After-Control-Impact (BACI) design, with a nearby site serving as a control. Data from other New England sources (both previously implemented projects and from literature) will be used to develop performance metrics for the restored oyster bed areas, which is generally agreed-upon to be densities of 50+ oysters per square meter in New England coastal waters.

Corner	Lat	Long
1	41° 43.999' N	70° 38.467' W
2	41° 43.959' N	70° 38.529' W
3	41° 43.945' N	70° 38.512' W
4	41° 43.987' N	70° 38.451' W

Figure 1. Wareham oyster restoration project location and proposed approximate footprint. The project site is located near Onset Island in Onset Bay, Wareham, MA.

Step 1. Use the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. Attach that list to the worksheet because it will be used in later steps. Make a preliminary determination on the need to conduct an EFH Consultation.

1. INITIAL CONSIDERATIONS		
EFH designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs?	X	
Is the action located in or adjacent to EFH designated for larvae?	**X**	
Is the action located in or adjacent to EFH designated for juveniles?	**X**	
Is the action located in or adjacent to EFH designated for adults?	**X**	
Is the action located in or adjacent to EFH designated for spawning adults?	**X**	
If you answered no to all questions above, then EFH consultation is not required -go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

Step 2. In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Please note that, there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts.

2. SITE CHARACTERISTICS	
Site characteristics	**Description**
Is the site intertidal, sub-tidal, or water column?	The proposed project site is sub-tidal, located in Onset Bay in Wareham, MA. The area includes historic oyster habitat.
What are the sediment characteristics?	Sediment conditions are mixed hard sand, gravel, and mud at the proposed project location.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so what type, size, characteristics?	There is no HAPC in the project area. The closest HAPC is designated for Atlantic Cod and is located in the Atlantic Ocean, approximately 275 km from the proposed project location.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the spatial extent.	According to the Massachusetts online mapping tool, there is no SAVs present in the Onset Bay portion of Buzzards Bay, including in the proposed project area (State of Massachusetts Online Mapping Tool, 2015). Field reconnaissance by TNC confirms these conditions. MA DMF will conduct follow-up diver reconnaissance in April to May of 2017 to determine potential resource presence and/or absence, including presence/absence of SAVs.
What is typical salinity and temperature regime/range?	According to the National Wetlands Inventory (NWI) data set describing Buzzards Bay, salinity exceeds 30 ppt. Seasonal water temperatures are typically 5–20°C.
What is the normal frequency of site disturbance, both natural and man-made?	We are not aware of any site disturbance, either natural or manmade, within the project footprint that is different than disturbance levels present throughout Buzzards Bay as a whole.
What is the area of proposed impact (work footprint & far afield)?	The proposed oyster restoration project site is ~1.0 acres.

Step 3. This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS			
Impacts	**Y**	**N**	**Description**
Nature and duration of activity(s)			Activities will include placing weathered surf clam or other appropriate shell, aged at least one year, on the Onset Bay substrate. The restored substrate will be seeded with certified disease-free, spat-on-shell juvenile oysters. Seeding density will be approximately 250,000 spat per acre. Disturbance caused by restoring oyster beds will be localized and limited relative to the total habitat area available: the project area is approximately 1 acre, while the total area of Buzzards Bay, which includes Onset Bay, is over 300,000 acres. The shell hash will be limited in height. It is expected that mobile species will avoid the project area during the brief placement period.
Will benthic community be disturbed?	**X**		Sediments and the benthic community will be affected when oyster shell is installed. Long-term conditions are expected to be enhanced for the existing conditions once the oyster bed is established.
Will SAV be impacted?		**X**	SAVs will not be affected. Based on available information (State of Massachusetts Online Mapping Tool, 2015), no SAV is present in the proposed project location. The site will be further assessed by MA DMF divers in spring 2017.
Will sediments be altered and/or sedimentation rates change?	**X**		Sediments in the project footprint will be altered by the placement of cultch material but the negative impacts are expected to be minimal. The site was selected based on both current and historical conditions: present conditions consist primarily of hard-bottom substrate, and historically oysters were present in the area. Long-term, the oyster reef will provide benefit to the bottom habitat and help stabilize sediment dynamics.
Will turbidity increase?	**X**		Turbidity will increase temporarily during oyster shell placement. The oyster reef is expected to reduce turbidity in the long-term due to the high water filtering function by oysters.
Will water depth change?		**X**	Average depth at the proposed project site is 2 feet, MLW. Final shell bed height is expected to be less than 6 inches above the existing substrate surface.
Will contaminants be released into sediments or water column?		**X**	No contamination is expected to be released. Oyster bed habitat will be restored using certified disease-free oyster spat. In addition, each proposed site will be tested for shellfish disease before the project is implemented. If disease is present and at levels that would limit project success (survivorship and recruitment), then an alternate high priority Buzzards Bay location will be considered and selected.
Will tidal flow, currents or wave patterns be altered?		**X**	Due to the low profile of the material and relatively small footprint of the project area, negligible changes to tidal flow, currents, or wave patterns in Onset Bay are expected.
Will ambient salinity or temperature regime change?		**X**	No changes to ambient salinity or the temperature regime are expected. Oyster beds typically do not influence these physical habitat parameters.
Will water quality be altered?	**X**		Water quality (turbidity) may be negatively affected during shell-placement activities. In the long-term, soon after the shell cultch placement, water quality is expected to be restored to and improved over the pre-work conditions due to the high-filtering capacity of oysters.

Step 4. This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species from the EFH species list (generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.nero.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			There is EFH for the following 16 species for all life stages: American plaice, Atlantic cod, Atlantic herring, Atlantic wolf fish, haddock, little skate, ocean pout, pollock, red hake, sea scallop, silver hake, white hake, windowpane flounder, winter flounder, winter skate, and yellowtail flounder. These life stages may use sand and gravel habitats at the depth, salinities, and temperatures that may be present at the project site.
Spawning	**X**		This project may impact sands and gravels used for spawning by some of the listed EFH species. In general, oyster beds are known to provide fish spawning habitat, so the long-term effects on spawning habitat are expected to be positive.
Nursery	**X**		This project may impact sands and gravels used as nursery habitat by some of the listed EFH species. In general, oyster beds are known to provide fish nursery habitat and cover opportunities, so the long-term effects on nursery habitat are expected to be positive.
Forage	**X**		This project may impact sands and gravels that some of the listed EFH species use for foraging. In general, oyster beds are known to provide fish foraging habitat with high productivity and faunal biomass per unit area, so the long-term effects on foraging habitat are expected to be positive.
Shelter	**X**		This project may impact sands and gravels that some of the listed EFH species use for sheltering habitat. In general, oyster beds are known to provide fish shelter habitat, with void space and additional three-dimensional cover opportunities. The long-term effects for sheltering habitat are expected to be positive.
Will impacts be temporary or permanent?			Impacts will be permanent, assuming the restored oyster bed habitat is sustainable. Impacts are expected to be net positive over the lifetime of the project.
Will compensatory mitigation be used?		**X**	No compensatory mitigation is proposed. Adding oyster shell will enhance the existing hard-bottom habitat and will provide additional habitat functions, ecological services, and values. Historically, oyster beds were widespread in the eastern United States and are a keystone species in coastal embayments. NOAA has committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).

Step 5. This section provides the Federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

5. DETERMINATION OF IMPACT		
		Federal agency's EFH determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: (check the appropriate statement)		**There is no adverse effect on EFH. EFH Consultation is not required.**
	X	**The adverse effect on EFH is not substantial. This is a request for an abbreviated EFH consultation. This worksheet is being submitted to NMFS to satisfy the EFH Assessment requirement.**
		The adverse effect on EFH is substantial. This is a request for an expanded EFH consultation. A detailed written EFH assessment will be submitted to NMFS expanding upon the impacts revealed in this worksheet.

Step 6. Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats. Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species know to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat)**
Alewife	Oyster reefs will improve water quality, habitat substrate, and fishery status in Buzzards Bay. The project is not expected to have any significant negative effects on species present in the proposed project area. Oysters were historically widespread throughout the Atlantic Coast, are a keystone species, and provide numerous ecological services that benefit fisheries. NOAA has committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).
Blueback herring	
Rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
Blue mussels	
Soft-shell clams	
Quahog	
Other species: Black sea bass	

References

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Table A1: EFH species and life-stages found within the proposed Wareham project footprint and within 5,000 meters of the project

Species	Life stages	Type	Fishery Management Council
American plaice	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Atlantic cod	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Atlantic herring	All, Adult, Juvenile	EFH	NEFMC
Atlantic wolf fish	All	EFH	NEFMC
Haddock	All, Eggs, Larvae	EFH	NEFMC
Little skate	All, Adult, Juvenile	EFH	NEFMC
Ocean pout	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Pollock	All, Adult, Juvenile, Larvae	EFH	NEFMC
Red hake	All, Adult, Eggs, Juvenile	EFH	NEFMC
Sea scallop	All	EFH	NEFMC
Silver hake	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
White hake	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Windowpane flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter skate	All, Adult, Juvenile	EFH	NEFMC
Yellowtail flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC

NEFMC: New England Fishery Management Council.

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NORTHEAST REGIONAL OFFICE
EFH ASSESSMENT WORKSHEET FOR
FEDERAL AGENCIES

(modified 08/04)

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This worksheet has been designed to assist Federal agencies in determining whether an EFH consultation is necessary, and developing the needed information should a consultation be required. This worksheet will lead you through a series of questions that will provide an initial screening to determine if an EFH consultation is necessary, and help you assemble the needed information for determining the extent of the consultation required. The information provided in this worksheet may also be used to develop the required EFH Assessment.

Consultation through NOAA Fisheries regarding other NOAA-trust resources may also be necessary if a proposed action results in adverse impacts. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, consultation with NOAA Fisheries may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Northeast Regional Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

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1. A description of the proposed action.
2. An analysis of the potential adverse effects of the action on EFH, and the managed species.
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4. Proposed mitigation if applicable.

In some cases, this worksheet can be used as an EFH Assessment. If the Federal agency determines that the action will not cause substantial impacts to EFH, then this worksheet may suffice. If the action may cause substantial adverse effects on EFH, then a more thorough discussion of the action and its impacts in a separate EFH Assessment will be necessary. The completed worksheet should be forwarded to NOAA Fisheries Northeast Regional Office, Habitat Conservation Division (HCD) for review.

The information contained on the HCD website (http://www.nero.noaa.gov/hcd/) will assist you in completing this worksheet. The HCD web site contains information regarding: the EFH consultation

process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Essential Fish Habitat Mapper

The Office of Habitat Conservation (OHC) maintains and Essential Fish Habitat Mapper tool which can be found at: http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/index_GIS.htm.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES

PROJECT NAME: Town of Bourne Oyster Restoration Project DATE: February 2016

PROJECT NO.: _____ LOCATION: Taylor Point Cove, Bourne, MA

PREPARER: B-120 Buzzards Bay Trustees

Project Description

Historically, oyster beds were widespread along the U.S. Atlantic Coast. Eastern oysters (*Crassostrea virginica*) are a keystone species that provide a wide range of beneficial ecological services such as improving water quality and providing habitat for many other species. Oyster bed restoration is a practice well recognized for contributing significant ecological services, and organizations such as The Nature Conservancy (TNC) and the National Oceanic and Atmospheric Administration (NOAA) have had a long-standing commitment to restoring oyster beds throughout the historical range of the species (NOAA Restoration Center, 2015; Takacs et al., 2005). The subject oyster restoration site is Taylor Point Cove, which is located in Town of Bourne, MA waters and part of Buzzards Bay.

The B-120 Buzzards Bay Trustees (NOAA, U.S. Department of the Interior (DOI) [acting through the U.S. Fish and Wildlife Service (USFWS)], the Commonwealth of Massachusetts [acting through the Executive Office of Energy and Environmental Affairs (EEA)], and the State of Rhode Island) included oyster restoration in their Final Programmatic Restoration Plan (RP) to address natural resource injuries and lost uses, including recreational shellfishing, resulting from the 2003 oil spill (NOAA et al., 2014). The project described in the RP includes placing oyster spat on shell strategically in multiple Taylor Point Cove Bay locations to increase local oyster populations to serve as spawner areas. The oyster beds will be managed by the Town of Bourne for sustainable recreational oyster harvesting. The specific project described here for the Bourne site is one of three proposed sites that will comprise the B-120 Buzzards Bay Trustee oyster restoration projects. The timing for this project has not been finalized, but the Town, TNC, and the Trustees anticipate work will occur in 2018.

TNC, a key implementing partner for this project, completed a comprehensive Buzzards Bay-wide site prioritization exercise (TNC, 2015) to identify potential oyster restoration sites. Potential sites in Buzzards Bay (including Taylor Point Cove) were evaluated based on a number of criteria: nexus to the spill injury; municipal engagement/capacity; and technical feasibility, which included ecological condition factors and regulatory considerations, as well as oyster disease presence and load. The Bourne site (Figure 1) was identified as a high priority site for oyster restoration. The Massachusetts Division of Marine Fisheries (MA DMF) will conduct diver surveys in spring 2016 to further assess and characterize the project site. DMF biologists will document the presence and abundance of eelgrass (*Zostera marina*), other submerged aquatic vegetation (SAV), or other resources such as hard clam (*Mercenaria mercenaria*) within the project footprint and adjacent benthic habitat. If the diver survey identifies sensitive resources such as eelgrass, other SAVs or other species within the proposed project footprint, the project partners will use the field assessment results to modify the restoration site limits to avoid or minimize impacts to sensitive resources.

Restoration of oysters will be a two-step process. First, appropriate cultch material, such as surf clam shells that have aged for at least one year, or other appropriate shell material will be placed at the designated location in municipal waters in Bourne, MA. The proposed project area is approximately 1 acre in size. Shell material will be placed on the site bottom during mid- to late June 2018. Second, the site will be seeded with disease-free, certified spat-on-shell juvenile oysters at an estimated rate of 250,000 spat per

acre. Remote set oysters will be placed in the fall of 2018, likely in September or October. Timing of releases may be adjusted according to prevalent environmental conditions. All of the proposed restoration activities will be in compliance with the MA DMF Shellfish Planting Guidelines. The oyster planting guidelines are designed to ensure that projects protect human health, minimize conflict related to access, enable shellfish resources to develop, avoid impacts to other marine resources, and encourage research to improve understanding of shellfish and their habitat (Hickey et al., 2015). Baggett et al. (2014) provides additional useful information about project design, implementation, and monitoring that the TNC and the Trustees may rely upon when designing and implementing oyster restoration projects.

The Town of Bourne will serve as the project proponent and will apply for all permits and other approvals, including compliance with the approval process to obtain a Municipal Shellfish Propagation Permit from MA DMF for planned oyster restoration activities.

Success of these oyster restoration projects will depend on a favorable combination of all of the factors that influence oyster population sustainability, including appropriate benthic substrate composition, potential for larval recruitment and retention, tidal current velocities affecting the site, water quality conditions, planktonic food availability for oysters, sedimentation rates affecting oyster survival and growth, and the presence of oyster diseases that may affect local populations. The B-120 Buzzards Bay Trustees support the project, including selecting the favorable Bourne Taylor Point Cove site. The goal is to increase oyster set, survivorship, growth, and recruitment in areas where appropriate substrate for oyster cultch is currently limited. Recreational oyster harvesting is anticipated at the project site once a self-sustaining oyster population has been achieved.

Oyster restoration monitoring metrics are well-described in the Oyster Habitat Restoration Monitoring and Assessment Handbook (Baggett et al., 2014). TNC will coordinate and participate in at least two years of monitoring of the restoration and control sites and will extend the proposed monitoring period if funding resources are available. Each oyster restoration project will include a Before-After-Control-Impact (BACI) design, with a nearby site serving as a control. Data from other New England sources (both previously implemented projects and from literature) will be used to develop performance metrics for the restored oyster bed areas, which is generally agreed-upon to be densities of 50+ oysters per square meter in New England coastal waters.

Corner	Lat	Long
1	41° 44.537' N	70° 37.506' W
2	41° 44.592' N	70° 37.450' W
3	41° 44.604' N	70° 37.468' W
4	41° 44.546' N	70° 37.524' W

Figure 1. Proposed Bourne, MA oyster restoration location in Taylor Point Cove and approximate project footprint. Project implementation is expected in 2018.

Step 1. Use the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. Attach that list to the worksheet because it will be used in later steps. Make a preliminary determination on the need to conduct an EFH Consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs?	X	
Is the action located in or adjacent to EFH designated for larvae?	X	
Is the action located in or adjacent to EFH designated for juveniles?	X	
Is the action located in or adjacent to EFH designated for adults?	X	
Is the action located in or adjacent to EFH designated for spawning adults?	X	
If you answered no to all questions above, then EFH consultation is not required -go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

Step 2. In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Please note that, there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts.

2. SITE CHARACTERISTICS	
Site Characteristics	**Description**
Is the site intertidal, sub-tidal, or water column?	The proposed project site is sub-tidal, located in Bourne, Taylor Point Cove. The area includes historic oyster habitat.
What are the sediment characteristics?	Sediment conditions are mixed hard sand and gravel at the proposed project location.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so what type, size, characteristics?	There is no HAPC in the project area. The closest HAPC is designated for Atlantic Cod and is located in the Atlantic Ocean, approximately 270 km from the proposed project location.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the spatial extent.	According to the Massachusetts online mapping tool, there is no SAV present in the Taylor Point Cove portion of Buzzards Bay, including in the proposed project area (State of Massachusetts Online Mapping Tool, 2015). Field reconnaissance by TNC confirms these conditions, and the MA DMF will conduct follow-up diver reconnaissance in April-May of 2018 to determine resource presence and/or absence, including presence/absence of SAV.
What is typical salinity and temperature regime/range?	According to the National Wetlands Inventory (NWI) dataset describing Buzzards Bay, salinity exceeds 30 ppt. Water temperatures typically range 5–20°C.
What is the normal frequency of site disturbance, both natural and man-made?	We are not aware of any site disturbance, either natural or man-made, within the Bourne project footprint that is different than disturbance levels present throughout Buzzards Bay as a whole.
What is the area of proposed impact (work footprint & far afield)?	The proposed oyster restoration project site is ~1 acre in area.

Step 3. This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS			
Impacts	**Y**	**N**	**Description**
Nature and duration of activity(s)			Activities will include placing surf clam or other appropriate material, aged at least one year, on the Taylor Point Cove substrate. The restored substrate will be seeded with certified, disease-free spat-on-shell juvenile oysters. Seeding density will be approximately 250,000 spat per acre. The exact timing of placement will be based on environmental conditions. Disturbance caused by restoring oyster beds will be localized and small relative to the total habitat area available: the project area is approximately 1 acre, while the total area of Buzzards Bay, which includes Taylor Point Cove, is over 300,000 acres, so mobile species may avoid the area during the short construction period.
Will benthic community be disturbed?	**X**		Sediments and the resident benthic community will be disturbed when oyster shells are placed. Long-term conditions are expected to be better than existing conditions once the oyster bed is established.
Will SAV be impacted?		**X**	SAV will not be affected. Based on available information (State of Massachusetts Online Mapping Tool, 2015), no SAV is present in the proposed project location. This will be further assessed by MA DMF in spring 2018.
Will sediments be altered and/or sedimentation rates change?	**X**		Sediments in the project footprint area will be altered by the placement of cultch material but the negative impacts are expected to be minimal. The site was selected based on both current and historical conditions: current conditions consist primarily of hard-bottom, and historically oysters were present in the area. Long-term, the oyster reef will provide benefit to the bottom habitat and help stabilize sediment dynamics.
Will turbidity increase?	**X**		Turbidity will increase temporarily during shell placement. The oyster bed is expected to reduce turbidity in the long-term due to the substantial water filtering by oysters.
Will water depth change?		**X**	Average depth at the proposed project site is 2 feet, MLW. Final shell height is expected to be less than 0.5 ft high.
Will contaminants be released into sediments or water column?		**X**	No contamination is expected to be released. Oyster reef habitat will be restored using certified disease-free oyster spat. The proposed project site will be tested for shellfish disease before the project is implemented. If oyster disease is present at levels that would limit project success, then an alternate location will be selected.
Will tidal flow, currents or wave patterns be altered?		**X**	Due to the low profile of the material and the small footprint of the project area, no substantial changes to tidal flow, currents, or wave patterns are expected.
Will ambient salinity or temperature regime change?		**X**	No changes to ambient salinity or temperature regime are expected. Oyster bed projects do not influence these physical parameters.
Will water quality be altered?	**X**		Water quality (turbidity) may be briefly negatively affected during shell-placement activities. In the long-term, beginning immediately following oyster shell placement, water quality will be improved due to the high-filtering function of the oysters.

Step 4. This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species from the EFH species list (generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.nero.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			There is EFH for the following five species for all life stages within the proposed project footprint: Atlantic cod, Atlantic herring, Atlantic wolf fish, little skate, and winter skate. Within 5,000 meters of the proposed project area, there is EFH for those same 5 species and 11 additional species: Atlantic cod, haddock, ocean pout, pollock, red hake, sea scallop, silver hake, white hake, window pane flounder, winter flounder, and yellowtail flounder. These life stages may use sand and gravel habitats at the depth, salinities, and temperatures that may be present at the project site.
Spawning	**X**		This project may affect sands and gravels used for spawning by some of the listed EFH species. In general, oyster reefs are known to improve fish spawning habitat, so the long-term effects on spawning habitat are expected to be positive.
Nursery	**X**		This project may affect sands and gravels used as nursery habitat by some of the listed EFH species. In general, oyster reefs are known to improve fish nursery habitat through providing additional cover opportunities, so the long-term effects on nursery habitat are expected to be positive.
Forage	**X**		This project may affect sands and gravels that some of the listed EFH species use for foraging. In general, oyster reefs are known to improve fish foraging habitat by increasing the productivity per unit area, so the long-term effects on foraging habitat are expected to be positive.
Shelter	**X**		This project may affect sands and gravels that some of the listed EFH species use for shelter/cover habitat. In general, oyster reefs are known to improve fish shelter habitat, through providing void space and additional three-dimensional cover opportunities, so the long-term effects for sheltering habitat are expected to be positive.
Will impacts be temporary or permanent?			Impacts will be permanent, assuming the restored oyster bed habitat is sustainable. Impacts are expected to be net positive over the lifetime of the project.
Will compensatory mitigation be used?		**X**	No compensatory mitigation is proposed. Adding oyster shell will enhance the existing hard-bottom habitat and will provide additional habitat functions, ecological services, and values. Historically, oyster beds were widespread along the Atlantic Coast and are a keystone species in coastal embayments. TNC, NOAA and other organizations are committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).

Step 5. This section provides the Federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

5. DETERMINATION OF IMPACT		
		Federal agency's EFH determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: (check the appropriate statement)		**There is no adverse effect on EFH** **EFH Consultation is not required**
	X	**The adverse effect on EFH is not substantial.** **This is a request for an abbreviated EFH consultation. This worksheet is being submitted to NMFS to satisfy the EFH Assessment requirement.**
		The adverse effect on EFH is substantial. **This is a request for an expanded EFH consultation. A detailed written EFH assessment will be submitted to NMFS expanding upon the impacts revealed in this worksheet.**

Step 6. Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats. Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat)**
Alewife	Oyster reefs will improve water quality, habitat substrate, and fishery status in Buzzards Bay. The project is not expected to have any net negative impact on species present in the proposed project area. Oysters were historically widespread throughout the Atlantic Coast, are a keystone species, and provide numerous ecological services that benefit fisheries. NOAA has committed to restoring oyster populations, habitat, and fisheries throughout the United States (NOAA Restoration Center, 2015; Takacs et al., 2005).
Blueback herring	
Rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
Blue mussel	
Soft-shell clam	
Quahog	
Other species: **Black sea bass**	

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The Nature Conservancy (TNC). 2015. Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations. Reviewed and approved by the B-120 Shellfish Technical Advisory Committee, September.

Attachment 1

Species List generated using the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States, to generate the list of designated EFH for federally managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm) and the proposed project footprint. We evaluated species within the project footprint and within 5,000 meters of the proposed project area. For the Bourne Taylor Point Cove project location, there are some differences between the EFH designations identified within the project footprint compared with the surrounding area (within 5,000 m).

Table A1: EFH species and life-stages found within the proposed Bourne project footprint

Species	Life Stages	Type	Fishery Management Council
Atlantic cod	All, Adult, Eggs, Juvenile	EFH	NEFMC
Atlantic herring	All, Adult, Juvenile	EFH	NEFMC
Atlantic wolf fish	All	EFH	NEFMC
Little skate	All, Adult, Juvenile	EFH	NEFMC
Winter skate	All, Adult, Juvenile	EFH	NEFMC

NEFMC: New England Fishery Management Council.

Table A2: EFH species and life-stages found within 5,000 meters of the proposed Bourne project footprint

Species	Life stages	Type	Fishery Management Council
American plaice	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Atlantic cod	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Atlantic herring	All, Adult, Juvenile	EFH	NEFMC
Atlantic wolf fish	All	EFH	NEFMC
Haddock	All, Eggs, Larvae	EFH	NEFMC
Little skate	All, Adult, Juvenile	EFH	NEFMC
Ocean pout	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Pollock	All, Adult, Juvenile, Larvae	EFH	NEFMC
Red hake	All, Adult, Eggs, Juvenile	EFH	NEFMC
Sea scallop	All	EFH	NEFMC
Silver hake	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
White hake	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Windowpane flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC
Winter skate	All, Adult, Juvenile	EFH	NEFMC
Yellowtail flounder	All, Adult, Eggs, Juvenile, Larvae	EFH	NEFMC

Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations

Prepared by

Reviewed and approved by the B-120 Shellfish Technical Advisory Committee, September 2015.

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Buzzards Bay B-120 Shellfish Restoration Site Prioritization: Recommendations

Summary

In April of 2003 the grounding of the B-120 oil barge, owned and operated by the Bouchard Transportation Company, resulted in an estimated 98,000 gallon oil spill in Buzzards Bay. This incident caused natural resource and resource use injuries. Federal and state Trustee representatives are tasked, through an Oil Pollution Act settlement of injuries with the responsible party, with managing and supporting restoration of natural resource and resource use injuries. Natural resource and resource use restoration planning was completed and injuries to shellfish resources and the recreational shellfishery were among those addressed. The Nature Conservancy (TNC) was selected by the Trustees to implement restoration strategies. This document provides siting recommendations to the Trustees for shellfish restoration project work and details the process utilized to arrive at the recommendations.

Recommendations

Prioritized Recommendations to the Trustees for Oyster Restoration Work:

1st Fairhaven: Little Bay
2nd Wareham: Onset Bay
3rd Bourne: Cohasset Narrows
4th Falmouth: W. Falmouth Harbor
5th Marion: Inner Sippican Harbor (west side)

Prioritized Recommendations to the Trustees for Bay Scallop Restoration Work:

1st Bourne: Squeteague Harbor
2nd Falmouth: West Falmouth Harbor
3rd Wareham: Sunset Cove

Background

In April of 2003 the grounding of the B-120 oil barge, owned and operated by the Bouchard Transportation Company, resulted in an estimated 98,000 gallon oil spill in Buzzards Bay. A Trustee Council (Trustees) was formed with representation from the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), the

Commonwealth of Massachusetts through its Executive Office of Energy and Environmental Affairs (EEA) and oversight from its Department of Environmental Protection (MassDEP), and the State of Rhode Island through the Rhode Island Department of Environmental Management (RIDEM), in order to address the natural resource injuries resulting from the oil spill. Restoration planning was conducted by the Trustees, as is mandated by the Oil Pollution Act of 1990. The Trustees completed an Environmental Assessment in compliance with the National Environmental Policy Act to address potential impacts from proposed restoration project actions. The Trustees are responsible for restoring natural resources and resource services and uses injured by the spill.

The B-120 oil spill resulted in natural resource and resource use impacts in Buzzards Bay and the inclusive municipalities and municipal waters. Among the impacted resources and uses were shellfish such as hard clam (*Mercenaria mercenaria*), Eastern oyster (*Crassostrea virginica*), and bay scallop (*Argopectens irradians*) and recreational shellfisheries. As part of the restoration planning the Trustees solicited project ideas from the public and evaluated those ideas utilizing criteria specific to the shellfish natural resource category. The Nature Conservancy in Massachusetts (TNC) submitted an idea which identified multiple restoration projects targeting oysters and bay scallops. Ultimately the Trustees selected this Tier 1 shellfish restoration project work for implementation and have entered into a cooperative agreement, through NOAA, with TNC supported by a specific work plan (Appendix A) with a goal to restore impacted shellfish resources. As part of the work plan, TNC is tasked with convening and coordinating a Technical Advisory Committee (TAC) with the primary goal of prioritizing the locations of shellfish restoration in multiple towns. The TAC has been formed, developed its purpose and operating procedures, has met regularly, and through this document is recommending the priority municipalities and locations for shellfish restoration to the Trustees.

Overview of Scoring

The criteria used for site evaluation were the Nexus to the Injury, Municipal Engagement/Capacity, and Technical Feasibility which included ecological condition factors and regulatory considerations, as well as disease prevalence and load. Each category has a potential score range of 0 – 4. The nexus to injury category is weighted to represent one-half of the total score. Per the Trustee/TNC work plan at least three oyster restoration projects and one scallop restoration project are intended to be implemented. It should be noted that there are slight differences in the evaluating categories and overall scoring formula for oyster projects and scallop projects. The differences stem from less concern over disease prevalence and a discrete suite of ecological factors for scallop restoration projects.

To determine scores of the Nexus to Injury, documentation related to the B-120 injury assessment and restoration planning, specifically the Lost use Valuation Report prepared by the

Technical Working Group (2009), was consulted. To determine scores for Municipal Engagement/Capacity, information was gathered and interviews were conducted by TNC staff with municipal shellfish constables over the phone, in person, and through email contact. General questionnaires as well as site specific follow up questionnaires were distributed, discussed, and completed as a way to standardize the outreach protocol. Technical feasibility, at the embayment scale level, was determined from information provided by shellfish constables, gathered through desktop analysis, and site visits. In general there is scant information related to disease prevalence and load in Buzzards Bay. Sources were identified and consulted with little useful site specific data available. Information was gathered on the process for conducting shellfish disease testing. Below are the results of the prioritization process with proposed recommendations to the trustees as well as details on methods and justification.

Oyster sites were scored using the compiled information with a numeric 0-24 scale (Formula 1). The 0-24 scoring is based on a summary of each evaluation category, each having a possible rank of 0-4. As is reflected in the B-120 Final Programmatic Restoration Plan/Environmental Assessment the Nexus to Injury criterion is more heavily weighted than the other evaluation categories and it represents one-half of the total score. Multiplying the score for Nexus to Injury by three, a maximum score of 12 is possible. The maximum score representing the sum of all other evaluation categories, all weighted equally, is 12. Therefore, the scoring scale is 0 - 24 with Nexus to Injury representing one-half of the score, and the remaining evaluation criteria representing the other half of the score.

Formula 1. Formula for scoring oyster restoration sites.

Total Score (Scale 0-24) = (Nexus to Injury)*3 + (Technical Feasibility, Ecological and Regulatory Parameters) + (Technical Feasibility, Disease Presence and Load) + (Municipal Engagement and Capacity)

The specific scoring criteria descriptions and numerical values are listed below.

A site receiving a higher total score was considered as a higher priority for project work recommendation than one with a lower total score. Sites with the highest scores have been determined as the sites that should be recommended by the TAC to the Trustees for technical consideration and funding. The results represent project areas that will ecologically and logistically support shellfish restoration, in municipalities that have the willingness/capacity to support project work, while considering the level of impact of the B-120 oil spill on recreational shellfishing resources. It should be noted that sites are defined to the embayment level. This is the feasible scale to effectively evaluate locations. Specific delineation of project work will be determined during the local, state, and federal permitting process.

Evaluation Criteria – Nexus to Injury

The relative impact of the oil spill on recreational shellfishing resources was an evaluative criterion to aid the TAC in the prioritization process. Municipalities that were more heavily affected by the spill in terms of recreational shellfishing resources were determined by investigating the extent of harvestable area closed to harvest due to contamination from the oil spill. Additionally, the duration of time that harvest area was prohibited due to the spill, was considered when determining a municipality's Nexus to the Injury. This information was obtained from the Lost Use Valuation Report prepared by the Bouchard B-120 Oil Spill Lost Use Technical Working Group (2009), the Final Programmatic Restoration Plan and Environmental Assessment, and municipal/state agency input.

1. ***Nexus to Injury*** – Identify the level to which municipal shellfishing resources were impacted by the B-120 oil spill.
    i. Spatial extent parameters to consider include relative area of 'approved' and/or 'conditionally approved' waters closed to recreational shellfishing due to oiling.
    ii. Duration of closure parameters to consider include the relative length of time recreational shellfishing was prohibited due to oiling.

    - 4: Severely High Impact
    - 3: High Impact
    - 2: Medium Impact
    - 1: Low Impact
    - 0: No Impact

    The score is to be multiplied by three, per the scoring formula in Figure 1.

Evaluation Criteria – Municipal Engagement and Capacity

A municipality's willingness to participate in shellfish restoration was ascertained through an outreach protocol by TNC staff with support from the TAC. The willingness of a town to engage in the process of implementing a shellfish restoration project as proposed by the Trustee/TNC work plan was of critical concern. The ability of a municipality to undertake a restoration project, as determined by municipal shellfish capacities was also considered and was a factor in the site selection process. The willingness/ability of municipal involvement and capacity was determined through a standardized outreach program. TNC staff made contact with municipal shellfish representatives. TNC staff prepared and distributed a questionnaire to shellfish constables that requested pertinent material that informed the TAC as to the feasibility of a town's involvement (*Appendix B*). Once questionnaires were completed, follow-up interviews were conducted by TNC staff to further explore this evaluation. Capacity in the

way of staffing levels and historic and current programs in each town helped distinguish municipalities. Scoring of a municipality's willingness/ability to participate was influenced in part by the capacities available as well as the level of engagement in the process.

2. ***Municipal Engagement and Capacity*** – Identify municipalities that have the interest and ability to engage in the proposed methods of shellfish restoration.
    i. Municipal capacity parameters to consider include budget, staff, and equipment, as well as level of engagement in existing/historical programs such propagation, relays, aquaculture and ability to enforce and manage resources.
    ii. Municipal engagement and interest parameters to consider include level of engagement in TNC/TAC information gathering process, level of interest in supporting and managing restoration project work.

- 4: Municipality is engaged, willing, and able to carry out, support, and leverage restoration project work
- 3: Municipality is mostly willing and has capacity to undertake restoration project work
- 2: Municipality has limited interest and/or capacity to undertake restoration project work
- 1: Significant constraints exist in the form of municipal engagement and/or capacity
- 0: Municipality actively not interested in and/or unable to engage in restoration project work due to budgetary, staff capacities, or other constraints

Evaluation Criteria – Technical Feasibility

Reviewing ecological and regulatory requirements helped identify site specific conditions and factors that will support shellfish populations. These conditions and factors include such elements as water quality/chemistry, sub tidal water depth, and bottom substrate type. Other parameters considered were historic and current levels of shellfish populations, and prevalence of predators (e.g. oyster drills, sea stars). Shellfish disease is a major factor to consider when siting oyster restoration work. Through direct interactions with municipal shellfish department personnel and other local and state representatives, locations thought to be suitable for shellfish restoration were identified. Pertinent information including GIS produced maps were created and consulted (*Appendix C*). These maps were utilized as a cross reference tool in assessing site suitability. Through site visits and utilizing available date, areas were refined down to small embayments, portions of embayments, coves, and/or sections of estuaries, by TNC staff and TAC members working with shellfish constables and other appropriate local or state representatives. These coastal water areas were considered taking

into account ecological characteristics, regulatory and logistical factors that will support shellfish restoration project work.

3. ***Technical Feasibility*** – Identify areas that are ecologically suitable for the proposed method of shellfish restoration considering regulatory factors. This category contains two criteria. The first includes general ecological and regulatory parameters. The second includes disease prevalence and load for oyster siting consideration.

   i. Ecological and Regulatory Parameters

   A. Ecological parameters to consider include sub tidal depth, water chemistry and quality (for example: temperature, salinity, dissolved oxygen, availability of appropriate phytoplankton), hydrodynamics, evidence of existing or historic native shellfish populations, bottom/habitat characteristics, and predators.

   B. Regulatory parameters to consider include National Shellfish Sanitation Program water classification.

   - 4: Ecological and regulatory parameters of site are suitable for shellfish restoration
   - 3: Most of the environmental and regulatory factors necessary for restoration are present.
   - 2: Few of the environmental and regulatory factors necessary for restoration are present.
   - 1: Significant environmental and regulatory barriers exist for a successful restoration project.
   - 0: Environmental and regulatory parameters of site are in no way suitable for shellfish restoration.

   ii. Disease Prevalence and Load

   A. The presence or absence and/or level of shellfish disease such as Dermo, MSX, and JOD are critical factors in siting oyster restoration. Best available information including existing data and proxies will be utilized in determining scores.

   - 4: Shellfish disease is known to be absent from proposed site.
   - 3: Very low load of shellfish disease is present.
   - 2: Moderate levels of shellfish disease are known to be present.
   - 1: Level of shellfish disease load is a significant obstacle to restoration success
   - 0: Heavy load of shellfish disease is known at the site such that survivability of shellfish is extremely unlikely.

Findings/Justification - Oyster

The findings of the evaluation are laid out in order, first by those which were reviewed at the town level, followed by those at the site specific level. For example the Nexus to Injury and Municipal Engagement/Capacity are town level criteria and Technical Feasibility and Disease Prevalence and Load are site specific criteria.

As per the Trustee/TNC work plan, project work will take place in at least three Buzzards Bay towns. Therefore the top scoring towns were determined and the top scoring sites within those towns were selected as those to be recommended to the Trustees. The two highest scoring sites per town were identified with the second site representing an alternate. Presenting alternate sites allows flexibility for the TAC and Trustees, should new information become available particularly related to shellfish disease, unforeseen circumstances arise, or additional restoration project work become possible due to implementation cost savings and availability of funds.

Nexus to Injury - Oyster

The Nexus to Injury scores were determined by referencing the Lost Valuation Report. As per the agreed upon site prioritization process, the initial score would be multiplied by three to reflect one-half of the overall score.

Table 1: Nexus to Injury Score – Determined by Estimated Reduction in Shellfishing Trips

Municipality	Number of shellfishing trips 2003	Number of shellfishing trips 2004	Total reduction in shellfish trips	Raw Nexus to Injury Score (0-4)	Final Nexus to Injury Score (raw score*3)
Fairhaven	16,707	2,981	19,688	4	**12**
Wareham	6,808	2,998	9,806	3	**9**
Bourne	7,976	0	7,976	3	**9**
Mattapoisett	3,973	295	4,268	2	**6**
Marion	1,288	571	1,859	2	**6**
Falmouth	1,527	0	1,527	2	**6**
Dartmouth	688	395	1,083	2	**6**
Westport	594	305	899	1	**3**
New Bedford	194	0	194	1	**3**
Gosnold	-	-	-	0	**0**

Notes: Table 1 from Bouchard B-120 Oil Spill Buzzards Bay, MA Lost Valuation Report, Cooperatively prepared by the Bouchard B-120 Oil Spill Lost Use Technical Working Group (Edited: Sorted high to low, added Raw Score and Final Score for Nexus to Injury)

Municipal Engagement/Capacity - Oyster

This criterion was informed by the level of engagement of municipal officials in the site prioritization process as well as a determination of the capacity to support and manage shellfish restoration in each municipality. Engagement was measured by the timeliness, amount of time, and level of interaction municipal officials offered during the outreach protocol. Interest levels and willingness to take on additional management and project work were thoroughly

considered. Capacities were measured by evaluating town shellfish programs, staffing levels, equipment, resources, and previous shellfish restoration, relay, and stocking work. Additional factors considered include whether a municipality had submitted ideas to the Trustees during the initial restoration planning public solicitation period.

Table 2: Municipal Engagement/Capacity Score - Oyster

Town	Score (0-4)
Wareham	4
Fairhaven	4
Bourne	4
Falmouth	4
Marion	4
Gosnold	3
New Bedford	1
Dartmouth	1
Mattapoisett	0
Westport	0

Table 2: Score determined by TNC staff through interactions with municipal shellfish constables based on level of engagement in outreach protocol as well as evaluating municipal capacities.

Technical Feasibility - Oyster

Ecological and logistical information was gathered from the municipal shellfish constables through site visits and interviews. Desktop research was conducted to confirm and cross reference the primary data collected. Water chemistry data were provided by the Buzzards Bay Coalition, utilizing their extensive data set for Buzzards Bay coastal waters. Other reference materials were utilized from the Massachusetts Estuaries Project Reports. The parameters identified as important for receiving a high score include; the National Shellfish Sanitation Program (NSSP) designated growing area status being either Approved or Conditionally Approved; bottom characteristic of hard/firm; subtidal depth range considering feasible implementation, storm effects, and ice scouring; known presence of oysters or oyster larvae; salinity levels; and abundance of predators. Presence of oyster larvae in the system was of interest to evaluate if natural recruitment could be anticipated into a habitat limited area. Spat collection data were reviewed when available per an ongoing TNC study in multiple locations in Buzzards Bay including Fairhaven, Bourne, Gosnold, Marion, and Wareham. Salinity levels were of interest in the role that it plays regarding the likelihood of shellfish disease such as Dermo, which is generally more prevalent in moderate salinity conditions as well as prominent predators such as oyster drills which are less prevalent in low salinity conditions. Additional site specific factors considered were management/enforcement constraints such as public access and fishing pressure, and known presence of other shellfish species and/or seagrass. What is shown here represents the ten highest scored sites in the five highest scored towns. There were a total of 27 proposed, considered, and scored areas bay-wide.

Table 3: Technical Feasibility of Oyster Sites

Municipality	Site Location	Feasibility
Fairhaven		
	Little Bay	4
	Stony Cove	3
Wareham		
	Onset Bay	4
	Cohasset Narrows	4
Bourne	Cohasset Narrows	4
	Scotch House Cove	3
Falmouth		
	West Falmouth Harbor	4
	Quissett Harbor	4
Marion		
	Inner Sippican Harbor	4
	Hammett Cove	3

Disease Prevalence and Load - Oyster

The presence and level of disease in a particular embayment is not easily quantified. There is a lack of available historical or current data to be used to compare sites against one another. As part of the municipal outreach protocol TNC staff ascertained if shellfish disease testing was conducted in each municipality. The town of Bourne was the only municipality that has recently conducted shellfish disease testing. It is important to note that data in Bourne municipal waters was not available for proposed restoration locations. Locations selected by the town to conduct disease testing were chosen based on potential areas for stock enhancement through the town propagation program. These areas however did not coincide with locations the town supported for restoration project work.

Characterization of shellfish disease levels in a particular area was determined through conversations with shellfish constables. This often came in the form of evidence through indicators. For example proposed sites were scrutinized utilizing constable's knowledge of;

existing and historic oyster populations, freshwater inputs affecting salinity levels, and/or likely historic disease related loss of resource events. For example locations that currently support wild populations of oysters were considered as minimally impacted by disease loads. As some shellfish disease such as Dermo is more prevalent in moderate salinity conditions, data on salinity levels were evaluated. General site characterization including specifics on groundwater and river inputs was provided by constables and cross referenced with extensive data provided by the Buzzards Bay Coalition. In some cases constables recalled resource mortality events and linked these occurrences to disease prevalence. For example the constable in the Town of Bourne recalled 'flare ups' of Juvenile Oyster Disease (JOD) in a particular location. This information influenced initial screening and the proposed site in this example was therefore not considered further as a feasible location for project implementation. With an absence of scientific data related to disease prevalence affecting shellfish resources, the current and historic extent of shellfish populations and site characteristics were utilized as indicators of disease prevalence in site assessment.

Information on disease prevalence and load in Buzzards Bay was also sought from regional shellfish pathology testing laboratories. Some testing has been conducted at the request of the MA Division of Marine Fisheries prior to the movement or relay of shellfish, the Barnstable County Cooperative Extension as part of research efforts, and the private aquaculture industry. Solicitation for data from these entities and the two primary labs conducting testing yielded no usable data for particular embayments of interest in Buzzards Bay.

Currently, there is insufficient data to ascribe scores for this criterion though it has been left in the matrix. As more data becomes available it may be possible to assign scores for particular sites which will aid in the overall assessment and determination of project suitability. It is possible to obtain current shellfish disease prevalence and loading through pathology testing. These data will be produced through the collection of wild stock animals that will be sent to and evaluated by a reputable lab. TNC will coordinate logistics with local shellfish constables and the pathology lab to ensure, where possible that shellfish disease testing is conducted. Should the parameters required for testing such as availability of the size, indicating year class, and quantity of oysters, not be available for collection and testing, the existing ecological conditions may be used in making final site determinations. Any disease testing results will be made available to the TAC and Trustees for review, with the intention that it will be considered in final site selections.

In the event that a proposed site shows high levels of shellfish disease through testing, such that the outlook for project success is deemed limited, the alternate proposed site for that town will be further scrutinized for disease levels. If the alternate site is determined, through testing, to have levels of disease that would limit project success, then the next site on the

prioritized recommendation list will be slated for implementation. (Please refer to Table 4: Overall Oyster Matrix, for detail). This sequence presents the most equitable system of project implementation while taking into account the existing level of data available for site prioritization.

Table 4: Overall Oyster Matrix – reference map (Appendix D)

Municipality	Site Location	Nexus to Injury	Engagement/ Capacity	Feasibility	Disease	Overall Score
Fairhaven						
Priority	**Little Bay**	12	4	4	-	**20**
Alternate	Stony Cove	12	4	3	-	**19**
Wareham						
Priority	**Onset Bay**	9	4	4	-	**17**
Alternate	Cohasset Narrows	9	4	4	-	**17**
Bourne						
Priority	**Cohasset Narrows**	9	4	4	-	**17**
Alternate	Scotch House Cove	9	4	3	-	**16**
Falmouth						
Priority	**West Falmouth Harbor**	6	4	4	-	**14**
Alternate	Quissett Harbor	6	4	4	-	**14**
Marion						
Priority	**Inner Sippican Harbor**	6	4	4	-	**14**
Alternate	**Hammett Cove**	6	4	3	-	**13**

Final Prioritization - Oyster:

In some cases proposed restoration locations in different municipalities received the same score. In order to arrive at a fully prioritized list for the Trustees to review, the collected information was scrutinized to recommend project work at a particular site with a higher priority than another site receiving the same score. The information used to arrive at this determination is explained below for these cases.

Wareham and Bourne have sites that score equally. Wareham was determined to rank higher in the priority list due to the slightly higher level of engagement, support, and likelihood for project success. Wareham has significant resources in capacity, equipment, and project experience. This is evident from the constable supporting the TAC as the municipal representative for all of Buzzards Bay, as well as in the form of in-kind project implementation in similar restoration work in other towns. These two reasons lead to differentiation between sites receiving the same overall scores in different municipalities.

In another case, Falmouth and Marion have sites that score equally. Falmouth was determined to be prioritized ahead of Marion for the following reasons. The town of Falmouth has shown significant interest and investment in this type of shellfish restoration work ahead of this prioritization process. The town has invested in their own oyster reef restoration site feasibility assessments. Beyond that, implementation of restoration work has begun in municipal waters. There are significant town resources dedicated to oyster and shellfish research in town which may be leveraged to support proposed B-120 restoration work. These reasons lead to the differentiation between sites receiving the same overall scores in different municipalities.

Findings/Justification - Scallop

The same process for determining oyster project work was followed for the ranking of scallop restoration sites. Nexus to injury, municipal engagement /capacity, and technical feasibility were determined at the town and site specific level. There are slight variations in the scallop site prioritization process in relation to the methods used to determine oyster siting scores. One difference stems from the omission of the disease category. In order to weight the Nexus to Injury criterion as one-half of the overall score, the raw Nexus to Injury score was multiplied by two (Formula 2). There were also different responses from municipal representatives as to the level of interest in supporting a scallop restoration project. That fact coupled with the more limiting ecological requirements to increase the likelihood of a successful scallop project led to many fewer potential suitable sites for project work, as opposed to oyster restoration siting.

Formula 2. Formula for scoring scallop restoration sites.

Total Score (Scale 0-16) = (Nexus to Injury)*2 + (Technical Feasibility, Ecological and Regulatory Parameters) + (Municipal Engagement and Capacity)

Nexus to Injury - Scallop

Refer to Nexus to Injury raw scores as determined above. Raw Nexus scores remain the same with final scores determined by multiplying the raw score by two which results in the Nexus to Injury score representing one-half of the overall score.

Municipal engagement/capacity - Scallop

The same methodology to determine a municipality's level of engagement and capacity to support scallop project work was employed to determine the scores for this criterion. The results of this category are shown below, note that there are differences between some municipality's willingness to participate in scallop vs oyster work. The main differences are shown in that the Town of Fairhaven and Marion were less interested in pursuing this type of work which resulted in lower overall scores.

Table 5: Municipal Engagement/Capacity - Scallop

Municipality	Score
Wareham	4
Bourne	4
Falmouth	4
Gosnold	4
Fairhaven	1
Marion	1
Dartmouth	1
New Bedford	1
Mattapoisett	0
Westport	0

Technical feasibility - Scallop

Parameters considered when investigating project locations for scallop restoration included; a mostly enclosed embayment, size of embayment, presence of hard bottom and/or seagrass, and water quality. Smaller embayments, with hard sandy/gravely bottom characteristics, with seagrasses and lower nutrient inputs scored higher. These were determined through discussion with municipal shellfish constables, site visits, and desktop research.

Table 6: Technical feasibility scores for Scallop Restoration.

Town	Site	Score
Falmouth	West Falmouth Harbor	**4**
Gosnold	Cuttyhunk Harbor	**4**
Bourne	Squeteague Harbor	**3**
Bourne	Buttermilk Bay	**2**
Wareham	Sunset Cove	**2**

Table 6. Embayments that are mostly enclosed, with presence of seagrass within or in vicinity, with not heavily degraded water quality.

Table 7: Overall Scallop Matrix – reference map (Appendix D)

Municipality	Raw nexus	Nexus final	engagement	feasibility	overall
Bourne	3	6	4	3	13
Wareham	3	6	4	2	12
Falmouth	2	4	4	4	12
Fairhaven	4	8	1	0	9
Gosnold	0	0	4	4	8
Dartmouth	2	4	1	1	6
Marion	2	4	1	0	5
Mattapoisett	2	4	0	0	4
Westport	1	2	0	2	4
New Bedford	1	2	1	0	3

Table 8: Final Scallop Site Scores Prioritized for Recommendation.

Town	Site	Raw Nexus to Injury	Final Nexus to Injury	Municipal Engagement	Technical Feasibility	Overall
Bourne	Squeteague Harbor	3	6	4	3	**13**
Falmouth	West Falmouth Harbor	2	4	4	4	**12**
Wareham	Sunset Cove	3	6	4	2	**12**

Final Prioritization

Two sites in different municipalities received the same overall score. The scores were determined using the agreed upon criteria and methodology. West Falmouth Harbor in Falmouth and Sunset Cove in Wareham received the same overall score. To arrive at a fully prioritized list for the Trustees to review one site was selected as more likely to result in a successful outcome. There were environmental factors that resulted in a higher prioritization in

Falmouth such as the presence of seagrass particularly in the outer portion of West Falmouth Harbor as well as the potential for larval retention in the system leading to greater monitoring success.

Conclusions

The aforementioned recommendations are meant to provide a basis for the B-120 Buzzards Bay Trustees to support and implement municipal shellfish restoration as described in the Trustee/TNC work plan. Information was methodically gathered, analyzed, and reviewed by TNC staff and TAC members to arrive at the prioritized list of locations for oyster and scallop restoration project work.

Appendices

Appendix A – Trustee/TNC Work Plan

B-120 Buzzards Bay Shellfish and Recreational Shellfishing Restoration

The Nature Conservancy Statement of Work

Oyster and Bay Scallop Restoration

May 2015

Introduction

The 2003 B-120 Buzzards Bay oil spill resulted in substantial injury to shoreline and aquatic resources and lost public coastal assess and uses, including lost recreational shellfishing attributed to extended closures of shellfishing areas and human health risk. Following settlement with the Responsible Party in May 2011, the B120 Buzzards Bay Trustees ("Trustees") began restoration planning including the solicitation of project ideas from the public to be considered by the Trustees through the preparation and release of the Draft B-120 Buzzards Bay Restoration Plan and Environmental Assessment (RP/EA). The Nature Conservancy (TNC) submitted a project idea during the solicitation period in fall of 2011 which identified multiple restoration projects targeting oyster and bay scallop. The TNC shellfish restoration idea was evaluated using criteria specific to the shellfish natural resource category, identified by the Trustees as a Tier 1 preferred project in the Draft RP/EA (identified as project idea SH-13), and was selected by the Trustees as a Tier 1 preferred project in the Final Programmatic RP/EA (PRP/EA). Section 5.9.1.4 of the PRP describes the Tier 1 preferred oyster project components and Section 5.9.1.3 discusses the Tier 1 preferred bay scallop project components. This statement of work (SOW) serves as the plan for developing and implementing oyster and scallop projects supported by the Trustees and developed through the Final PRP.

The Nature Conservancy (TNC) has been working with local and state stakeholders to help coordinate proactive shellfish restoration activities in Buzzards Bay. In response to the shellfish injuries from the B-120 Buzzards Bay spill, in conjunction with a long-term need for restoring the once-abundant shellfish resources in the Bay, conservation organizations, municipal shellfish managers, the Massachusetts Division of Marine Fisheries (MA DMF), and other parties and individuals are interested in restoring and enhancing shellfish populations in Buzzards Bay. The intent of this effort is to increase shellfish populations that support sustainable harvests and long-term resource productivity and sustainability within Buzzards Bay municipal waters.

TNC proposes shellfish restoration and enhancement activities within municipal waters to increase and enhance populations of shellfish for improving both functional habitat and sustainable recreational shellfisheries. The oyster and scallop projects are also expected to provide benefits to a variety of species that rely on these biota and the diverse aquatic species assemblages associated with oyster beds and other healthy habitats supported by bivalves. These potential benefits include habitat enhancement for commercially and recreationally important finfish, decapods and other nekton that use oyster beds, eelgrass beds, and hard bottom substrates for spawning and foraging; wading birds, shorebirds and other waterfowl that rest and feed on bivalves and other benthic organisms which utilize shellfish habitats; and water quality improvements to reduce excess water column nutrient loads from anthropogenic sources.

Restoration Project Narrative

TNC proposes a 4-year work commitment as part of this SOW to develop, implement and assess performance of multiple oyster and bay scallop projects. The detailed work plan indicating work tasks over the 4-year period is attached as Appendix A.

TNC proposes to actively participate in and provide staffing support for a Technical Advisory Committee (TAC) comprised of MA DMF, TNC, NOAA (on behalf of the Trustees), and one municipal shellfish warden who will represent the ten Buzzards Bay municipalities. Between the agreement start date and October 31, 2015, the TAC will meet to identify and discuss potential restoration sites and develop and use site evaluation criteria for rating and ranking of feasible project sites in multiple Buzzards Bay towns. TNC, as part of the TAC, will provide a review and assessment of assembled shellfish data and other relevant information useful for developing strategies and recommendations to the Trustees for approval of funds for the selected project implementation. The restoration activities and work tasks proposed by TNC are discussed and distinguished according to oyster and bay scallop projects, as described below.

Restoration Site Prioritization

TNC proposes to undertake a shellfish restoration prioritization process during Year 1 of this SOW. This effort will include staffing and expertise to create a process and meetings with Buzzards Bay towns which are interested in restoration of oysters and bay scallops. Between April 1 and October 31 of 2015, the TAC will develop shellfish restoration project siting criteria, including the following: (1) ecological requirements (including bottom substrate and habitat, larval recruitment and retention, and water quality conditions), (2) local level willingness to participate and provide enforcement/management related to harvest as well as leveraged funding or in-kind support, and (3) the relative impacts of oil spill-related pollution on recreational shellfishing resources as determined by the B-120 Buzzards Bay Trustee Council findings. The final products of this process will be (1) a well-organized planning and site selection process and (2) a written site selection prioritization document, due on or before September 30, 2015, to undertake at least four shellfish restoration projects in Buzzards Bay municipal waters, including both oyster and bay scallop projects. Data compilation and analysis completed by TNC and the TAC will be reviewed, evaluated and used to identify priority shellfish restoration sites in the written prioritization document. The document will also include a summary section highlighting prioritization methods and results and recommended locations for shellfish restoration work matching the work plan timelines associated with the existing budget for this SOW. The Trustees will determine final project locations no later than October 31, 2015.

Existing mapping products developed by TNC using widely available state-level data sources offer planning tools for the potential siting of shellfish restoration projects as well as examples of local areas that are “zoomed” for detailed project-level assessment purposes. For detailed information relating to site selection criteria, TNC has provided a series of special assessments, titled *Assessing Shellfish Opportunities in*

Massachusetts, available at http://www.conservationgateway.org/News/Pages/MA-shellfish-restoration.aspx.

The data used to create this series are available from the Commonwealth of Massachusetts Office of Geographic and Environmental Information and the MA Division of Marine Fisheries. The following maps may be beneficial to the TAC and are available on the above-referenced web link:

- Designated Shellfish Growing Areas—open, condition open, prohibited
- Shellfish Habitat Suitability Areas—all shellfish species
- Bottom Sediment Composition—grab sample points
- Habitat Suitability—bottom type, shellfish suitability (oyster and blue mussel), and bathymetry
- Habitat Suitability and Designated Growing Areas—bottom type, and shellfish suitability
- Recreational Shellfish Licenses—number of licenses by municipality
- Commercial Shellfish Licenses—number of licenses by municipality
- Shellfish Aquaculture Leased Areas—number of licenses by municipality
- Municipal Shellfish Restoration Opportunity—level of shellfish activity by municipality

Information generated by TNC and the TAC through the oyster and scallop site prioritization is expected to be used by the Trustees in determining the level of environmental review required beyond the PRP/EA project Readiness Category II documentation. TNC understands that the Trustees will be responsible for coordinating and completing any requisite NEPA compliance for the oyster shellfish projects, but the Trustees may seek compiled site screening data and other information from TNC, TAC or other project/agency participants in completing any further NEPA compliance. The Trustees through the release of the Final PRP/EA determined that the proposed bay scallop projects qualify as Readiness Category I projects, and the NEPA compliance review is complete.

Oyster Restoration Projects

TNC proposes to implement three oyster placement projects under this 4-year Trustee-supported agreement. Project implementation will be located in priority sites as determined and agreed upon by the TAC and recommended to the Trustees for final determination; individual oyster projects are expected to be implemented in at least three municipalities based upon site evaluation criteria and project site prioritization.

Success of the oyster restoration projects will depend on appropriate conditions of the selected sites: appropriate benthic substrate composition, potential for larval recruitment and retention, tidal current velocities affecting the site, water quality conditions, planktonic food availability for oysters, sedimentation rates affecting oyster survival and growth, the presence

of oyster diseases that may affect local populations, and most likely, a combination of these factors that influence oyster population sustainability.

Restoration practices for oyster will include the placement of aged (at least one year) surf clam or other appropriate shell material as cultch at the agreed upon locations in municipal waters. Each of the proposed projects is anticipated to be 1+ acre, and will be seeded with disease-free certified spat-on-shell juvenile oysters at an estimated rate of 250,000 spat per acre. Shell material will be placed on the selected site bottom during mid to late June, and seeded with juvenile oysters in mid-July to ensure an opportunity to enhance wild recruitment of oyster larvae in Buzzards Bay waters, but this suggested timing may be adjusted to deal with changing conditions. All of the proposed restoration activities will be in compliance with the MA DMF Shellfish Planting Guidelines. Participating towns will be project proponents and the applicants for all permitting requirements, including compliance with the permitting process to obtain a Municipal Shellfish Propagation Permit from MA DMF for planned oyster restoration activities.

Oyster spat on shell will be placed strategically in multiple Buzzards Bay locations to increase local oyster populations to serve as spawner areas managed by the respective municipalities for sustainable recreational oyster harvesting. These restoration areas will receive shell cultch/hash to enhance bottom substrates to increase oyster set, recruitment, survivorship and growth where substrate habitat-limited conditions exist and will benefit from shell placement. Recreational oyster harvesting is anticipated with sustainable populations of oysters produced through targeted restoration techniques acceptable to Buzzards Bay municipalities.

TNC requests funds from the Trustees to manage and oversee the oyster restoration projects during the term of TNC's 4-year work commitment, working collaboratively with multiple participating municipalities and project participants. It is anticipated that TNC, the towns and other project participants will voluntarily provide leverage funding and in-kind labor and equipment to strengthen these projects and increase the likelihood of their success, and which may potentially stimulate additional projects and local stewardship in restoring and enhancing sustainable oyster populations throughout Buzzards Bay.

Oyster Project Performance Monitoring

Oyster restoration monitoring metrics are well described in *Oyster Habitat Restoration Monitoring and Assessment Handbook* (Baggett et al. 2014). The TAC will develop and recommend to the Trustees monitoring strategies for the funded projects. TNC will coordinate and participate in at least two years of monitoring of the restoration and control sites. If additional funds become available and staff time and resources allow, TNC will conduct site monitoring beyond the two years of funding currently dedicated for this purpose. TNC proposes to conduct the monitoring of the oyster restoration sites, and annually report the results to the TAC and Trustees for review and comment as part of the regular annual reporting

documentation. Reporting results will be used to determine whether project modifications or strategies are needed in subsequent oyster restoration project activities.

Each oyster restoration project will include a Before-After-Impact-Control (BACI) approach and site adjacent to the project site as a control. Since reference sites are generally not available in Buzzards Bay due to scarcity of native oyster beds, the BACI design will allow for comparison of similar bottom type both before and after project implementation. Data from other New England sources (both previously implemented projects and from literature) will be used to develop performance metrics for the restored oyster bed areas, which is generally agreed upon to be densities of 50 oysters per square meter in New England coastal waters.

Bay Scallop Projects

Bay scallop restoration employing caged spawner populations has been demonstrated to be successful. Following the *North Cape* oil spill off the southern coast of Rhode Island in 1996, a bay scallop restoration program was implemented in three Rhode Island coastal salt ponds (Ninigret Pond, Quonochontaug and Point Judith Ponds). At each pond location, a method of protecting reproductively mature broodstock scallops in mesh bags and cages was implemented. Caging the broodstock helped to protect against predation and increased survival, and reproductive output. The caged spawner method also affords limited broodstock to be in close proximity for increased fertilization success and recruitment.

The proposed projects aim to restore sustainable bay scallop populations that provide ecological services and support seasonal recreational shellfisheries. TNC proposes to purchase disease-free certified bay scallop seed from a state-certified commercial hatchery for employing restoration techniques, working in collaboration with participating municipalities. The intent is that scallop broodstock will spawn with gametes released into the water column; larvae will then settle naturally and recruit into the local Bay populations. The success of bay scallop restoration depends on larval retention in the system and survival throughout the planktonic phase, as well as availability of suitable settlement sites and the survival and growth of post-set to harvestable size.

TNC proposes establishing one or more caged spawner scallop populations that will be placed in selected municipal waters. TNC proposes to use B-120 Buzzards Bay funds to support one or more caged spawner projects over a two-year period of implementation to increase scallop recruitment and population size in the selected municipal water sites. Project locations will be located in priority sites as determined and agreed upon by the TAC and recommended to the Trustees for approval. Selected scallop project sites will be based on criteria and process discussed under the section titled, Restoration Site Prioritization, above.

TNC requests funds from the Trustees to manage and oversee the bay scallop restoration project(s) during the term of TNC's 4-year work commitment, working collaboratively with the participating municipalities (shellfish constables and other natural

resources staff) and project participants. It is anticipated that TNC, the towns and other project participants will voluntarily provide leverage funding and in-kind labor and equipment to strengthen the scallop project(s), increase the likelihood of success, and potentially stimulate additional projects and local stewardship for restoring and enhancing sustainable bay scallop populations.

Bay Scallop Project Performance Monitoring

The Trustees, through recommendations of the TAC, will require quantifiable metrics indicating the performance of bay scallop population restoration projects undertaken using the B-120 Buzzards Bay lost recreational shellfish settlement funds. The Trustees propose to cost-effectively allocate a portion of the bay scallop restoration funds to both TNC and MA DMF (funds for MA DMF will be addressed under a separate Trustee agreement) to complete pre- and post-project monitoring surveys. Staff from local municipalities and other organizations, as well as local volunteers may be available to assist in the project monitoring. Project performance, to be recommended by the TAC and approved by the Trustees, may include annual dive surveys (e.g., belt transects) to help assess scallop population size, scallop distribution according to bottom habitat type, and potential predator populations. Assessment techniques may also include installation and seasonal monitoring of spat bag arrays to quantify young-of-the-year scallops recruited into the population as a result of broodstock releases.

Each scallop restoration project will include a Before-After-Impact-Control (BACI) approach and site adjacent to the project site as a control. Since reference sites are generally not available in Buzzards Bay due to scarcity of bay scallops, the BACI design will allow for comparison of similar bottom type both before and after project implementation. Data from other New England sites (both previously implemented projects and from literature) will be used to develop performance metrics for scallop restoration work.

Reporting

TNC will prepare and submit 6-month progress reports (using the current NOAA Restoration Center report template) and detailed semi-annual technical reports with summary data tables and other graphics at the end of each project year for the anticipated agreement period of May 2015-February 2019. TNC will submit one final technical report within 3 months of the completion of all field work associated with the shellfish restoration projects completed under this SOW.

Data Sharing

TNC agrees to provide all desktop and field data collected for the Trustee-funded oyster and bay scallop projects to the TAC in electronic format (e.g., EXCEL, WORD, ArcView). In turn, data collected by MA DMF and others for the Trustee-funded bay scallop projects will be shared with TNC and the Trustees through the TAC. TNC will be responsible under this SOW to complete quality review and assurance before submitting the data and any summary data analyses and results. In addition, TNC also agrees to submit summary information on number of

volunteers, volunteer hours and any other in-kind services or equipment contributed to the Trustee-funded projects. As part of the annual technical reports, TNC will provide representative photographs of site work activities and volunteer participation.

Public Outreach and Education

The Trustees anticipate multiple public meetings associated with the shellfish restoration projects, and expect thoughtful coordination among the TAC and participating municipalities (e.g., town administrator, select board, shellfish constable involvement). TNC recognizes that it will be important to provide updates to the public indicating project progress and successes. TNC will attend public meetings that may be held in one or more Buzzards Bay municipalities, and will work with the Trustees to develop, organize, and present shellfish restoration project information at these public meetings. Work undertaken will be coordinated with TNC and the Trustees.

The Buzzards Bay Coalition (BBC) will play an active role under the subaward agreement to organize a preproject implementation informational meeting for each oyster or scallop location, provide preparation of presentation materials, and attend related board of selectmen, conservation commission, and shellfish advisory commission meetings.

TNC recognizes that the proposed restoration will provide excellent educational opportunities for volunteer engagement on in-the-water projects, experimental learning by youth and other volunteers, as well as important labor services needed to implement the restoration projects. Examples of engagement include participation in shell hash deployment, retrieval and processing of spat collectors, and monitoring survival and productivity of caged spawner scallops at the restoration sites. The BBC will provide outreach engagement with volunteers to provide assistance with spat-on-shell seed preparation (bagging shell), spreading shell cultch at the project site, and in-the-water monitoring activities.

Project Budget Justification

This SOW presents a budget breakdown based on the understanding that the Trustees are allocating $528,000 for this 4-year project. Monies will be transferred to NOAA; and NOAA will work with TNC, via a formal cooperative agreement, to implement the work. In 2015, the Trustees will transfer to NOAA funds for Year 1 of the Statement of Work. Funding for Years 2, 3 and 4 is expected to occur through the same process as that is applied in Year 1, and will be contingent on approval by the Trustees and NOAA Grants Management Division.

	GRANT*	**LEVERAGE**	**TOTAL**
SALARY	107,142	311,879	419,021
BENEFITS	42,857	122,045	164,902

TRAVEL	11,440	-	11,440
SUPPLIES	76,835	-	76,835
CONTRACTS - Outreach	15,000	-	15,000
CONTRACTS - Oyster	100,500	-	100,500
CONTRACTS - Scallop	58,900	-	58,900
OFFICE SPACE	15,000	-	15,000
PERMITS	6,000	-	6,000
TOTAL DIRECT	**433,674**	**433,924**	**867,598**
INDIRECT	**94,324**	**94,379**	**188,703**
TOTAL	**527,998**	**528,303**	**1,056,301**
*B-120 funds provided through cooperative agreement grant			

	Year 1	**Year 2**	**Year 3**	**Year 4**	**TOTAL**
SALARY	18,077	40,065	49,000	-	107,142
BENEFITS	7,231	16,026	19,600	-	42,857
TRAVEL	2,440	5,080	2,920	1,000	11,440
SUPPLIES	2,000	26,945	26,945	20,945	76,835
CONTRACTS - Outreach	-	5,000	5,000	5,000	15,000
CONTRACTS - Oyster	4,000	32,335	32,335	31,830	100,500
CONTRACTS - Scallop	4,000	24,450	24,450	6,000	58,900
OFFICE SPACE	5,000	5,000	5,000	-	15,000
Other Expense-Permit Fees*	-	2,000	2,000	2,000	6,000
TOTAL DIRECT	**42,748**	**156,901**	**167,250**	**66,775**	**433,674**

INDIRECT	**9,298**	**34,126**	**36,377**	**14,524**	**94,324**
TOTAL	**52,046**	**191,027**	**203,627**	**81,299**	**527,998**
* Municipalities are exempt from most permit fees; however the Chapter 91 Public Waterways License requires					
payment even by towns. Additonally, the Wetland Protection Act requires public notice in a newspaper					
for Notice of Intent purposes.					

Estimated Costs Related to Oyster Projects

Task	***1-Acre Cost***	***3-Acre Cost***
Pre- and post-monitoring	*$17,000*	*$51,000*
Contracts for shell/equipment placement	*$16,500*	*$49,500*
Permitting	*$2,000*	*$6,000**
Supplies (seed, spat on shell, buoys, line, ADP bags, fish totes)	*$20,500*	*$61,500*
Total **	***$56,000***	***$168,000***

Estimated Costs Related to Bay Scallop Project (2-year project)

Task	***1 Site, 2-year Deployment Cost***
Pre- and post-monitoring	*$22,900*
Contracts for cage deployment/removal and spat lines	*$36,000*
Permitting	*$0****
Supplies (broodstock scallops, buoys, cages, ADP bags, spat lines)	*$15,335*
Total*	***$74,235***

** This represents three 1-acre projects requiring separate applications, with estimated permitting costs of $2,000 per project, for a total of $6,000.*

*** Tables depict direct costs only. Other related project costs will include staff time, travel and indirect. Numbers are rounded due to annual average costs.*

**** Permits for caged scallops are not required since this will be considered an aquaculture activity within a municipal propagation permit.*

Budget Narrative (See Appendix B for First Year Budget)

Personnel: TNC MA Coastal Director (Jon Kachmar) will have primary responsibility for project oversight and completion for the duration of the project, estimated at 15% of FTE for the duration of the project. TNC MA Coastal Ecologist (Matt Pelikan) will provide assistance with

the in-water implementation and monitoring of restoration projects as well as grant and contract management estimated at 50% FTE for the duration of the project. Coastal Restoration Ecologist (Steve Kirk), based at TNC MA, has been hired as a termed TNC employee to provide overall in-the-water project implementation and monitoring work, estimated at 100% of FTE for years 1, 2 and 3 of the project. Year 4 activities will be covered by existing staff if additional funding is not secured to support the termed Coastal Restoration Ecologist. During the first year, the TNC New Hampshire Director of Marine Science and Conservation (Ray Konisky) will provide assistance with overall project design, in-the-water project siting, and monitoring planning estimated at 20% FTE. Other TNC staff who will dedicate a small (5% or less) amount of time working on this project will include TNC North America Coastal Restoration Coordinator (Bryan DeAngelis) who will provide guidance on project design, in-water restoration methods assistance, and project monitoring metrics; and Global Marine Team Restoration Scientist (Boze Hancock) who will provide scientific advice on project methods and monitoring during the duration of the project.

Total personnel cost budgeted to be funded by the grant is $107,879. TNC personnel cost which will leverage this grant is estimated to be at least: $311,879.

Fringe Benefits: Standard federally-approved TNC rates will be applied to salary. For budgeting purposes, TNC applied our current federally approved rate, which is 40%. Total grant funded fringe is estimated at $42,857. Amount of leveraged fringe that TNC expects to provide is at least: $122,045.

Travel: Reimbursement based on the federally-approved vehicle mileage rate for oyster and scallop restoration project work; related travel is estimated to be $11,440 and includes site visits to shellfish restoration project areas in Buzzards Bay, including an estimated 8 meetings per year over 3 years with project partners, contractors, Trustees, and other stakeholders, for a total of 24 meetings as well as other estimated travel to each of the four project locations throughout Buzzards Bay. The per unit cost is .575 cents per mile resulting in a total estimated 6,578 reimbursable miles over the duration of the project. All the travel funds requested are for vehicle mileage only; TNC will cover any limited per diem and hotel expenses associated with the projects.

Supplies: Costs are budgeted at $76,835 and will include Trustee-allowable costs for surf clam shell cultch (estimate based on $1,500 per 100 yards of shell delivered to each of the three project site shoreside locations, totaling $4,500), oyster (estimate $18,000 for 250,000 spat-on-shell seeds for each of the three projects totaling $54,000) and scallop seed (estimate $4,000 for 10,000 scallops deployed twice over 2-year spawner project, for a total of $8,000). $10,335 in supplies is for aquaculture growing cages, buoys, line and float supplies, monitoring and other field needs such as diving supplies, transect and quadrat monitoring materials, aquaculture bags for spat collection; and printing of photos, maps, and reports.

Contractual: TNC has budgeted $174,400 for the following contracts and sub awards expenses. Shell cultch loading services from shoreside shell pile to barge (Assumes $500 per day for three days for each of the 3 oyster projects, totaling $4,500) Barge services (Assumes $5,000 per day for 3 days for each of the 3 oyster restoration projects, totaling $45,000), diving services for scallop projects (Assumes $1,000 per day for 4 contract divers working 8 days per year over 2 years, totaling $16,000);) and equipment installation/removal of aquaculture cages by contractors (Assumes $500 per day for 8 days for each year of 2-year scallop project, totaling $8,000), scallop cage maintenance (Assumes $500 per day for 12 days per year for each of the 2-year scallop project, totaling $12,000), pre-and post-monitoring of oyster and scallop populations (Estimated at $18,000 per year based on past contracted monitoring services and additional quotes from potential contractors for this work for 3 years of monitoring during years 2, 3 and 4 with some limited expenses anticipated in Year 1 ($4,000) to secure pre-monitoring for Year 2 with $15,000 needed in year 4, totaling $73,900), Pre- and post-monitoring for oysters will be awarded under contract to a qualified institution or entity and will include diving, transect work, and report writing, and while we have identified several options for monitoring including academic, private and public organizations, per federal contracting requirements this work will be bid or sole source justified, whichever is applicable. Subaward to Buzzards Bay Coalition for outreach and education of the 4-year period ($5,000 per year over 3 years, totaling $15,000). Note, included in this total is $8,000 ($4,000 for oysters and $4,000 for scallops) that we anticipate may need to be expended in Year 1 to secure the contract work necessary for project work in Year 2. This represents work needed to undertake pre-monitoring and other site planning work required as a result of the anticipated lag in approval for Year 2 work for oyster and scallop projects. All of these estimated costs assume contracting with the private sector for services. However, if we are successful in receiving in-kind services from the municipalities where the projects will occur, these leveraged in-kind services could considerably reduce the contract costs. However, since TNC is uncertain what municipalities will be engaged in the work until after final site selection is completed in October 2015, TNC assumes reliance on the contracts to complete the proposed work. Any cost savings will be proposed for re-investment in additional in-water shellfish restoration work.

Other: We budgeted approximately $6,000 for permit application fees, project plans and related expenses. We have also budgeted $15,000 for three years of leased office space for the Coastal Restoration Ecologist Position, which will be necessary to be based in the project area.

Indirect: We budgeted $94,324 for indirect on billable expenses and $94,379 for indirect cost on leveraged costs. TNC's annually approved federal NICRA rate will be applied. For budgeting purposes, we have used our fiscal year 2016 proposed rate of 21.75%.

Contact Information

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	Appendix A--NOAA BOUCHARD DETAILED WORKPLAN	
Task 1	Priortization and Site Selection—Oyster and scallop site planning with municipalities and partners including implementation plan with specific project locations	May 2015 to September 2015
Task 2	Provide technical assistance for prioritized shellfish restoration project planning to municipalities	May 2015 to October 2015
Task 3	Pre-monitoring and securing necessary agreements for Year 2 projects	October 2015
Task 5	Project team coordination and Technical Adviosry Committee (TAC) staffing for projects #1 and #2	November 2015
Task 6	Oyster Project #1 - Oyster Restoration planning, permitting & implementation	November 2015 to July 2016
	Scallop Project #1a (phase 1) - Scallop restoration planning, permitting & implementation	November 2015 to July 2016
Task 7	Public outreach and participation in meetings	November 2015 and June 2016
Task 8	Project pre-monitoring	May 2016 and June 2016

Task 9	Project post-restoration monitoring	October 2016
Task 10	Project reporting summary and overall results	December 2016
Task 11	Project team coordination for projects #2 and #3	November 2016
Task 12	Oyster Project #2 - Oyster restoration planning, permitting & implementation	November 2016 to July 2017
	Scallop Project #1b (Phase 2) - Scallop restoration planning, permitting & implementation	November 2016 to July 2017
Task 13	Public outreach and participation meetings	November 2016 and June 2017
Task 14	Project pre-monitoring	May 2017 and June 2017
Task 15	Project post-restoration monitoring	October 2017
Takl 16	Project reporting summary and overall results	December 2016
Task 17	Project team coordination meeting for projects #5	November 2017
Task 18	Oyster Project #3 - Oyster restoration planning, permitting & implementation	November 2017 to July 2018
Task 19	Public outreach and participation meetings	November 2017 and June 2018
Task 20	Project pre-monitoring	May 2018 and June 2018
Task 21	Project post-restoration monitoring	October 2018

Task 22	Final 4-year project reporting summary and performance monitoring results	February 2019

Appendix B—Year 1 Budget, Bouchard B-120

Category	Position / summary	portion of time; # of units	rate	Total
Personnel*				
	TNC MA Coastal Ecologist (Steve Kirk)	*.08 FTE*		*$5,000*
	TNC NH Director of Marine Science & Conservation (Ray Konisky)	*.12 FTE*		*$8,077*
	TNC North America Coastal Restoration Coordinator (Bryan DeAngelis)	*.06 FTE*		*$5,000*
	**Additional staff who will work on this project in year one and may charge a small amount of time include: TNC MA Coastal Director, TNC MA Coastal Ecologist, TNC Global Marine Team Restoration Scientist*			
Total Personnel				$18,077
Benefits	TNC - Approved benefits rate		40% of personnel	$7,231
Travel	Mileage reimbursement at the federally approved vehicle mileage rate	4,244 Miles	0.575/mile	$2,440
Supplies	Seed deposit, if necessary, for year 2 project ($1,000) and other general supplies ($1,000) including, printing, photo, maps, reports, etc.			$2,000
Contracts	Potential deposits to secure pre-monitoring contacts (oyster & scallop) if necessary for Year 2	2 contracts	$4,000.00	$8,000
Other	One year lease of office space for Restoration Ecologist Position in Buzzards Bay area	1 lease	$5,000	$5,000
Total Direct				$42,748
Total Indirect	Actual to be based on TNC-Federally approved NICRA. TNC's FY 15 Federally Approved NICRA rate is 22.48%. TNC's proposed rate for FY16 (effective 7/1/15) is 21.75%.		21.75%	$9,298

Total Budget				$52,046

Appendix B – Municipal Questionnaire and Follow up

_____(Municipality) _____(Name, Position)

This questionnaire is meant to gain a general understanding of the willingness/ability of a municipality to undertake shellfish restoration.

1. Environmental Factors:
    a. What shellfish species are present in your municipality?
    _____
    b. Can you generally characterize the water quality in your municipality?
    Choose One: 1.Good 2. Fair 3. Poor (Comment_____)
    c. What is the rough percentage of 'open' vs 'closed' waters? _____
    Rain closures? (yes/no) _____
    d. Are there areas of significant coastal erosion in your municipality?_____
    e. Has there been a recent history of shellfish disease in your municipality and if so:
    What/Where?_____

2. Municipal shellfish program
    a. List/describe shellfish program in town: (For example: Species, Relay, Propagation, Aquaculture)_____
    _____
    _____
    b. Number of recreational permit holders. _____How much recreational shellfishing activity? What species?_____
    c. Number of commercial permits holders._____How much commercial shellfishing activity? What species?_____
    d. Did your town submit proposal/s to B-120 Trustees for shellfish restoration?_____ If yes, which proposal?_____

3. Municipal Resources:
    a. Shellfish/Natural Resources budget_____
    b. Staff
        i. Year Round_____
        ii. Seasonal_____
    c. Equipment, please list (boats, barges, upwellers, growout gear, etc.)
    _____
    _____
    _____

CONTINUE ON NEXT PAGE CONTINUE ON NEXT PAGE

4. Level of Interest (0 = no interest, 5 = extremely interested)
    - **a.** How interested are you/your municipality in building oyster reefs for ecosystem service purposes? (Water quality improvement, habitat creation, erosion control)
      Please Circle One 0 1 2 3 4 5
    - **b.** How interested are you/your municipality in building oyster reefs for fisheries enhancement?
      Please Circle One 0 1 2 3 4 5
    - **c.** How interested are you/your municipality in deploying caged scallops as a spawner population?
      Please Circle One 0 1 2 3 4 5
    - **d.** How interested are you in managing restored shellfish areas resource in restoration areas for extended periods? (For example, 5 years or greater?)
      Please Circle One 0 1 2 3 4 5

5. Other:
    a. Please feel free to provide other comments that you think important to discuss or not covered in this questionnaire. (For example: political realities in my municipality limit the chance of this type of work because the selectmen are totally opposed.)

_____
_____
_____
_____
_____
_____
_____
_____

Please contact me with questions. I plan on reaching out to you to follow up, preferably in person to discuss your responses. Thank you.

Respectfully,

Steve Kirk Costal Restoration Ecologist

The Nature Conservancy – MA

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FOLLOW UP QUESTIONNAIRE

Municipality_____ Oyster

Site Location _____

NSSP Designated Growing Area number :_____ (Approved, Conditional, Restricted, Prohibited)

Average depth at mlw _____

Bottom characteristic: (soft/medium/hard), Sediment Type: (Mud/Sand/gravel/cobble)

Wave energy level: (Low Med High) Direction of greatest exposure to wind _____ Fetch _____

Presence adult oysters (Yes/No) Presence Juvenile Oysters (Yes/No) Presence Oyster Larvae (Yes/No)

Historical Presence of Oysters (Yes/No) Evidence_____

Nearby shoreside habitat (marsh, wooded, agriculture, suburban, heavily developed)

Known presence of other shellfish species (Yes/No)_____

Known presence of submerged aquatic vegetation i.e. eelgrass (Yes/No)

Open to harvest: (Yes/No) (Commercial/Recreational)

Shellfish relayed into area: (Yes/No) Shellfish relayed out of area (Yes/No)

Nearest public access point_____

Does your town conduct shellfish disease testing? (Yes/No) In this area? (Yes/No)

Assessing Shellfish Restoration Opportunities and Constraints in Massachusetts Using GIS-based Mapping

Objective

The objective of assessing shellfish in Massachusetts, and relevant parameters related to their lifecycles, is to better understand the current opportunities and constraints that exist for siting shellfish restoration projects. The Nature Conservancy is interested in restoring/enhancing native shellfish beds in an effort to recognize the ecological services they provide (water quality, habitat, nutrient cycling, and potentially storm protection). The focus of this shellfish mapping exercise is to identify, display and analyze existing data that are pertinent to the siting of shellfish restoration projects in near coastal municipal waters.

The mapping products in this document offer a planning tool for the potential siting of shellfish restoration projects, realizing that some areas considered for restoration may turn out to be impractical based on other user needs, on-the-ground conditions, and subsequent discussions with local, state and private interests. Distribution of the maps is intended for municipal shellfish wardens and/or harbormasters with responsibilities for shellfish resources as well as other individuals and organizations interested in restoration.

Intent

The following considerations were used to create the attached shellfish restoration assessment maps:

- For habitat suitability (species specific areas) we have focused only on two habitat-building species: American oysters and blue mussels. Habitat suitability site selection considers historic and current population of shellfish as well as the necessary ecological enabling conditions that support opportunities for their restoration such as hard bottom areas and appropriate range of water depth.

- The intent of this work is to provide assessment information for avoiding conflicts with public health related shellfish closure areas, public recreational and commercial shellfishing activities, aquaculture growing areas, and any other unidentified existing or future uses.

- A better understanding of opportunities and constraints for siting shellfish restoration in municipal waters within the Commonwealth to result in more successful projects, for both ecological and social benefits.

Assessment Criteria

While there is a plethora of data available for accessing shellfish restoration opportunities, the following six data layers are readily available for this effort.

Sediment Characteristics:

This layer is based on state MassGIS office data showing bottom grab samples throughout near coastal waters in Massachusetts. The maps provide samples of both hard bottom areas conducive to oyster and blue mussel restoration work and a category for all other bottom sample types. This will allow for determining the areas that might naturally have habitat building shellfish beds (oysters and mussels), particularly the hard bottom areas such as gravel and rock sediment types.

Shellfish Water Classification (Shellfish Growing Areas):

These data are provided by the Massachusetts Division of Marine Fisheries (MA DMF) in order to reduce the risk of pathogens getting into shellfish for human consumption. The categories include approved (open), conditionally approved, conditionally restricted, prohibited (closed), restricted, and management closure. This layer is important for understanding current growing/fishing activities as well as limitations on planting for ecological services. (Note: this publication includes a static look at a particular point in time for the various water quality classifications. Since growing areas are updated regularly you must consult the MA DMF and/or the municipality of interest for official up-to-date information.)

Shellfish Suitability Areas:

These layers are provided by the MA DMF in an effort to capture both historic and current populations of various commercial shellfish species (includes blue mussels, quahogs, razor clams, oysters, softshell clams, scallops, and surf clams). This information also helps develop a foundation for site selection that incorporates known or existing native shellfish areas.

Municipal Shellfish Activities:

This layer was developed by The Nature Conservancy (TNC) using data assembled from municipal shellfish constable, harbor masters or other individuals responsible for shellfish regulation at the municipal level. Since shellfish management in Massachusetts is undertaken with an integrated state management and local implementation approach, ecological restoration activities will need to be in concert with local and state shellfish management requirements.

Municipal Shellfish Permits

These data are provided by the MA DMF pertaining to the number of shellfish permits granted in each town for both recreational and commercial fishing activities. This is a measure of the degree of shellfishing activity within each municipality.

Aquaculture Licenses:

Licenses for shellfish aquaculture activities data are provided by MA DMF. This information quantifies the number of licenses by municipality. While a spatial layer of such activities is not available at a state or municipal level, this information provided guidance for seeking more specific information from individual municipalities as needed.

Bathymetry (Bottom Depth):

Bathymetry data is assembled from two sources. The state MassGIS office provides bathymetry for all Massachusetts state waters. Actual water depth survey information is also available from the National Oceanic and Atmospheric Administration (NOAA) nautical charts for Massachusetts waters. Both sources of bathymetric data provide insight into shellfish growing enabling conditions based on each shellfish species preferred habitat types and associated water depths.

Final Mapping Products

The attached shellfish restoration siting maps include the data layers as identified above. These layers are displayed either independently or in composite with other data depending upon the scale and/or relevance of the specific data. This process is not intended to create a prioritized list of potential shellfish restoration locations since each possible location will require additional analysis and consultation as well as permitting discussions with municipalities and state resource managers before any investment is considered.

Some of the layers are more appropriately viewed at a statewide level to understand where shellfish resources, as well as associated enabling conditions, are concentrated within the Commonwealth. State level maps include the following:

- Designated Shellfish Growing Areas—open, prohibited, etc.
- Shellfish Habitat Suitability Areas—all shellfish species
- Seafloor Sediment Composition—grab sample points
- Habitat Suitability—bottom type, shellfish suitability (oyster and blue mussel), and bathymetry
- Habitat Suitability and Designated Growing Areas—bottom type, and shellfish suitability
- Recreational Shellfish Licenses—number of licenses by municipality

- Commercial Shellfish Licenses—number of licenses by municipality
- Shellfish Aquaculture Leased Areas—number of licenses by municipality
- Municipal Shellfish Restoration Opportunity—level of shellfish activity by municipality

In an effort to provide examples of finer resolution data analysis, maps have been developed for "zoomed in" areas within the Commonwealth. These regions include the North Shore, Boston Harbor, South Shore, Cape Cod, Buzzards Bay and the Islands. We hope to eventually upload these data into an online viewer that would allow the user to zoom in to any coastal location to further assess restoration potential wherever it is desired. Each map for the region's specific locations include seafloor sediment composition, designated shellfish growing areas, shellfish habitat suitability areas, and seagrass mapping. The following maps are available:

- Parker River—Newbury/Rowely/Ipswich
- Boston Harbor--Boston
- North River—Marshfield
- Plymouth Harbor 1 and 2--Plymouth
- Great Neck—Wareham
- Sconticut Neck—Fairhaven
- Bass and Swan Pond Rivers—Dennis
- Also, all Buzzards Bay Towns

For additional information please see:
http://www.conservationgateway.org/ConservationPractices/Marine/HabitatProtectionandRestoration/Pages/MA-shellfish-restoration.aspx

Contact:

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Appendix D – Buzzards Bay Reference Map