FINAL SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR SALT MARSH, FISH PASSAGE, AND EELGRASS RESTORATION ADDRESSING THE BOUCHARD BARGE-120 (B-120) BUZZARDS BAY OIL SPILL SHORELINE, AQUATIC AND NATURAL RESOURCE USE INJURIES MASSACHUSETTS AND RHODE ISLAND

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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 in southeastern Massachusetts. 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 injuries and lost public uses, including marsh habitat, estuarine and tidal freshwater habitats, and eelgrass habitat. 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 Resource Damage Assessment (NRDA) process, the Buzzards Bay Trustees [hereafter, "the Trustees," including the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (USFWS), the Massachusetts Executive Office of Energy and Environmental Affairs (MA EOEEA), and the Rhode Island Department of Environmental Management (RIDEM)], previously conducted restoration planning via release of a Draft Restoration Plan and Environmental Assessment (RP/EA) for the Buzzards Bay B-120 Oil Spill (NOAA et al. 2014). The RP/EA was prepared in accordance with the National Environmental Policy Act (NEPA) to evaluate impacts from the proposed restoration alternatives and consider public input.

After receiving and thoroughly considering public input, a Final Programmatic Restoration Plan (PRP)/EA) and Finding of No Significant Impact (FONSI) were issued in September 2014, and are 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 resource services to baseline conditions, and compensate for interim losses. This Final Supplemental EA (SEA) has been prepared in accordance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.28) to "tier off" of the Final PRP/EA 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 restoration projects.[1] This Final SEA has been prepared with public review of the Draft SEA, and to fulfill NEPA analysis requirements for three Readiness Category II projects identified in the Final PRP/EA as Tier 1-preferred priority projects: the Round Hill Salt Marsh Restoration Project (SA-4), Horseshoe Pond Dam – Weweantic River Restoration Project (SA-2), and the conservation mooring project for restoring eelgrass (SA-10), hereafter the "Conservation Moorings Restoration Project."

[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 SEA addresses the site-specific elements related to the proposed actions. Specific references to sections of the Final PRP/EA relevant to the analysis in this SEA are provided, as needed.

Readiness Category II projects are projects that were in the early planning or preliminary design phase at the time the Final PRP/EA was developed and released, but lacked sufficient details needed to complete a federal environmental review. At the time of the Final PRP/EA release, the Trustees proposed to only use funds to complete sufficient planning and preliminary design on these projects to understand their potential environmental impact. The three projects included in this Final SEA are now advancing to the design and permitting phase, and environmental compliance consultations have been initiated prior to or concurrently with this SEA document.

In addition to NRDA injury restoration funding for the Buzzards Bay oil spill, the Round Hill Salt Marsh Restoration Project was previously identified as a project alternative for the NRDA injury restoration for the New Bedford Harbor (NBH) contamination, affected by polychlorinated biphenyls (PCBs). The NBH Trustee Council identified this project as a preferred alternative in its Round III and Round IV Restoration Plans. Lastly, the Round Hill Salt Marsh Restoration Project was also selected to receive supplemental construction funds administered by the USFWS from the Disaster Relief Appropriations Act of 2013 (Hurricane Sandy). This Final SEA examines and discusses the alternatives and environmental consequences of the preferred and non-preferred alternatives for the Round Hill Marsh Restoration Project to also address NEPA for the Disaster Relief Appropriations Act of 2013 funding for the project. In January 2017, the Trustees released the Draft SEA for public review and input. This Final SEA, accompanying the FONSI, incorporates the public input provided on the Draft SEA.

1.1. Proposed Actions

The B-120 oil spill impacted marsh, tidal freshwater, estuarine, and eelgrass habitats in Buzzards Bay. To address these impacts, the Trustees are proposing to fund implementation of the Round Hill Salt Marsh Restoration Project, the Horseshoe Pond Dam – Weweantic River Restoration Project, and the Conservation Moorings Restoration Project. An overview of each of these projects is provided below.

1.1.1 Round Hill Salt Marsh Restoration Project

The goal of this project, with the site located in Dartmouth, MA, is to restore 11± acres of intertidal native *Spartina*-dominated high and low salt marsh community and the ecological functions and services lost from the site over nearly 100 years due to historic soil filling, loss of tidal exchange, and other ecological disturbances. The proposed project will also protect and enhance the ecological integrity of Meadow Shores Marsh to the immediate west by interconnecting the sustaining tidal hydrology and re-establishing a more stable tidal inlet channel through the barrier beach and through which the tidal waters flow. The restored saltmarsh will enhance the tidal exchange between this larger marsh area and Buzzards Bay to increase ecological services provided by this salt marsh-and-coastal beach complex.

1.1.2 Horseshoe Pond Dam – Weweantic River Restoration Project

This project will remove the existing, dilapidated Horseshoe Pond dam structure, repair the bridge,

remove the dam apron, install two canoe/kayak launches, stabilize downstream streambanks, and manage invasive species. In addition to removing a public safety hazard structure that requires regular inspection and maintenance, this project will restore historical, native habitat conditions for fish, wildlife, and plants. Removing the dam will restore natural tidal exchange between the Weweantic River and estuary, and will afford upstream riverine habitat accessibility to migratory fish species for spawning, rearing, and restoring healthy, sustainable diadromous fish runs.

1.1.3 Conservation Moorings Restoration Project

This project is to restore eelgrass beds and protect vegetation from disturbance and marine bottom sediment scour associated with traditional boat moorings and mooring chains by replacing traditional moorings with technologically-advanced moorings termed "conservation moorings," thereby allowing existing bare substrate scars in eelgrass beds to naturally revegetate and coalesce as a dense bed. Installation of innovative conservation boat moorings and diligent maintenance activities are known to lessen impacts to ecologically important eelgrass beds, including marina sites in Buzzards Bay. In addition to replacing traditional moorings with conservation moorings, a project award requirement will include regular maintenance of these moorings. Project site locations would be selected through a competitive grant proposal process, focused on locations in Buzzards Bay where existing moorings are known to be causing scouring and scars in existing eelgrass beds. While most of the mooring locations are expected to be characterized by very similar ecological conditions and nearby marina activities and operations, the grant solicitation process will carefully take into account and evaluate site-specific conditions and any potential impacts that may not be fully addressed in this Final SEA. As previously noted in Section 6.3.3 of the Final PRP/EA, negligible negative impacts would be expected with their installation. To add, as predicted in the Final PRP/EA, the Corps of Engineers now uses a General Permit for the installation of conservation moorings due to the overall negligible negative impacts from the proper implementation of this technique and associated maintenance.

1.2. Public Participation

The public commented on the Draft B-120 Buzzards Bay RP/EA and were provided the opportunity to propose project ideas and alternatives related to the injury restoration goals established by the Trustees in the Draft RP/EA. Following the issuance of the B-120 Buzzards Bay Final RP/EA in which these three projects were identified as preferred projects recommended for implementation, public meetings were held to inform the public about each of the projects. In addition, as part of the process for completing the Federal environmental review of these projects, the Trustees solicited the public for further input through a 30-day comment period (completed in February 2017) for the Draft SEA document. During the public comment period, one letter and one verbal comment were received by the Trustees, and clarifications have been made to this document in response to the comments (Refer to Appendix D for a summary of the comments).

Round Hill: The Round Hill Salt Marsh Restoration Project has received funding from multiple federal and state agency sources, and as part of the funding process, the project proponents (Town of Dartmouth, Massachusetts Department of Fish & Game - Division of Ecological Restoration (MA

DER), NOAA, and USFWS) have conducted thorough outreach with the public, including three public meetings to discuss project goals and objectives and the final project design (Table 1).

Table 1. Public Outreach Meetings for the Round Hill Salt Marsh Restoration Project

Date	Type of Outreach	Summary of Information
September 30, 2014	Final PRP/EA released (with response to comments)	Addressed all questions and comments received on the proposed project during the public comment period for the Draft RP/EA
November 19, 2015	Public meeting/ presentation	Presented project goals/objectives and initial proposed plans for review
January 19, 2016	Meeting minutes published	Summarized questions and answers from November 19, 2015 meeting
June 29, 2016	Public meeting/ presentation	Presented revised preferred project alternative design plans
January 25, 2017	Public meeting/ presentation	Presented a refined, preferred project alternative design, including the tidal inlet channel design and operation and maintenance plan

Horseshoe Pond: The Horseshoe Pond Dam – Weweantic River Restoration Project was proposed by the Buzzards Bay Coalition (BBC), as owner of the property. The BBC has worked collaboratively with other project proponents including the NOAA, USFWS and the Massachusetts Division of Marine Fisheries (MA DMF) to develop and assess a set of project alternatives. The BBC led two public meetings to present the project alternatives and a feasibility analysis (Table 2).

Table 2. Public Outreach Meetings for the Horseshoe Pond – Weweantic River Restoration Project

Date	Type of Outreach	Summary of Information
September 30, 2014	Final PRP/EA released (with response to comments)	Addressed all questions and comments received on the proposed project during the public comment period for the Draft RP/EA
December 8, 2015	Public meeting/ presentation	Presented project overview and five alternatives under consideration; received and responded to public comments
June 16, 2016	Public meeting/ presentation	Presented results of the feasibility study for the five proposed alternatives; received and responded to public comments

Conservation Moorings: The Conservation Moorings Restoration Project is expected to include multiple sites in Buzzards Bay, with implementation to be led by the MA DMF. The Trustees expect to implement this project through a competitive grant funding process managed by the MA DMF. The Trustees also expect to collaborate with MA DMF and other project partners (e.g., municipal harbormasters) to provide public outreach explaining the purpose of the grant program, ecological value of conservation moorings, and the competitive grant solicitation process.

1.3. Scope of the NEPA Analysis

This Final SEA describes and compares the potential impacts of the proposed site-specific alternatives for the Round Hill Salt Marsh Restoration Project, the Horseshoe Pond Dam – Weweantic River Restoration Project, and the Conservation Moorings Restoration Project, as well as the No Action alternative for each project. In particular, this SEA analyzes the potential direct, indirect, and cumulative ecological, social, and economic impacts associated with the alternatives.

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

- Short-term or long-term impacts: These characteristics are determined on a case-by- case basis and do not refer to a specific timeframe. 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 downstream where the sediment settles.
- 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 manmade 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.

1.4. Purpose and Need

Purpose: The purpose of the three proposed restoration projects is to compensate the public for injuries to resources within the 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, NOAA and the USFWS need to evaluate site-specific alternatives for the three proposed restoration projects referenced above that will improve habitat function and public recreational opportunities related to injuries to marsh, freshwater tidal habitat, estuarine habitat, and eelgrass habitat.

2. Existing Environment

Chapter 2 of the Final PRP/EA included a detailed description of the existing environment of Buzzards Bay and the areas impacted by the oil spill; a brief overview is provided here. This section also describes the existing environment for the specific locations or limits proposed for the Round Hill Salt Marsh Restoration Project, the Horseshoe Pond Dam – Weweantic River Restoration Project, and the Conservation Moorings Restoration Project.

2.1. Buzzards Bay

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). There are approximately 280 miles (450 km) of Bay shoreline. 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 (2,067 hectares) of salt marsh are present along Buzzards Bay, comprising 8.6% of wetlands in the watershed (BBNEP 2013). 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).

The four counties in Massachusetts encompassing Buzzards Bay (Bristol, Plymouth, Barnstable, and Dukes Counties) are in attainment for all Clean Air Act criteria pollutants (MADEP 2013).

Biological Environment: 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 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 migrate into

streams and rivers in the Buzzards Bay watershed as elvers/juveniles ("yellow phase" eels) to spend up to 10 years in freshwaters of the 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. However, 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 BBNEP 2013).

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 northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), rufa red knot (*Calidris canutus rufa*), Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), dwarf wedgemussel (*Alasmidonta heterodon*), and the northern red-bellied cooter (*Pseudemys rubriventri*). 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 Buzzards Bay and other Northwest Atlantic marine waters, are federally-designated as Species of Concern. American eel, also present in Buzzards Bay and its tributaries, are also designated by the USFWS as a Species of Concern.

Socioeconomic Conditions: 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. Of these municipalities, the following have environmental justice populations: Dartmouth, Fairhaven, Falmouth, Mattapoisett, New Bedford, and Wareham (MA Executive Office of Energy and Environmental Affairs 2010; Rhode Island Statewide Planning Program 2015).

Environmental Justice Communities: Environmental justice (EJ) is federally defined as the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits. The federal Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was signed into law by President Clinton on February 11, 1994, calling on each Federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

The Commonwealth of Massachusetts 'Environmental Justice' definition is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) has determined that EJ populations are those found to be most at risk of being unaware of or unable to participate in environmental decision-making, or to gain access to state environmental resources. The EEA EJ policy is a key factor in decision-making by its agencies. The policy can be located at: http://www.mass.gov/eea/grants-and-tech assistance/environmental - justice-policy.html. Information on the EJ communities near or in the vicinity to each project area is provided in the following project sections, as applicable.

Historic Resources: Federal agencies proposing ecological restoration projects or implementing other federal actions are required to consider potential impacts to historic resources as defined by and in accordance with the National Historic Preservation Act (NHPA). Through Section 106 of the NHPA, federal agencies are required to consult with State Historic Preservation Office (SHPO) and Tribal Historic Preservation Office (THPO) and other potential consulting parties to identify potential historic resources that may be affected by a project. For the subject projects in this Final SEA, the Massachusetts Historical Commission (MHC) serves as the SHPO, and requires that a Project Notification Form (PNF) be prepared and submitted for the proposed projects. Where historic resource concerns exist for a project, experts will collect historic information relevant to the site and conduct site investigations to identify historic resources, the Area of Project Effect (APE), and measures to avoid, minimize, of mitigate any adverse effects. Where adverse effects will be unavoidable with project implementation, federal agencies are required to address these impacts by preparing a Memorandum of Agreement (MOA) with the SHPO, potential THPOs, and other consulting parties. The MOA is signed by all parties and includes stipulations that describe mitigative measures to address adverse effects as an outcome of the project. Additionally, the Advisory Council on Historic Preservation (ACHP) is also consulted in determining whether the federal agency has adequately addressed potential SHPO and/or THPO concerns.

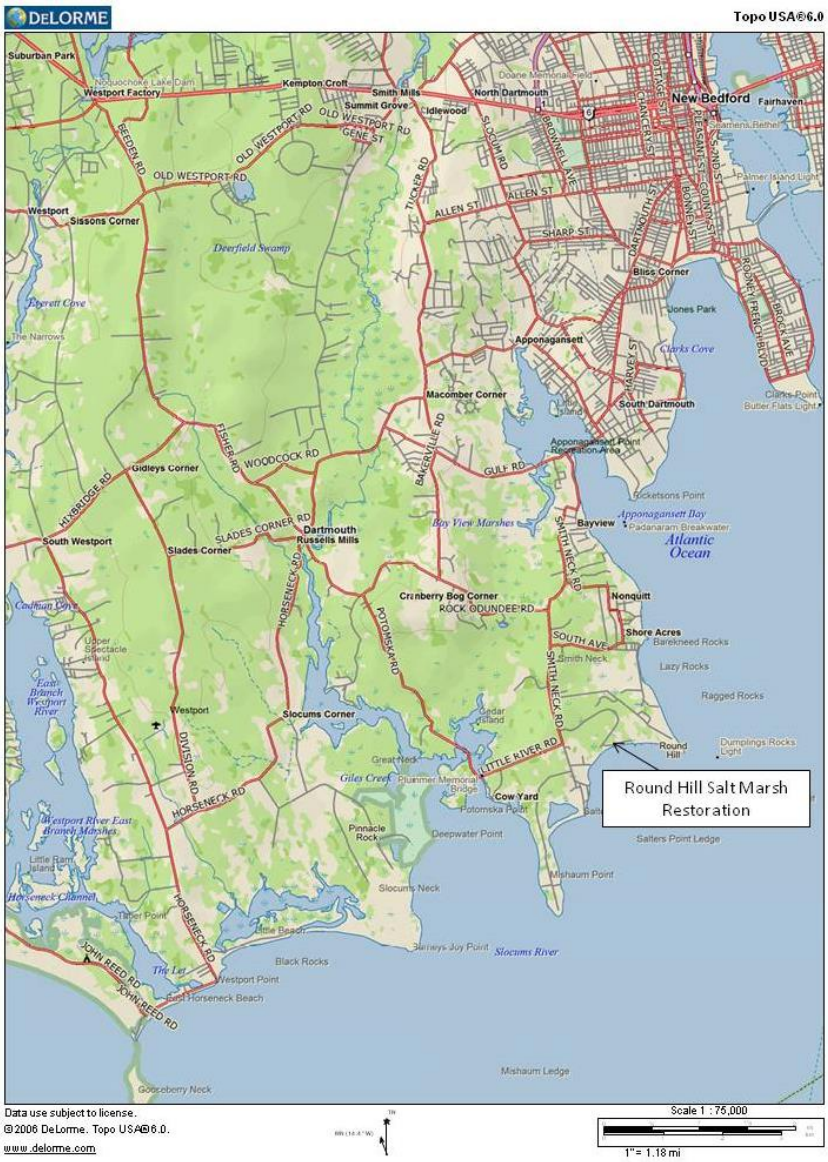
Carbon Sequestration Considerations[2]**:** Coastal ecosystems such as salt marshes and seagrass beds, capture carbon dioxide from the atmosphere and store carbon in sediments and soils (NOAA Habitat Conservation, Undated; Mcleod et al., 2011). Ecologically sequestered carbon is known as "blue carbon", decomposes very slowly, and is stored in oxygen-poor soils (NOAA Office of Habitat Conservation, undated). McLeod et al. (2011) estimated that the annual carbon burial rate (or "sequestration rate") for salt marshes and sea grasses is more than 10 times the carbon burial rate for temperate or tropical forests. Restoration of marshes and other coastal ecosystems can result in quantifiable reductions of greenhouse gases, based on the difference in carbon storage capacity between un-restored and restored ecosystems (MA Division of Ecological Restoration 2016).

[2]Previously described more generally as "Greenhouse Gas Considerations" in the Draft RP/SEA. The discussion of carbon sequestration presented, herein addresses a key ecological process that is both affected by and has an effect on the health and primary productivity of salt marshes, sea grasses and other coastal wetlands. Productive wetlands serve as sinks to sequester carbon gases. In many Northeastern U.S. locations, wetland productivity is decreasing due to stressors as marshes are unable to keep surface elevational pace with high rates of sea-level rise.

2.2 Specific Project Locations

Round Hill Salt Marsh Restoration Project Location: The proposed Round Hill Salt Marsh Restoration Project is located in the Town of Dartmouth, MA, on the state's southeastern Buzzards Bay coastline (Figure 1). The restoration site is situated within a larger town-owned beach and open-space property and contains approximately 15 acres of historically-filled salt marsh and salt pond complex. Private properties (residences and a golf course) are located to the north and east, and the 39-acre Meadow Shores Marsh system is situated immediately to the west and southwest. A town beach for use by the public and an associated parking lot are located to the immediate south of the project site.

Figure 1. Location of the Round Hill Salt Marsh Restoration Project

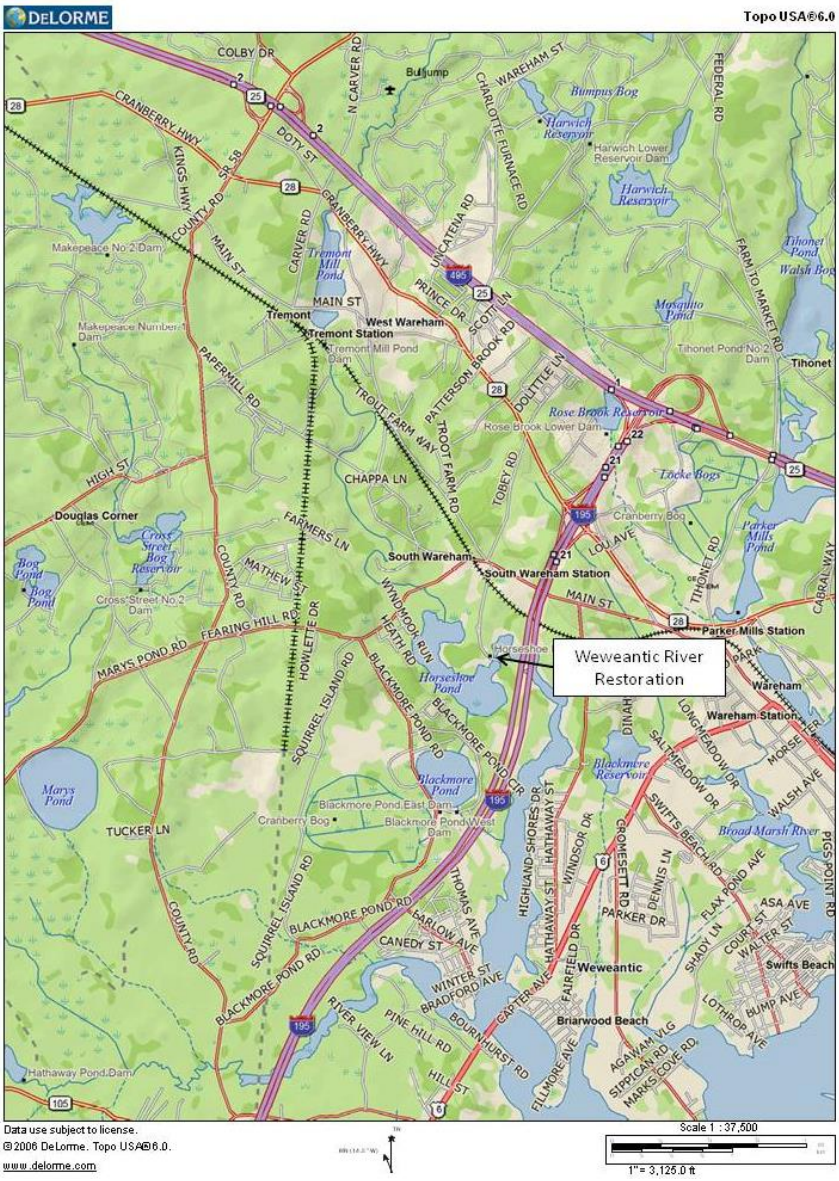


The Round Hill site is part of the Allens Pond and Westport River Watershed Important Bird Area (IBA); piping plover are the only federally-listed species known to breed in the IBA, although seasonally-migrating bald eagle are periodically present, and several state-listed species – least tern, short-eared owl, common tern, northern harrier, and upland sandpiper – are also present in the IBA (Mass Audubon 2016). Piping plover are the only listed species known to nest in the vicinity of the Round Hill Salt Marsh Restoration Project site. Prior to potential nesting activity, Mass Audubon stakes off areas where nesting occurs or potentially occurs to discourage beach users from encountering or disturbing the nests or foraging birds. While potential foraging and roosting habitat for red knot may also be associated with the beach habitat on or proximate to the site, no other sensitive or endangered species are known to regularly use the Round Hill Salt Marsh Restoration Project area. Mass Audubon biologists have been conducting routine shorebird monitoring surveys at and in the vicinity of the site, including during the nesting season, since 2005 (Lauren Miller-Donnelly, personal communication).

Within the Town of Dartmouth, there is one designated Environmental Justice block group, situated within two miles of the project site, and with 1,300 people, which represents approximately 3.8% of the town's population (MA Executive Office of Energy and Environmental Affairs 2010).

Horseshoe Pond Dam – Weweantic River Restoration Project Location: The Horseshoe Pond Dam (also known as the Horseshoe Mill Dam) spans the Weweantic River at the head-of-tide in Wareham, MA (Figure 2). Historically, the dam supported a nearby metal forge mill, reportedly for the manufacture of nails and later horseshoes; the former metal works facility was located immediately west of the dam on the north bank of the impoundment. The current impoundment encompasses approximately 91 acres of largely vegetated wetlands ranging from floating vegetation (e.g., pond lilies) to emergent marsh and forested wetlands, but was predominantly open water in the past when the dam was fully functioning. The current impoundment water surface level is lower, as compared to its historical maximum, due to removal of weir boards (i.e., stop logs) in the low-level spillway outlet, modification of the dam due to the lack of maintenance resulting in disrepair over more than a half century, and infilling of sediment over time.

Figure 2. Location of the Horseshoe Pond Dam – Weweantic River Restoration Project



The existing dam configuration includes a concrete weir with an angled downstream face connected to a concrete apron (Figure 3). The spillway is tied into masonry walls on either side; a concrete bridge over the spillway spans the masonry abutments. The bridge and spillway are connected directly by vertical concrete piers forming the framework structure for the installation of stop-logs (or weir boards) on top of the concrete spillway. Due to the age of the dam, impoundment and appurtenances, the federal agencies have initiated consultation with the Massachusetts Historical Commission (MHC) with potential interests in the site under Section 106 of the National Historic Preservation Act to obtain any additional information on historic and/or archaeological concerns or interests for this project site. A Project Notification Form (PNF) was previously submitted by the BBC to MHC in 2012, and a subsequent PNF has been submitted by NOAA to initiate the federal consultation for this proposed project. MHC provided a response in

January 2017, and supplemental historic documentation will be completed by an experienced historic consultant working with the Buzzards Bay Coalition (BBC) and NOAA as Lead Federal Agency for the project. With the results of the assessment, design measures will be employed by the design engineer to avoid or minimize potential adverse effects on historic resources (See Appendix C).

Figure 3. Horseshoe Mill Dam Spillway and Bridge from Downstream Side (left) and Former Mill Race (right)

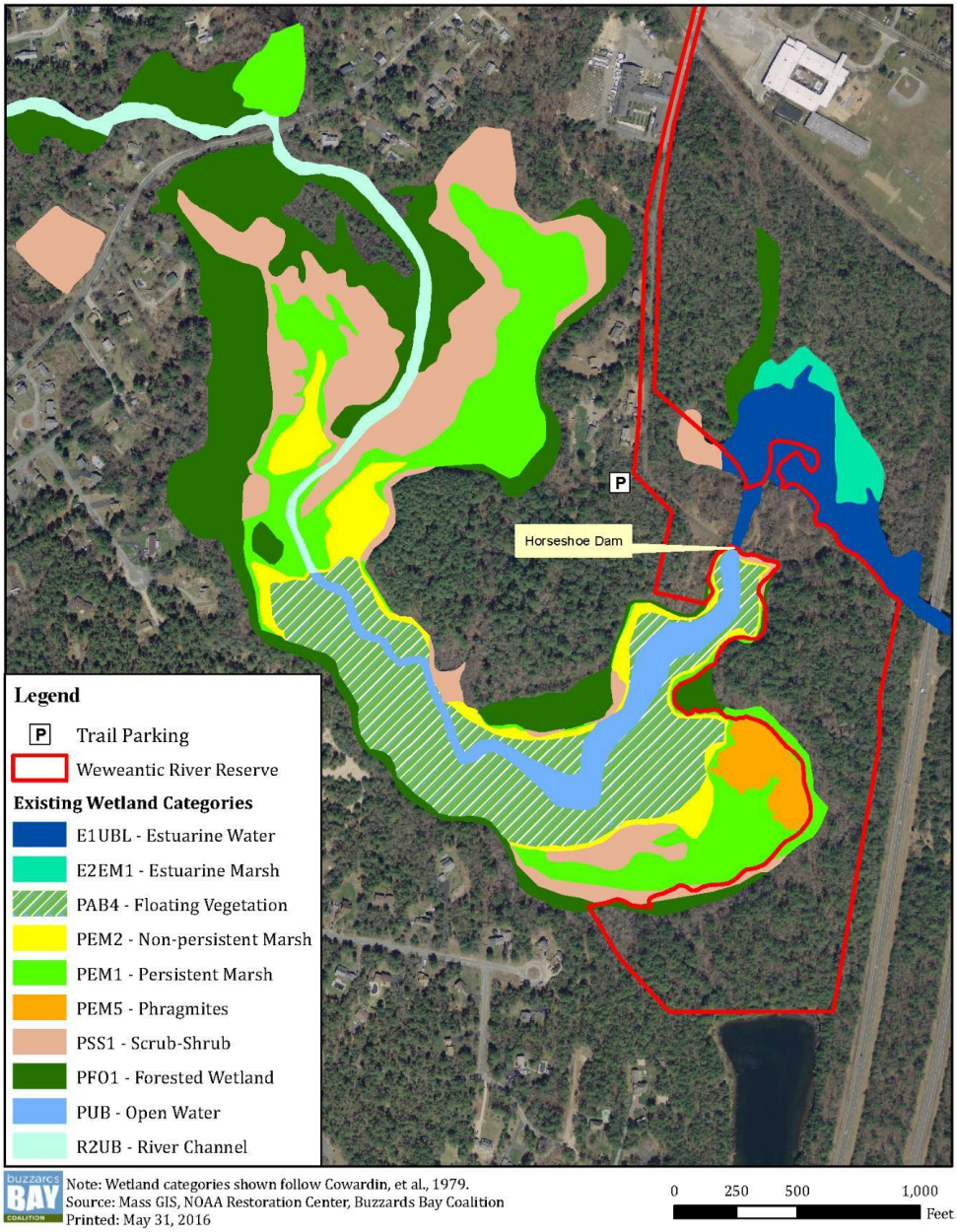
Source: Princeton Hydro 2016

This defunct dam is an attractive nuisance to unauthorized persons whom are accessing potentially dangerous points of the structure. The structure represents a public safety hazard: the open stop-log bays are potential fall hazards to pedestrians; the concrete spillway and low- level orifice create strong, but hidden, hydraulic forces that are a serious injury or drowning hazard to anyone swimming, wading, or boating too close to the structure. The former mill race under higher flows also represents a hazard due to the presence of falling walls and other channel and bank debris.

Plant communities have expanded with the past drawdown of the impoundment and ongoing sediment accretion, with plants colonizing the impoundment fringe, and progressing through stages of plant community succession. Since 2013, the NOAA Restoration Center (RC) and the BBC have mapped the impoundment area, according to habitat cover types. These include river channel, open water, floating aquatic vegetation, non-persistent and persistent marsh, invasive *Phragmites*-dominated marsh, scrub-shrub and forested wetland (Figure 4). Estuarine marsh and intertidal and sub-tidal waters occur below the dam. Wetland cover categories were based on Cowardin et al. (1979).

Approximately 170 feet upstream of the existing dam is a legacy dam that predates the Horseshoe Mill Dam. This dam is a timber-crib with earthen or stone fill, is approximately 10 feet wide, extends ~160 feet to span the width of the impoundment, and has a stone masonry spillway that is partially breached. This remnant structure is described in the alternatives section (Section 4).

Figure 4. Existing Weweantic River Wetlands in the Vicinity of Horseshoe Mill Dam



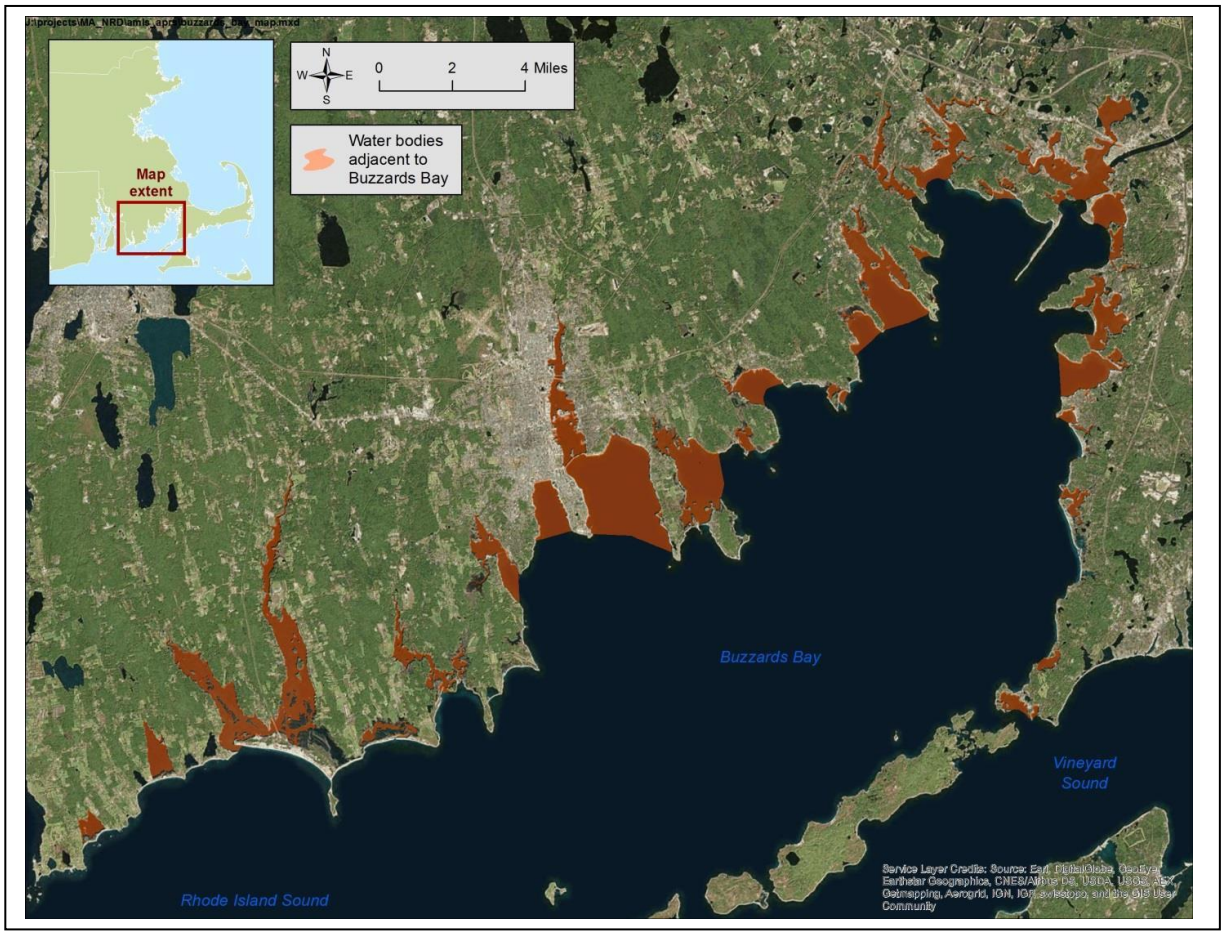
Source: Princeton Hydro 2016

Within the Town of Wareham, there are four designated Environmental Justice block groups, with 4,522 people, which represent 23.5% of the town's population (MA Executive Office of Energy and Environmental Affairs 2010).

Conservation Moorings Restoration Project Locations: The specific locations where conservation mooring installations would occur will be selected as part of a competitive grant process. Candidate locations will be limited to areas in Buzzards Bay where existing, traditional moorings are causing or have caused damage to and loss of eelgrass beds due to poor functioning of the existing moorings.

Figure 5 shows highlighted areas that include known marinas and boat storage areas in Buzzards Bay. The Conservation Moorings Restoration Project would be expected to occur within these highlighted areas, although not all of these areas have existing or mapped eelgrass beds that are eligible for the project. These highlighted areas represent bays and inlets that typically have a water depth of less than 20 feet (BBNEP 2016b).

Figure 5. Bays and Inlets of Buzzards Bay that Include Known Marinas and Boat Storage Areas. These locations represent areas where the Conservation Moorings Restoration Project may be implemented; they do not represent exact marina or future project locations.



3. Round Hill Salt Marsh Restoration: Environmental Effects Analysis

3.1. Project Alternatives

This section provides a summary of the site-specific alternatives that the Trustees have considered in this Final SEA for the Round Hill Salt Marsh Restoration Project. NEPA requires that any federal agency proposing a major action consider reasonable alternatives to the proposed action. Screening criteria are used to determine whether an alternative is reasonable. Alternatives considered but found not to be reasonable are not evaluated in detail in a Final SEA. To warrant detailed evaluation by the Trustees, an alternative must be reasonable and meet the project's purpose and need (see Section 1.4). The Trustees must also consider a No Action alternative.

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 4.3.1 of the PRP/EA. The implemented Round Hill Salt Marsh Restoration Project will:

- Directly restore former native tidal marsh habitat and improve natural tidal hydrologic conditions, while increasing coastal resiliency for natural resources and the local community;
- Address the same or similar marsh and wetland type injured by the spill;
- Increase fish and wildlife habitat for species injured by the oil spill; and
- Provide or enhance ecological services that include multiple biological, physical and chemical processes, and account for sea-level rise and landward marsh migration.

The Trustees have considered five alternatives for this NEPA analysis:

1) Alternative A – the proposed action (Preferred Alternative) – Maximum Build Marsh Restoration Area; Fill Removal and Non-Structural Planned Inlet Maintenance;

2) Alternative B – Minimum Marsh Restoration Area; Fill-Removal Only Alternative;

3) Alternative C – Maximum Marsh Restoration Area; Fill-Removal Only Alternative;

4) Alternative D – Maximum Marsh Restoration Area; Fill Removal and Inlet Stabilized by Groins; and

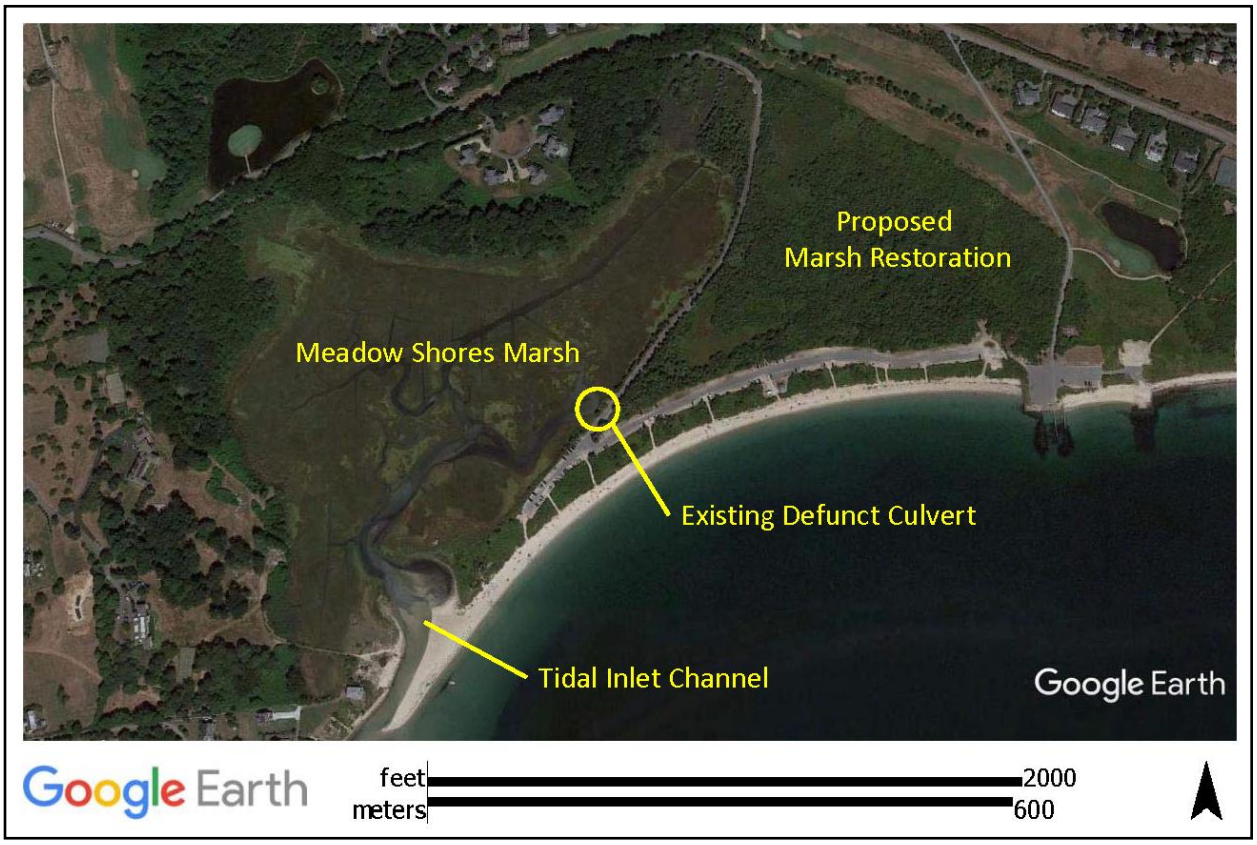
5) Alternative E – No Action (or maintaining existing habitat and hydrologic conditions).

These alternatives were developed by the Round Hill Salt Marsh Restoration Project team, which includes the Town of Dartmouth, MA DER, NOAA, and USFWS. The project alternatives were previously presented at the public meetings described in Section 1.2. The ecological, economic, and social impacts of the alternatives are discussed in Section 3.2.

3.1.1 Alternative A – Proposed Action Alternative (Preferred Alternative) – Maximum Build Marsh Restoration Area; Fill Removal and Non-Structural Planned Inlet Maintenance

Summary: Located in the Town of Dartmouth, MA, on the state's southeastern Buzzards Bay coastline, the proposed Round Hill Salt Marsh Restoration Project is situated within a larger town-owned beach property and contains approximately 15 acres of historically filled salt marsh and salt pond complex. Private properties (residences and a golf course) are located to the north and east, and the 39-acre Meadow Shores marsh system immediately to the west. A town-owned public beach providing passive recreational uses and associated parking lot with foot access paths to the beach are located to the immediate south and east of the marsh restoration site (Figure 6).

Figure 6. Round Hill Salt Marsh Restoration Project Site and Meadow Shores Marsh



Under past private ownership, various development activities occurred at the project site between 1928 and 1937. Up to 6 feet of dredged sands and local farm soils were placed within on-site tidal wetlands hydrologically linked to Meadow Shores Marsh to the west-southwest, with fill to construct a broad landing strip for dirigibles (Figure 7). Today, a non-functioning wooden culvert remains beneath Ray Peck Drive that formerly connected the site to the Meadow Shores Marsh (Figure 8). As described in Section 2.2, the primary source of tidal hydrology for this salt marsh complex (including both Meadow Shores Marsh and the proposed Round Hill Salt Marsh Restoration Project) is a tidal inlet channel that connects Meadow Shores Marsh and Buzzards Bay (Figure 6). This inlet has been documented to migrate and seasonally close to tidal flushing due to the periodic inability of the marsh's tidal prism to overcome the deposition of sand from the predominantly westward longshore transport process.

Figure 7. Historical Conditions, USGS Topographical Map circa 1890s Prior to Filling, and Aerial Photograph circa 1928 Just after Filling of Round Hill Salt Marsh

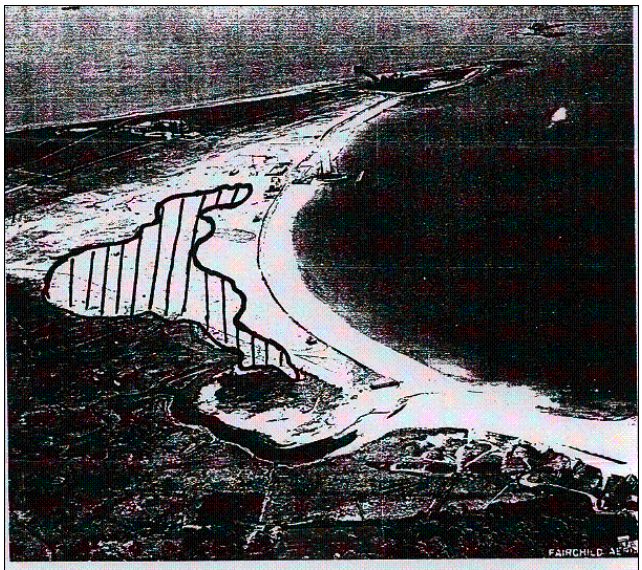


Figure 9. Oblique aerial photograph of Meadows Shore and Round Hill taken by Fairchild Aerial Surveys in 1928, shortly after filling of the northern third of the marsh and dredging of the inlet.

Figure 8. Existing Non-Functioning Culvert beneath Ray Peck Drive

Restoration Actions

Preferred alternative:

- Removal of mostly sand fill soils from the historical wetland site at the Round Hill project site, grading and re-vegetation of the graded area with native salt marsh plants to restore approximately 11 acres of salt marsh. Final marsh restoration acreage area will depend on the final, permitted design plans, scheduled to be completed by summer 2017.
- Installation of a larger-sized culvert under Ray Peck Drive to replace the existing, non-functional culvert and to restore the tidal connection between Round Hill and Meadow Shores marshes.
- Excavation of marsh channels, pools, and/or pannes within Round Hill marsh to restore estuarine fish, macro-benthic invertebrate and wildlife habitats and hydrologic connectivity. The final marsh surface elevations will be based on assessment and consideration of any potential tidal hydrologic dampening through the inlet channel, Meadow Shores Marsh, and the culvert under Ray Peck Drive. Overall, the project partners seek to establish final marsh plain elevations which take into account predicted sea-level rise rates and marsh soil porosity, to provide a long-term healthy marsh, and to minimize non-native, invasive plant colonization.
- Installation of a walking path along a portion of the marsh, construction of an overlook platform, and installation of public educational signage to explain marsh restoration and ecological services provided.
- Repositioning of the existing Meadow Shores marsh inlet: the existing inlet will be filled with sand and a new, more easterly inlet will be excavated. The new geo-morphologically designed channel will be relocated such that the distance from Buzzards Bay to the marsh is shorter and more direct to allow improved tidal exchange, and to keep the channel away from residential properties and seawall structures to the west. Because the channel migrates over time, the Town of Dartmouth will be responsible through anticipated permit conditions to monitor and re-position the inlet channel location, as needed, and as part of its permitted maintenance activities. The project will include a regulatory-agency approved operation and maintenance plan for the town to follow and for which to remain in compliance. The channel position will be adjusted to maintain optimal tidal exchange and minimize risk to residential properties.
- Planned periodic maintenance of the Meadow Shores Marsh inlet and Ray Peck Drive culvert, as required.
- The design avoids direct loss of subtidal, intertidal, beach and dune resources, as there is no direct and permanent placement of hardened groin structures to stabilize the inlet.
- Re-establishment of the inlet would comply with any time-of-year restrictions to minimize temporary impacts to protected bird species nesting, roosting and/or foraging habitats along the barrier beach.
- There would be no structures to risk interference with longshore sediment transport and the risk of down-gradient beach loss as with the inlet with groin structures alternative. The non-structure alternative is also the preferred alternative for addressing state and federal regulations.

- Implementation of this inlet channel design alternative involves a formal agreement with the adjacent private landowner, but the agreement would focus only on access and movement of sand and not the permanent placement of any hardened structures such as groins (See Alternative D, below).This alternative is supported by the property owner abutting the town property, and located where a portion of the inlet channel will be repositioned.
- The exclusion of hardened structures (one that may interfere with the public's ability to access the beach and tide water uses as required by MA Chapter 91 public use rights) also eliminates a requirement to design and maintain a public access feature around or over inlet structure(s) that would otherwise be required by MA regulations.
- This design alternative minimizes the potential for loss of marsh integrity and ecological functioning from a prolonged channel inlet closure, and protects a more natural approach to restoring tidal exchange, channel migration potential, and coastal resilience, as compared to the groin, Alternative D. Further, placement of clean sand to form the channel plug (a potential area of approximately 0.25± acres) is expected to provide greater beach resiliency to property owners to the southwest, and is also expected to result in at least equivalent of sand beach habitat for use by piping plover (an area of 7+ acres, based on MA Audubon monitoring data, 2005-2016) and other coastal birds once the new inlet channel is repositioned.
- Soils to be excavated from the marsh restoration area have been sampled, tested, and determined to be clean (non-contaminated) soils, predominantly sand. The project proponents tentatively plan to use at least a portion of the excavated, clean sands to nourish the pubic recreational town beach immediately to the south (an area of 1.75± acres). This temporary work activity area will include equipment such as grader or dump truck to transport excavated sands from the restoration site through the existing parking lot and on to the beach area, upgradient of mean high tide and extending upslope to the existing dune habitat. Sand placement and grading would occur during the period of October through March 15. Excess clean sand and other soils are expected to be removed off-site and potentially reused at other beneficial beach nourishment or upland sites, and if temporarily stored, at approved upland stockpiling site(s), with other placement locations, yet to be determined.

Project Benefits: This site presents a rare opportunity to directly restore approximately 11+ acres of salt marsh on a publicly-owned site and enhance another 70 acres of contiguous salt marsh and barrier coastal beach ecosystem, including the 39-acre Meadow Shores Marsh and bordering freshwater wetlands, beach, and uplands. This project will directly restore salt marsh services, functions and values lost from the site for nearly 100 years, and will protect and enhance the ecological integrity and health of the larger Meadow Shores Marsh. This self-sustaining project will significantly enlarge this valuable tidal system, enhancing the tidal inlet, maintaining or increasing beach habitat important for shore birds, and ensuring the many other functions and values which the marsh complex provides to the Buzzards Bay environment. These service benefits include: providing enhanced primary production, detrital export, sediment trapping, and coastal fish and wildlife habitats; contributing valuable public stewardship and educational opportunities attributed to its location adjacent to the Town beach; and providing passive

recreational opportunities with beach nourishment and construction of associated walking trail and observation platform. The benefits of this project for enhancing marsh resiliency to sea-level rise are described in Section 3.2.

This restoration project will directly result in the restoration of salt marsh values and functions toward the goals of restoring lost historic salt marsh and addressing natural resource injuries in New Bedford Harbor and Buzzards Bay. Specifically, this project was identified as one of 69 restoration opportunities within the New Bedford Harbor Environment Wetlands Restoration Plan (MWRP 2002), and was selected for funding by the New Bedford Harbor Trustee Council in 2011 (Environmental Assessment, Round IV, NBHTC 2011) due to the significant ecological benefits that the project would provide. Additionally, the project was selected for funding support through the Disaster Relief Appropriations Act of 2013, as the restored salt marsh is expected to increase ecological and infrastructure resiliency to future coastal storms. The restoration of former salt marsh and enhancement of the Meadow Shores salt marsh and coastal barrier beach complex are consistent with additional Federal plans including the objectives of the National Wildlife Refuge System, the North American Waterfowl Management Plan, Partners in Flight, U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan by restoring significant coastal marine habitat for migratory birds, estuarine and anadromous fish, and other estuarine and marine wildlife. This marsh restoration project supports strategies to conserve and restore important coastal habitat areas outside of the USFWS National Refuge system and aid in preventing "gaps" along important migratory bird routes.

Further, this project will promote the integration of natural and built infrastructure by incorporating a properly-sized culvert beneath Ray Peck Drive that will support and enhance tidal flushing and sustain the wetland restoration site. Restoration of habitat by removing fill from the former salt marsh will increase the tidal prism of the Meadow Shores Marsh complex and extend the long-term viability of the system by enhancing tidal inlet stability. Including long-term maintenance for the primary tidal inlet, with no groin structures, will reduce permanent impacts to valued resource areas and conjointly serve to protect the health and functioning of both the existing system and the restored marsh.

3.1.2 Alternative B – Minimum Marsh Restoration Area; Fill Removal Only Alternative

- Removal of approximately one-half of the fill-material from the historic salt marsh at the Round Hill project site to restore 6.9± acres of salt marsh;
- Installation of a smaller-sized culvert at Ray Peck Drive to restore tidal connection between Round Hill and Meadow Shores marshes;
- Excavation of marsh channels, pools, and/or pannes within Round Hill marsh to restore hydrologic connections;
- No planned maintenance at the Meadow Shores marsh inlet channel; and potential migration and periodic closure of the inlet would continue.
- Place and grade clean sand excavated from the restoration site on upland areas adjacent to the marsh restoration site and on the town-owned public beach

immediately south of the site. Any excess excavated sands are expected to be removed off-site and potentially reused at other beneficial beach nourishment or upland sites, and if temporarily stored, at approved upland stockpiling site(s), with other placement locations yet to be determined.

This alternative would result in the restoration of 6.9 acres of coastal salt marsh in support of the functioning, health and resilience of the Round Hill and Meadow Shores Marshes, Dartmouth, New Bedford, and Buzzards Bay environs. However, this project alternative would not achieve the goal of maximizing the salt marsh restoration area at this site, would not restore the potential to contribute toward a fully-restored tidal marsh prism, nor address the disturbances associated with episodic inlet closure associated with the larger Meadow Shores marsh-coastal beach complex. As with the No Action Alternative, the risk of chronic marsh degradation and loss, as well as decreased ecological functioning, channel inlet migration potential, and lower resiliency would remain.

3.1.3 Alternative C – Maximum Marsh Restoration Area; Fill-Removal Only Alternative

- Removal of the full amount of fill-material from the historic salt marsh at the Round Hill project site to restore approximately 11+ acres of salt marsh;
- Installation of a larger-sized, designed culvert at Ray Peck Drive to restore tidal connection between Round Hill and Meadow Shores marshes;
- Excavation of marsh channels, pools, and/or pannes within Round Hill marsh to restore hydrologic connections;
- No planned maintenance at the Meadow Shores marsh inlet channel, but with greater tidal exchange and tidal prism to maintain a natural tidal inlet connection, it is expected to result less potential for and lower rate of inlet migration.
- Place and grade clean sand excavated from the restoration site on upland area adjacent to the restoration site and the town-owned public beach immediately south of the site. Any excess excavated sands are expected to be removed off-site and potentially reused at other beneficial beach nourishment or upland sites, and if temporarily stored, at approved upland stockpiling site(s), with other placement locations yet to be determined.

This alternative would result in the restoration of approximately 11+ acres of coastal salt marsh in support of the functioning, health and resilience of the Round Hill and Meadow Shores marshes, Dartmouth, New Bedford, and Buzzards Bay environs. During the feasibility investigations, it was determined that this alternative would increase the tidal prism by 21+ % and restore a more stable inlet – an inlet that would remain open and less susceptible to migration. Through a collaborative public-outreach process to consider and incorporate public comment and concerns in the project design, the proposed design takes into account potential inlet migration, but relies only on the larger restored tidal prism to support greater inlet stability, an action likely unacceptable to federal and state regulatory agencies and the abutting property owners. This project alternative, while associated with a reduced risk of inlet closure, still presents the possibility of inlet closure and the disturbances associated with episodic inlet closure within the

larger Meadow Shores marsh-coastal beach complex. As with the No-Build Alternative, the risk of loss of marsh health, functioning, migration potential and resiliency would likely remain.

3.1.4 Alternative D – Maximum Marsh Restoration Area; Fill Removal and Inlet Stabilized by Groins

- Removal and off-site disposal of the full amount of fill-material from the historic wetland site at the Round Hill project site to restore 11+ acres of salt marsh;
- Installation of a larger-sized culvert at Ray Peck Drive to restore tidal connection between Round Hill and Meadow Shores marshes;
- Excavation of marsh channels, pools, and/or pannes within Round Hill marsh to restore hydrologic connections;
- Stone groins installed along each side of the inlet to stabilize the Meadow Shores marsh inlet, and to maintain tidal inlet connection and remove potential inlet migration.
- Place and grade clean sand excavated from the restoration site on upland areas adjacent to the restoration site. Any excess excavated sands are expected to be potentially reused on nearby beaches for beneficial nourishment, or at nearby upland sites.

This alternative would result in the restoration of approximately 11+ acres of coastal salt marsh in support of the functioning, health and resilience of the Round Hill-Meadow Shores Marsh Complex, Dartmouth, New Bedford, and Buzzards Bay environs. To address the uncertainty and lack-of- control of inlet stability and migration, this project alternative includes the installation of hardened groins (see Louis Berger 2015) located at the Meadow Shores marsh inlet. While this design approach provided the greatest certainty of maintaining inlet functioning and would result in the benefit of stabilized tidal exchange to both Meadow Shores marsh and the proposed 11+-acres restoration area within Round Hill project site, it would also result in significant beach resource area impacts within the restoration project area resulting from the installation of groins, including the potential to block longshore sediment transport. Securing all federal, state and local regulatory authorizations for this alternative would be uncertain due to the direct and secondary resource impacts.

3.1.5 Alternative E – No Action Alternative

Without this project, no additional natural resources will be restored to contribute to the functioning, health, and resiliency of the Round Hill, Meadow Shores, Dartmouth, New Bedford, and Buzzards Bay environs. This alternative would take no further action to compensate the public for related injuries to resources within the municipal waters of Buzzards Bay, MA from the B-120 oil spill. No marsh restoration or enhancement will occur to provide important ecological services, nor will beach nourishment occur to provide greater coastal resiliency at and in the vicinity of the inlet channel, or public recreational benefits to the public beach and beach users.

3.2 Environmental Consequences

This section evaluates the potential environmental consequences[3] of each of the alternatives described in Section 3.1. The direct and indirect effects on the physical, biological, social, and economic environments for each alternative are compared in Table 3. The cumulative effects analysis for the projects described in this document is presented in Section 6.

[3]The content of the following Environmental Consequences section and subsequent Environmental Consequences sections in this Final SEA, addressing each of the three selected restoration projects, have been modified from the Draft SEA to focus on specific issues relating to ecological stressors to salt marshes and other coastal wetlands, and in particular, sea-level rise and warming seas. Likewise, the "Sea Level Rise and Carbon Sequestration Considerations" attribute in Tables 3, 4 and 5 below has been renamed from the more generic "Climate Change Considerations" in the Draft SEA. Despite the removal of document text referencing the 2016 CEQ climate change guidance that was addressed in Section 7 of the Draft SEA, NOAA has concluded that information and discussion on the impacts of sea-level rise and effects of or on carbon sequestration remain valid, are highly relevant to coastal habitat restoration and planning, and are helpful to the public and decision makers in implementing the restoration actions in this Final SEA.

Table 3. Comparison of Environmental Consequences of Alternatives for the Round Hill Salt Marsh Restoration Project

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Physical/ Biological Resources: Adverse impacts	• *Adverse impacts to physical and biological resources are expected to be short-term, direct, and minor.* Existing degraded freshwater wetland habitat would be excavated and removed and replaced with native salt marsh habitat. During restoration construction, the degraded habitat in the marsh area would be adversely affected by disturbance from construction equipment, noise, and increased sedimentation. • The beach and dune habitat would be minimally affected by construction to occur during a seasonal period when shore birds are not using the marsh-beach complex, and recreational beach use is typically low. Breaching the new channel would cause a short-term disturbance and increase suspended solids.	• *Adverse impacts same as Alternative A.*	• *Adverse impacts same as Alternative A.*	• *Adverse impacts are expected to be long-term, direct and moderate.* Installation of groins would result in the direct loss of subtidal, intertidal, beach and dune resources from the direct placement of hardened stone to construct and secure the inlet. These structures may also adversely affect the public access and use of public waters below mean low water. • Groins located within the intertidal zone could interfere with long-shore transport of sand westward, risking loss of the natural sand supply for beach southwest of the groins.	• The health of the adjacent Meadow Shores Marsh complex would remain at risk with the continued presence of a reduced tidal prism (from loss of wetlands due to the historic salt marsh filling at Round Hill). • The high risk of chronic inlet migration, inlet closure and resulting disturbance to the natural tidal regime over the long-term, including sea-level rise, will continue to adversely affect the marsh, leading to reduced salt marsh health and functioning by marsh impounding, peat substrate subsidence, soil pore water anoxia and surface water hypoxia, and marsh vegetation die-off.

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Physical/ Biological Resources: Beneficial impacts	• *Beneficial impacts to physical and biological resources are expected to be long-term, direct, and major.* The project would restore 11+ acres of coastal salt marsh, the primary natural resource of interest at the project location. This alternative would maintain the inlet in a beneficial locational position, promoting tidal exchange and the natural tidal regime for the larger Meadow Shores marsh-coastal beach complex. Greater beach area attributed to the channel plug placement is expected to benefit shore bird use in the vicinity of the inlet channel. Greater use of the marsh tidal creeks by fish and nekton would also be expected.	• *Fewer beneficial impacts compared to Alternative A. T*his alternative would restore 6.9 acres instead of 11+ acres, and would not contribute toward a fully restored tidal prism or address the disturbances associated with episodic inlet closure.	• *Fewer beneficial impacts compared to Alternative A.* With no inlet maintenance, this alternative would retain the disturbances associated with episodic inlet closure within the larger Meadow Shores marsh-coastal beach complex.	• *Fewer beneficial impacts compared to Alternative A.* Beneficial impacts would be similar for marsh resources, but less benefit to the beach which could be impacted by loss of natural sand supply.	• *No beneficial impacts.* Current conditions would remain or possibly degrade over time, particularly with increasing sea-level rise rates.

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Endangered Species: Adverse impacts	• Piping plovers and piping plover nesting, resting or foraging habitats are not likely to be adversely affected by the restoration actions. The proposed actions are consistent with the Massachusetts Division of Fisheries and Wildlife Habitat Conservation Plan for Piping Plover (MDFW, 2016). The Trustees have also submitted a letter to the USFWS requesting an evaluation of the effects determination. Additional consultation may be required by the USFWS to address potential inlet channel maintenance. An operations and management plan will be a component of the permitted project, and will require the Town to maintain the channel and beach with approved actions occurring during periods that will not result in adverse effects to piping plover. • Piping plovers nest on the beach, and typically are present during the period of April through August, and thus would not likely be affected by construction activities that are expected to take place in the fall, winter, and early spring. With this alternative, the channel would be hydrodynamically stable and result in beneficial foraging effects to piping plover.	• Same as Alternative A	• Same as Alternative A	• This alternative could have moderate to major adverse effects on foraging and nesting habitat for piping plovers due to the loss or alternation of beach due to groin installation. • MA State regulatory guidance provided for this approach noted that any groin design interfering with longshore sand transport and resulting in loss of sand supply to the beach would need to address protection of the southwestern beach through an approved operation and maintenance (O&M) plan detailing methods and procedures for re-supplying sand. The most-likely O&M plan would require the mechanical redistribution of sand across the groin and inlet, resulting in long-term, chronic impact to regulated resource area (subtidal, intertidal, and beach habitats) disturbances and project costs.	• *No adverse effects*.

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Endangered Species: Beneficial impacts	• *Beneficial impacts are expected to be long-term, direct, and minor. R*elocating the inlet channel would maintain or improve current conditions for piping plovers using the beach. The inlet channel plug is expected to result in a net increase in beach area serving as nesting, resting or foraging habitats to piping plover.	• *No beneficial impacts*: without inlet channel maintenance, current conditions will persist.	• *No beneficial impacts*: without inlet channel maintenance, current conditions will persist.	• *No beneficial impacts* would be expected because of the on-going beach disturbance.	• *No beneficial impacts*.
Essential Fish Habitat: Adverse impacts	• *Adverse impacts to essential fish habitat (EFH) areas are expected to be short-term, direct, and minor and limited to only the construction period and footprint.* NOAA submitted an EFH consultation to NMFS' Office of Habitat Conservation (OHC) to consider potential adverse effects on EFH (see Appendix A). Any OHC recommendation(s) will be incorporated into the final project design and channel inlet O&M plan. Based on the assessment, the Trustees do not anticipate adverse effects to EFH with the project.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No adverse impacts*.
Essential Fish Habitat: Beneficial impacts	• *Beneficial impacts to EFH are expected to be long-term, direct, and minor to moderate.* Benefits would likely include increased marsh habitat and improved access to marsh habitat for species, increased species richness, and improved water quality.	• Same as Alternative A; benefits may be less or degrade over time without regular inlet channel maintenance.	• Same as Alternative A; benefits may be less or degrade over time without regular inlet channel maintenance.	• Same as Alternative A	• *No beneficial impacts*.

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Air Quality: Adverse impacts	• *Short-term, minor, adverse air quality impacts would result from the emissions* and *dust generated by construction equipment used to remove fill, adjust the inlet channel, and transport or construct new marsh vegetation and habitat features.* These emissions would likely be minimal compared with daily commuter or commercial activity in the region. During implementation, workers would use best management practices (BMPs) to manage construction emissions, noise, and dust release issues.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No adverse impacts*
Air Quality: Beneficial impacts	• *No beneficial impacts*	• *No beneficial impacts*	• *No beneficial impacts*	• *No beneficial impacts*	• *No beneficial impacts*

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Water Quality: Adverse impacts	• *Adverse impacts to water quality are expected to be short-term, direct, and minor.* Water quality may be negatively affected briefly during construction activities. Marsh restoration would include removing fill material, constructing marsh habitat, and excavating and improving the tidal inlet channel. During this time, turbidity and suspended solids may increase in and around the construction area.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• Marsh impounding would lead to marsh loss and a decrease in water quality in the marsh over time.
Water Quality: Beneficial impacts	• *Beneficial impacts to water quality are expected to be long-term, indirect, and minor to moderate.* The restored tidal marsh habitat would improve and maintain water quality by supporting native biological communities (e.g., salt marsh vegetation and nearshore shellfish beds) that benefit from high water quality.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No beneficial impacts*

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Social and Economic Resources: Adverse impacts	• *No adverse impacts are expected.* Construction will be timed to avoid prime beach season. Construction activities to remove fill from the restoration area would take place after Labor Day, during the fall and winter and into the early spring, before the access road is fully opened to the public. For excavated sands that are transported off-site, trucks would operate during Monday through Friday work hours, and there would be no regularly-scheduled weekend construction activities. • *No effects on historic resources.* The MHC was previously consulted, and MHC concluded that no historic or archaeological resources would be affected by the project.	• Same as Alternative A	• Same as Alternative A	• *Moderate adverse, long-term direct socioeconomic impacts are expected from this alternative.* • The presence of a hardened structure across the inlet may interfere with the public's right to access, as granted under MA DEP Chapter 91 jurisdiction and require alternative means of access be provided in the project design. • Implementation of this design alternative would require a formal agreement with the adjacent private landowner, for the placement of a hardened and permanent structure located within a portion of the private property.	• *No adverse impacts*

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Social and Economic Resources: Beneficial impacts	• *Beneficial, long-term direct and indirect and minor to moderate socioeconomic impacts are expected from the restoration actions.* Short-term direct benefits would be additional income for workers implementing the restoration actions. Equipment, such as trucks and excavators used to remove fill, and supplies such as native marsh plant material, are expected to be sourced locally or regionally, and the workforce in the area is sufficient to supply all labor and equipment needs without impacting local services. Long-term indirect benefits would result from restoring historic, native habitat; enhancing the quality of marsh habitat; providing a buffer against storm surges; and expanding the amount of native marsh habitat in the area. The project may include the reuse of clean sands excavated from the restoration area to nourish the nearby town-owned beach. Any excess sands may be used to nourish other nearby public beaches that have lost capacity. These benefits are expected to improve recreation and increased tourism in this area.	• Fewer beneficial impacts as compared to Alternative A because of a smaller marsh footprint that would reduce recreational opportunities.	• Fewer beneficial impacts as compared to Alternative A because of periodic inlet migration that may disrupt recreation.	• *Fewer beneficial impacts as compared to Alternative A because of on-going disturbance associated with groin installation.*	• *No beneficial impacts*

Attribute	Alternative A (Preferred)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Sea-level Rise and Carbon Sequestration Considerations	• The proposed Round Hill Salt Marsh Restoration Project alternative will result in ecological gains due to the restoration of historical salt marsh from the currently degraded wetland; and would improve project area resiliency and adaptability with marsh surface elevation conditions and a healthier marsh to keep pace with sea-level rise. The more productive marsh is expected to increase the area and quality of estuarine habitat and flood storage capacity. • By restoring salt marsh habitat, the project will enhance long-term coastal resiliency by providing opportunity for tidal wetland migration with respect to predicted sea-level rise. Incorporating restored wetland acreage directly south of the built environment (residential homes and a private golf-course), the project will provide a buffer and greater protection from coastal storms. Addition of clean sand for beach nourishment may also contribute to coastal resiliency of public beaches in the area. • The restoration and landward migration of healthy salt marsh also provides opportunity for increased carbon sequestration for enhanced environmental conditions.	• Ecological benefits of this alternative would be similar to but smaller than Alternative A because the marsh would be smaller in acreage.	• Ecological benefits of this alternative would be similar to but smaller than Alternative A because the marsh would be less sustainable.	• Ecological benefits of this alternative would be similar to Alternative A.	• Without restoration, the natural tidal regime is inhibited from supplying fine sediments and facilitating the landward migration of salt marsh, leading to the loss of sediment accretion, marsh migration potential, and ability of coastal habitats to remain resilient in the face of sea-level rise. Further, the existing wetland does not provide the same level of buffering capacity in terms of storm event protection that the preferred alternative would provide. No additional carbon sequestration would result with this alternative, and decreasing marsh productivity would likely continue with sea-level rise and a poorly functioning tidal connection with Buzzards Bay.

4. Horseshoe Pond Dam – Weweantic River Restoration: Environmental Effects Analysis

4.1 Project Alternatives

This section provides a summary of the project alternatives that the Trustees have considered for the Horseshoe Pond Dam – Weweantic River Restoration Project. NEPA requires that any Federal agency proposing a major action consider reasonable alternatives to the proposed action. Screening criteria are used to determine whether an alternative is reasonable. Alternatives considered but found not to be reasonable are not evaluated in detail in this Final SEA. To warrant detailed evaluation by the Trustees, an alternative must be reasonable and meet the project's purpose and need (see Section 1.4).

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 4.3.1 of the PRP/EA. The implemented Horseshoe Pond Dam – Weweantic River Restoration Project will:

- Directly enhance aquatic and shoreline habitat types similar to those injured by the spill and improve natural hydrologic conditions, while increasing coastal resiliency for natural resources and the local community;
- Address the same or similar aquatic or shoreline habitat types injured by the spill, and the high value of and resource need for this habitat in the Buzzards Bay region;
- Increase fish and wildlife habitat for species injured by the oil spill; and
- Provide or enhance ecological services that include multiple biological, physical and chemical processes.

The Trustees have considered five alternatives for NEPA analysis:

1) Alternative A – the proposed action (Preferred Alternative);

2) Alternative B – Dam Repair with Fish Ladder (Denil fishway);

3) Alternative C – Dam Lowering with Nature-like Fishway (2% Rock Ramp);

4) Alternative D – Partial Dam Removal with Extended Riffle; and

5) Alternative E – No Action (or maintaining existing habitat and hydrologic conditions).

The ecological, economic, and social impacts of the alternatives are discussed in Section 4.2.

4.1.1 Alternative A – Proposed Action Alternative (Preferred Alternative) – Dam Removal (Spillway Removal)

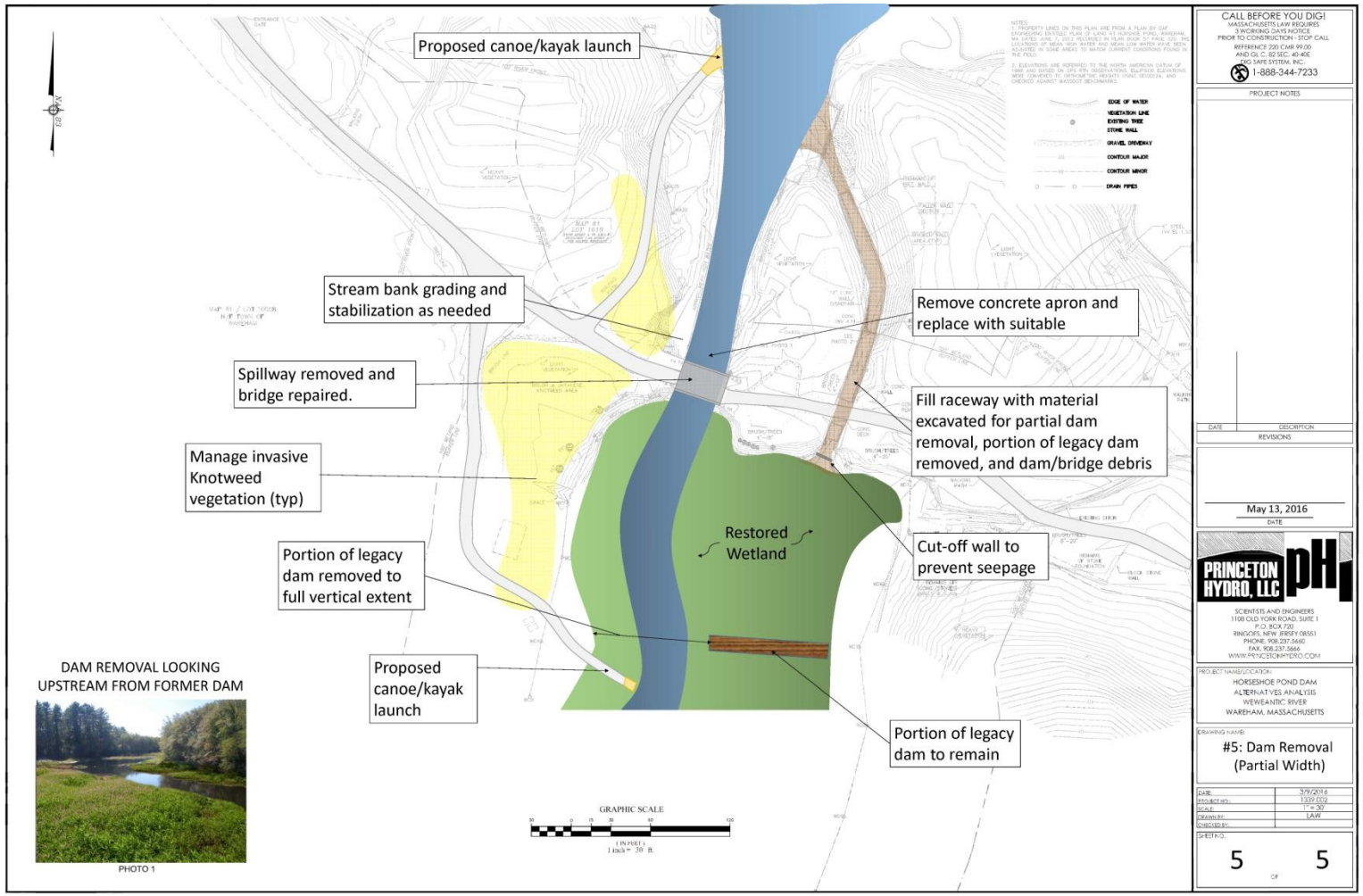
The preferred alternative for this project involves the full removal of the existing spillway and partial width removal of the remnant legacy dam approximately 170 linear feet upstream of the Horseshoe Pond dam (Figure 9). This alternative is expected to be self-sustaining and require the least operation and management. As a component of the project, the existing footbridge would be repaired, two canoe/kayak launches would be installed (one into the impoundment from the southwestern side of the dam, and the other northwest of the dam to the downstream tidal area), and the defunct mill race would be blocked, filled and vegetated. Construction activities will include:

- Fully removing the concrete spillway both vertical and horizontal extents;
- Saw-cutting the dam and extended decking apart from remaining bridge, removing the decking that extends from the bridge to the spillway;
- Removing the remnant sluice gate mechanisms;
- Removing the concrete apron under the bridge with placement of suitable natural boulder substrate in this reach;
- Managing sediment, as needed;
- Removing a portion of the upriver legacy dam with full vertical extent and partial horizontal extent;
- Repairing and remodeling the bridge;
- Installing two footpaths and two boat launches;
- Invasive plant species management within the impoundment and in vicinity of the new boat launches;
- Constructing a cut-off wall at the upstream end of the raceway to prevent seepage, filling the raceway with dam debris and imported fill, and stabilizing it with vegetation; and
- Grading/capping/stabilizing the left riverbank downstream of the bridge.

In addition, access roads, soil erosion and sediment controls, site protection measures and water level management are anticipated. These construction tasks are outlined in the alternatives analysis prepared by the project engineer in the study report (Princeton Hydro 2016).

The removal of both the spillway and a significant portion of the legacy dam would lower normal water surface elevations approximately 3.6 to 4.5 ft at the dam, restore free-flowing conditions to the impoundment, and restore full tidal exchange to the lower third of the impoundment, some of which is expected remain a broad pool. This alternative restores full tidal exchange to the site including measured mean high water (MHW) (0.56 ft, NAVD88), atypical high tide of approximately 2.5 ft, NAVD88, and the highest tide of the year of approximately 4 ft, NAVD88 that would affect the lower half of the impoundment.

Figure 9. Horseshoe Dam Restoration Project. Conceptual Drawing for Alternative A, Dam Removal (Spillway Removal)



Source: Adopted from Princeton Hydro 2016

With the dam removal alternative, a greater extent of riffle habitat will be restored upriver of the tidally influenced area. The natural sediment transport regime, which is both fluvially- and tidally-influenced, would also be restored. The upper portion of the impoundment is stabilized by riparian and wetland vegetation and the low-gradient longitudinal profile of the affected impoundment area suggest minimal potential for channel incision (i.e., headcutting) in the upper impoundment. The lower impoundment would likely remain a depositional setting with tidal exchange and result in minimal sediment mobilization. While some sediment mobilization is possible in the central portion of the existing impoundment area, this alternative would result in minor sediment mobilization.

Based on preliminary discussions with Massachusetts Department of Environmental Protection MassDEP) regarding sediment analysis results, this alternative would include active sediment management (e.g., stabilization in-place and/or excavation, relocation and stabilization) for the impounded sediment and adjacent soils immediately upstream of the dam between the spillway and the legacy dam, where elevated contaminants have been detected in previous sampling and analysis. Some sediment is expected to be excavated, placed, and dewatered preferentially in the former millrace with lower end closed off from releases, or as necessary, the sediments would be placed away from the proposed channel for permanent stabilization. The final design, to include sediment management will take into account the sediment management guidance developed and supported by MassDEP and MA DER. Adjacent soils, in the vicinity of the proposed canoe/kayak launch upstream of the dam, may need to be stabilized with stone or other natural materials to prevent soil or sediment mobilization. The soils forming the eroded left bank immediately downstream of the dam would need to be regraded and vegetatively stabilized. The final design for the project site work is expected to take into account potential historic resources, and include measures to avoid, minimize, and mitigate adverse effects on historic resources.

The topographic cross-sections and profile data collected from the impoundment and the use of one-dimensional hydraulic modeling of the dam removal alternative reveal no changes to existing upstream public infrastructure including the Fearing Hill Road Bridge. Public access to the restored site would be enhanced with the repair of the existing bridge infrastructure spanning the spillway, creation of a trail canoe and kayak launch at the restored river reach along the southwestern side of the dam, and construction of another trail with canoe and kayak launch northwest of the dam along the downstream estuarine area.

This alternative restores full migratory fish passage at the site, and access to upriver spawning and rearing habitats. This alternative also avoids any changes or impacts to the existing boulder and cobble riffle immediately downstream of the dam that is used as spawning habitat by migratory fishes such as rainbow smelt (*Osmerus mordax*). This alternative affords the greatest potential for adaptation of tidal habitats in response to the predicted regional sea-level rise and water temperature increases by providing unimpeded tidal exchange and reconnection with an undeveloped landscape setting conducive to natural ecological succession.

Freshwater pond habitat for warmwater fishes would be diminished with this alternative; however, riverine habitat for resident and migratory fishes would be substantially increased with restoration of formerly inundated upriver areas, the return of free-flowing riverine conditions, and natural river channel connectivity. With the predicted reduction in normal water surface elevation, existing shallow open water (5± acres) and floating emergent vegetation (17± acres) areas would be eliminated and converted to other wetland types, including a significant increase in forested wetland (9± acres) and scrub-shrub wetlands (7± acres) (Princeton Hydro 2016). There is potential for a secondary riffle to be exposed within the restored area upstream of the dam removal site that may provide additional riffle habitat for migratory fish spawning. Other riffles with potential spawning habitat would also be restored upriver with this project alternative.

Secondary ecological benefits will result from this project alternative. State-listed rare plants identified in the tidal estuary downstream, including Parker's pipewort (*Eriocaulon parkeri*), pygmyweed (*Crassula aquatica*), Eastern grasswort (*Lilaeopsis chinensis*), and tall cordgrass (*Spartina cynosuroides*), will gain new potential habitat upstream with the dam removal alternative. Control of invasive plant species will target existing stands of common reed (*Phragmites australis*) bordering the impoundment to manage expansion by this non-native species. In addition, the stands of Japanese knotweed (*Fallopia japonica*) in the vicinity of the proposed pond canoe and kayak launches will be removed and managed to prevent spread by this invasive annual species. Wetland functions related to water quality protection and enhancement would improve substantially: with less impoundment, lower retention time, increased flow, and an increase in canopy cover of woody riparian vegetation adjacent to the channel, instream temperatures would be more moderated and dissolved oxygen levels would increase in the restored river reach.

It is anticipated that this work will be conducted over a relatively short-term (one to two months) period. The work would be conducted during the low-flow period, and it is anticipated that all in-channel work would proceed in the wet. However, if greater river flows are present during construction, the mill race could be used to temporarily divert flows around the river channel work area, by temporarily using an upstream coffer dam and/or culvert extending from upstream of the legacy dam. Post-construction, the new channel extending from the former spillway through the lowered legacy dam breach would act as the freshwater surface water elevation control and the impoundment would be substantially reduced in area. A small portion of the upstream reach would remain ponded based on the channel longitudinal profile information and hydraulic modeling results (Princeton Hydro 2016).

This alternative provides the safest conditions for the public, and long-term maintenance would be associated only with the maintenance and repairs to the footbridge.

4.1.2 Alternative B – Dam Repair with Fish Ladder (Denil Fishway)

This Alternative (Alternative 2 in Princeton Hydro 2016) would involve the repair of the dam and installation of a fish ladder to address the dam structural deficiencies and to meet present- day

dam safety standards, and the goal of providing migratory fish passage restoration. This alternative would entail any needed repairs to the spillway, the low-level outlet, and gate structure, so as to re-gain the ability to close the low-level outlet and preferentially direct a requisite amount of river flow through the fish ladder to afford effective fish passage. This alternative includes the similar bridge repairs installation of canoe and kayak launches, and modifications to and filling of the mill race as proposed in Alternative A. Construction activities would include:

- Removal of appurtenant structures (existing sluice gate mechanisms);
- Resurfacing the concrete surfaces of the dam spillway (including within the low level outlet);
- Notching the concrete spillway to construct a 3-ft wide reinforced concrete Denil fishway with baffle boards;
- Installing a new low-level outlet sluice gate;
- Repairing and remodeling the bridge, repairing decking between the bridge and the spillway and installing safety grating and a new bridge railing;
- Installing two paths and two boat launches;
- Invasive plant species management within the impoundment and in the vicinity of the new boat launches;
- Blocking the raceway with installation of a cut-off wall at the upstream end to prevent seepage, filling the raceway with soil fill, and stabilizing the work area with vegetative stabilization; and
- Grading, capping, and stabilizing of the river's left riverbank immediately downstream of the bridge.

In addition, access roads, soil erosion and sediment controls, public safety measures (e.g., construction fencing, signage, or barriers) and water management controls would be needed. The anticipated construction tasks for this project alternative are outlined in alternatives analysis (Princeton Hydro 2016).

Dam repair would raise the water surface elevations in the existing pond by approximately 2 feet above existing normal conditions, and would re-submerge most of the impoundment. Water depths within the existing impoundment would deepen, although the gradual process of sediment accumulation would continue. No significant sediment volume would be mobilized as a result of this alternative; and no active sediment management would be expected. The dam would stand as the existing limit to the head of tide, and the up-gradient limit for estuarine habitat. There would be no expected tidal inundation of the impoundment including the highest existing tides of the year that have been recently documented at approximate elevation of 4 ft, NAVD88. With the dam in place, there would be no anticipated change in the scour potential of upriver infrastructure, although over-topping frequency would increase for the Fearing Hill Road Bridge for the 100-year and larger flood events.

Public access for this alternative would be enhanced with the repair of the bridge spanning the spillway, creation of two trail canoe and kayak launches into the impoundment and into the estuary from the western side of the dam, and the filling of and vegetatively stabilizing the defunct mill race. This project component would take into account results of historical resource assessment and in consultation with MHC and the ACHP.

The fish ladder design includes a concrete Denil fishway with 3-ft wide passage sluice installed at and immediately downstream of the existing spillway. Conversion of the existing mill raceway into a fish bypass channel (i.e., fishway) had been previously investigated by fish passage engineers from the USFWS and deemed less effective due to the substantial distance between the downstream "entrance" of the raceway from the spillway – a common reason for low-passage efficiency of such fish passage facilities (Bunt et al. 2012). The bifurcation of flow between the spillway and the bypass channel would create a false attraction to the spillway, where fish cannot pass, thereby leaving the bypass channel largely ineffective at passing fish upstream. Furthermore, the bifurcation of flow would reduce flow to the downstream riffle that is currently serving as valuable spawning habitat for smelt and other migratory fish species.

Repairing the dam and installing a Denil fishway at the spillway would provide for fish passage at the dam, but would vary in effectiveness depending on the target migratory fish species, their body size and swimming capability, and age class. The Denil fishway would primarily benefit river herring (both alewife and blueback herring); other species would utilize the ladder with less frequency and success. This alternative would result in no direct impact, positive or negative, to the downstream riffle which is currently serving as spawning habitat for smelt and other species. Similar to the No Action alternative, this alternative would not allow for the potential for tidal habitat to adapt, via upriver tidal exchanges, to increases in sea-level rise and instream temperatures. Impoundment riverine habitat may be improved for warmwater fishes and may also be enhanced by the addition of fish accessing the pond through the fish ladder.

With an increase in normal water surface elevation, certain vegetated areas would be more deeply inundated and are predicted to revert to open water, although sediment deposition and eutrophication processes would continue. With the increased inundation, the greatest predicted changes to wetland habitats in the impoundment would be an increase in floating aquatic vegetation (12± acres) and open water (7± acres), with a decrease in persistent emergent marsh (<10 acres) (Princeton Hydro 2016).

Wetland functions such as water quality protection and enhancement will not substantially improve with the repaired dam and impoundment remaining in place. The dam and impoundment result in daily and seasonally-elevated water temperatures and depressed dissolved oxygen concentrations in the impoundment and to downstream reaches due to reduced velocity/turbulence, direct exposure to sunlight for prolonged periods, as well as a greater proportion of surface water volume relative to groundwater discharge rates, particularly during summer, low-flow periods. State-listed rare and uncommon plants identified in the tidal estuary downstream, including Parker's pipewort and Eastern grasswort, will not gain in potential

upstream habitat. The control of invasive species will target identified stands of common reed within the impoundment to prevent spread by the species. In addition, the stands of Japanese knotweed (*Fallopia cuspidatum*) in the vicinity of both proposed canoe/kayak launches would be cleared and managed.

It is anticipated that the construction work would be conducted over a two to three-month period due to the concrete resurfacing and fishway construction, as well as the sluice gate installation that will be needed. The work would be conducted during the low-flow period and to the extent possible would utilize the low-level outlet and temporary coffer dam for water control, until the repairs of the low- level outlet are completed. At such time it is anticipated that flow would be diverted through the mill raceway to complete the low-level outlet reconstruction. Post-construction, the newly installed sluice gate will be closed and the pond restored to a higher, permanent water surface elevation with flow both spilling over the spillway and through the Denil fishway. For low river flows during the upstream fish migration season, flows would primarily pass through the fishway.

Dam repairs and installation of a fishway result in the greatest overall costs due to both upfront costs and ongoing long-term operation and maintenance costs. In the short-term, repair of the spillway, the low-level outlet, gate structure and bridge; filling of the defunct mill race; and the construction of a Denil fishway would result in the greatest upfront costs. The dam would require regular inspections, maintenance, repairs, and any future upgrades to remain compliant with dam safety standards. In addition, the fish ladder will also require regular maintenance throughout each springtime fish passage season, such as debris removal, seasonal opening and closing, as well as maintenance and repairs, thus resulting in the greatest long-term costs. With the dam spillway and fish ladder in place, this implementation alternative represents the greatest responsibility for operation and maintenance in addition to risk and liability to the dam owner.

4.1.3 Alternative C – Dam Lowering with Nature-Like Fishway (2% Rock Ramp)

This alternative (Alternative 3 in Princeton Hydro 2016) represents an option that partially restores the site to pre-dam conditions. This alternative would involve lowering the entire spillway to the elevation of the existing low-level outlet and installation of a boulder and cobble nature-like fishway with a projected 2% slope (or less) that would extend downstream from the spillway approximately 142 ft, and require regrading of the adjacent riverbanks. In addition, this alternative would include the similar bridge repairs, installation of canoe and kayak launches, and elimination of the defunct mill race, as proposed in Alternative A. Construction activities would include:

- Removing or lowering the concrete spillway;
- Saw-cutting and removing the upper portion of the dam spillway and extended decking of the bridge from the dam, removing the decking that extends from the bridge to the spillway;
- Removing the remnant sluice gate mechanisms;

- Removing the concrete apron under the bridge;
- Installing a rock ramp fishway from the lowered spillway extending 142+ ft downstream;
- Repairing and remodeling the existing concrete bridge;
- Installing two paths and two boat launches;
- Managing invasive plant species within the impoundment and in vicinity of the new boat launches;
- Constructing a cut-off wall at the upriver end of the raceway to prevent seepage, filling the raceway with dam debris and imported clean fill, and stabilizing it with vegetation; and
- Grading, covering, and stabilizing the left riverbank downstream of the bridge.

In addition, access roads, soil erosion and sediment controls, public safety measures (e.g., construction fencing, signage, or barriers), and some level of water controls will be needed. These construction tasks are outlined in the alternatives analysis (Princeton Hydro 2016).

Dam lowering will result in an approximate 3-ft reduction in normal water surface elevation of the impoundment since the nature-like fishway will have greater flow capacity and greater conveyance than the dam low-level outlet at normal flows. This alternative would result in creating free-flowing conditions in the upper half of the impoundment, leaving tidally- influenced backwatered conditions in the lower half of the impoundment. As noted above, the upper portion of the impoundment is stabilized by vegetation, and the low-gradient longitudinal profile and modeling indicate minimal potential for channel incision (i.e., headcutting) in the upper impoundment. The lower impoundment would likely remain a depositional setting and result in no increased sediment mobilization. While some sediment in the channel at the upriver end of the impoundment may be mobilized over time, in general, this alternative would result in minimal sediment mobilization and require no sediment management beyond the normal erosion and sedimentation control and water management during the construction of the nature-like fishway.

With the uppermost nature-like fishway crest set at the same elevation as the existing low-level outlet, tidal inundation would be partially restored to the impoundment; higher than average tides and storm surges, but not with normal tidal exchange, would create tidal backwater conditions in the lower impoundment. The diurnal MHW (0.56 ft, NAVD88) of estuarine waters would not enter the impoundment but would flood the upper portion of the nature-like fishway. However, the typical daily high tide (2.5 ft, NAVD88) and the highest tides of the year (approximately 4 ft, NAVD88) would fully inundate the nature-like fishway and flood the impoundment. Cross-sectional survey and hydraulic modeling indicates no changes to upstream infrastructure including Fearing Hill Road Bridge.

Public access to the impoundment would be enhanced with the repair of the bridge spanning the spillway, creation of a trail canoe and kayak launch into the impoundment from the southwestern side of the dam, and creating a second trail and canoe and kayak launch northwest of the dam along the downstream estuarine area. The defunct mill race would be filled and vegetatively stabilized, improving public safety.

The primary benefit of the nature-like fishway is to create hydraulic conditions at the dam site that are passable over a wide range of river flows and a afford a broader range of fish species (e.g., juvenile American eel) and age classes (e.g., glass eels and elvers) than could be accommodated by the Denil fish ladder in Alternative B. Additionally, it would be a river-wide design that would be expected to accommodate essentially all fish which attempt to pass. In contrast, the Denil fishway would have a 3-ft wide access way, and would be expected to pass a lower proportion of fish. The ramp would extend to, and is intended to expand, the existing smelt spawning riffle, which is also at a slope of approximately 2%. Conversely, the nature-like fishway would remain exposed to tidal fluctuations and could adversely affect migratory fish spawning in this river reach. This alternative would allow for tidal habitats to adapt with upriver tidal advancement with increases in sea-level rise and instream temperatures. Shallow water habitat for warm water fishes in a smaller impoundment would remain but be limited. The reduction in normal water surface elevation will result in the elimination of shallow open water (5± acres), and less floating emergent vegetation community (17± acres) that would convert to other wetland types including a significant increase in scrub- shrub (8± acres) and non-persistent emergent marsh vegetation (6± acres) (Princeton Hydro 2016).

State-listed rare plants identified in the tidal estuary downstream, including Parker's Pipewort, pygmyweed, Eastern grasswort, and salt reedgrass, would likely not expand in potential upstream habitat. Control of invasive plant species would target existing stands of common reed bordering the impoundment to prevent expansion. In addition, the stands of Japanese knotweed in the vicinity of the proposed canoe and kayak launches would be cleared and managed. Wetland function related to water quality protection and enhancement may improve; with less backwatering, lower retention time, less direct insolation, and greater vegetation canopy cover over the channel, instream water temperatures would be more moderated, and dissolved oxygen levels would increase through the former impoundment and into downstream reaches.

It is anticipated that this work will be conducted over a one to two-month period. For this alternative, work would be conducted during the low-flow period and all in-channel work would with regulatory approvals to work "in the wet." Conversely, the mill race could be utilized to temporarily divert river flows around the main channel, by utilizing an upstream coffer dam. Post-construction, the lowered spillway (i.e., upstream end of the rock ramp fishway) would serve as the water surface elevation control and impoundment elevations would be reduced. The lower portion of the impoundment would remain as an impoundment.

This alternative would lower the existing spillway, and thus, would no longer be subject to dam safety regulations. There would no longer be a requirement for routine inspections, maintenance and repairs, although regular inspection and maintenance would be strongly recommended to ensure the long-term proper function and performance of the nature-like fishway, which for example, may need adjustments if shifting in boulders and cobble occurs. Public safety would be improved in comparison to existing conditions; although the structure owner would still be required to complete maintenance needs, if required.

4.1.4 Alternative D – Partial Dam Removal with Extended Riffle

This alternative would involve the full removal of the existing spillway (both vertical and horizontal extent) and the installation of a riffle at a 1.25% slope extending from the existing spillway to the remnant legacy dam approximately 170 ft upstream. The extended riffle would be composed of cobble and gravel, and include roughness elements and small pools to provide resting locations for upstream migrating fishes. In addition, the footbridge would be repaired and two canoe and kayak launches would be installed, one into the impoundment from the southwestern side of the dam, and the other northwest of the dam along the downstream estuarine area. The mill race would be filled and vegetatively stabilized, improving public safety. Construction activities would include:

- Fully removing the concrete spillway;
- Saw-cutting the dam and the extended decking apart from the bridge, removing the decking that extends from the bridge to the spillway;
- Removing the remnant sluice gate mechanisms;
- Removing the concrete apron under the bridge (with placement of suitable boulder and cobble substrate in this reach);
- Installing a riffle extending from the spillway to the breached legacy dam upstream (with appropriate bank work and sediment management as needed);
- Stabilizing the breach in the legacy dam (as needed);
- Repairing and remodeling the existing concrete bridge;
- Installing two paths and two boat launches;
- Managing invasive plant species within the impoundment and in the vicinity of the new boat launches;
- Constructing a cut-off wall at the upstream end of the raceway to prevent seepage, filling the raceway with dam debris and imported clean fill, and vegetatively stabilizing the site; and
- Grading, capping, and stabilizing the left riverbank downstream of the bridge.

In addition, access roads, soil erosion and sediment controls, site protection measures and some level of water controls would be needed. These construction tasks are outlined in the alternatives analysis (Princeton Hydro 2016).

This alternative will lower the water surface elevation in the lower impoundment by approximately 3.6 to 4.5 ft., leaving the lower third of the impoundment backwatered and, dewatering peripheral areas and restoring free-flowing conditions to the upper two-thirds of the impoundment. As noted above, the upper portion of the impoundment is stabilized by vegetation, and the low-gradient longitudinal profile and hydraulic modeling of the basin indicate the potential for minor channel incision (i.e., head-cutting) in the central portion of the impoundment. The lower impoundment would likely remain a depositional setting and result in no new sediment mobilization. While some sediment mobilization is possible in the central portion of the impoundment, this alternative would result in minor sediment mobilization.

Based on preliminary discussions with MassDEP regarding the sediment analytical results, the construction of the extended riffle would likely include management (e.g., stabilization in-place and/or excavation, relocation, and stabilization) of the impoundment sediments and nearby soils immediately upstream of the dam. These are site areas where elevated contaminants were detected in previous sampling and by analysis. This material would be excavated and placed preferentially in the defunct millrace, or if required by regulatory agencies, in an alternative upland site. The final design would include sediment management activities based on the sediment management guidance prepared and supported by MassDEP and MA DER. Adjacent soils, in the vicinity of the proposed canoe and kayak launch upstream of the dam, may need to be stabilized with stone to prevent soil or sediment mobilization. The eroded left bank immediately downstream of the dam site would need to be stabilized.

With the riffle crest extending to the existing legacy dam, tidal flooding would be partially restored in the impoundment; higher than average tides and storm surges, but not normal tidal fluctuation, would create backwater conditions in the lower impoundment. The constructed riffle would have greater tidal flooding than the steeper-sloped nature-like fishway in Alternative C. Normal daily high tides (e.g., Mean High Water) would not access the impoundment but would intercept the upper portion of the extended riffle. However, the typical high lunar and annual tides would fully inundate the extended riffle and the lower reach of the impoundment.

Topographic cross-sectional and channel profile surveys and hydraulic modeling indicate no changes to upstream infrastructure including Fearing Hill Road Bridge. Public access to the impoundment would be enhanced with the repair of the footbridge spanning the spillway, creation of a trail and canoe and kayak launch into the impoundment from the southwestern side of the dam, and construction of another trail and canoe and kayak launch northwest of the dam bordering the downstream estuary. At a lower slope, the extended riffle would offer more favorable hydraulic conditions for passage of a broad range of fish species and age classes in comparison to either the Denil fishway in Alternative B or the steeper-sloped nature-like fishway in Alternative C. This riffle would avoid any changes or impacts to the existing migratory fish spawning riffle; however, this extended riffle would remain exposed to the tidal fluctuations.

This alternative would allow for potential for tidal habitats to adapt to increases in sea-level rise and instream water temperatures. Freshwater pond habitat for warmwater fishes in the impoundment would be reduced over existing conditions; however, riverine habitat for resident and migratory fishes would increase with restoration of formerly inundated upriver areas and the return of free-flowing conditions. With a reduction in normal water surface elevation, existing shallow open water (5± acres) and floating emergent vegetation (17± acres) would be lost and converted to other wetland types, including a significant increase in forested wetland (9± acres) and scrub-shrub wetland (6± acres) (Princeton Hydro 2016).

State-listed rare plants identified in the tidal estuary downstream, including Parker's pipewort, pygmyweed, Eastern grasswort and tall cordgrass would likely not expand in potential upstream habitat. Control of non-native plant species would target existing on-site stands of invasive

common reed bordering the impoundment to prevent expansion. In addition, the stands of Japanese knotweed in the vicinity of the proposed canoe and kayak launches would be cleared and managed. Wetland functions related to water quality protection and enhancement may improve; with less backwatering, lower retention time, less direct insolation, and with greater canopy cover over the channel, instream temperatures would be moderated, and dissolved oxygen levels would increase through the former impoundment and into downstream reaches.

It is anticipated that this work will be conducted over a two-to-three-month period. For this alternative, work would be conducted during the low-flow period and all in-channel work would with regulatory approvals to work "in the wet". Conversely, the mill race could be utilized to temporarily divert river flows around the main channel, by utilizing an upstream coffer dam.

Post-construction, the lowered spillway (i.e., upstream end of the rock ramp fishway) would serve as the water surface elevation control and impoundment elevations would be reduced. The lower portion of the impoundment would remain as an impoundment.

This alternative would lower the existing spillway, and thus, would no longer be subject to dam safety regulations. There would no longer be a requirement for routine inspections, maintenance and repairs, although regular inspection and maintenance would be strongly recommended to ensure the long-term proper function and performance of this lower-sloped nature-like fishway, which for example, may need adjustments if shifting in boulders and cobble occurs. Public safety would be improved in comparison to existing conditions; although the structure owner would still be required to complete maintenance needs, if required.

4.1.5 Alternative E: No Action Alternative

Under the No Action alternative, the Trustees would not allocate restoration funds available through the oil spill settlement and designated by the Trustees specifically for the aquatic and shoreline injury restoration category. Taking no action at this time represents leaving the dam as is, including the spillway, low-level outlet, the spanning bridge, and the adjacent mill race, and thus, creating no material change to the dam or impoundment. No funds would be allocated for repairing or managing the low-level outlet that would otherwise remain open in the current condition.

The No Action alternative would result in no change in existing water surface elevations, velocities and shear stresses at the dam, in the downstream channel, or upstream of the dam. The upper third of the impoundment, where a distinct channel has formed, is not backwatered and exhibits free-flowing conditions. Existing impoundment conditions would remain; no sediment would be mobilized with this alternative and the gradual process of sediment transport and accumulation would continue at the current rate (assuming no increased soil releases in the contributing watershed). No sediment management would occur with this alternative. The dam would stand as an existing impediment to the head-of-tide, and the up- gradient limit for tidal habitat. Ultimately, the impoundment would continue to fill with sediment and vegetation, and

the dam would continue to deteriorate with increased likelihood to fail. Ecological values and natural physical riverine processes would continue to be adversely affected by the Horseshoe Pond dam barrier.

The highest tide of the year and any tides above the invert elevation of the low-level outlet would continue to flood the impoundment. With the dam in place and the low-level outlet open, there would be no concern over impacts from substrate scour or inundation. Public access would continue in its current state, with informal rooftop boat launches to and from the impoundment adjacent to the spillway and into the downstream estuary. Trail access to the eastern portion of the property would remain via the existing failing footbridges over the spillway and the adjacent bypass channel.

Benefits to the migratory fish populations, particularly access to spawning and rearing habitats would not be increased over existing conditions. The No Action alternative would have no impact, positive or negative, to the downstream riffle which is currently or has recently served as migratory fish spawning habitat. Accordingly, with the dam in place, this alternative would not restore fish passage through the dammed reach for smelt or the other important migratory fish species, including river herring (both alewife and blueback herring), American eel, and sea lamprey, as well as numerous riverine resident fish species present, which commonly move throughout the river system in response to habitat changes or life cycle needs (e.g., feeding, cover and spawning).

With no changes to the dam with the No Action alternative, there will be limited potential for expansion of tidal habitat expansion, as well as the river system's ability to shift and adapt to regional increases in sea-level rise, instream water temperatures, and estuarine acidification. Fish habitat within the impoundment would largely remain as poor freshwater habitat for warmwater fishes. With no change in the impoundment conditions, plant community conditions and succession would continue at its current rate, and with the gradual accumulation of sediments and eutrophication. The impoundment would remain shallow and continue to be colonized by emergent vascular plants. Wetland functions such as water quality protection and enhancement will remain relatively unchanged. Daily and prolonged increases in water temperatures would continue to characterize the impoundment, with depressed dissolved oxygen concentrations in the impoundment and to the downstream estuary.

State-listed rare plants identified in the estuary downstream, including Parker's Pipewort, pygmyweed, Eastern grasswort, and tall cordgrass, would not benefit from ecological changes in the upriver habitat. Invasive species including common reed and Japanese knotweed bordering the impoundment would continue to expand into suitable habitat areas where no routine management of the accumulating impounded sediment would occur. The left bank downstream of the spillway, where erosion has been identified, would remain unstabilized and likely continue to chronically release sediment to the downstream estuary.

With this alternative, the dam with open stop-log bays, and no guardrails, will remain as a potential public safety hazard to pedestrians using the bridge. Both the spillway and low-level outlet would also remain a public safety hazard; the low-level outlet, in particular, produces strong hydraulic forces that can trap swimmers or boaters. With the dam in place, risk and liability remain high for the dam owner.

4.2 Environmental Consequences

This section evaluates the potential environmental effects of each alternative described in Section 4.1. The direct and indirect effects on the physical, biological, social, and economic environments are compared in Table 4. The cumulative effects analysis for all three projects described in this document is presented in Section 6.

Table 4. Comparison of Environmental Consequences of the Horseshoe Pond Dam – Weweantic River Restoration Project Alternatives

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Physical/ Biological Resources: Adverse Impacts	• *Adverse impacts to physical and biological resources are expected to be short-term, direct, and minor in the Weweantic River and estuary, while adverse impacts to the existing degraded pond habitat are expected to be short- to moderate-term, direct, and moderate as impacts will be at the local level and will not extend for a long duration.* During dam removal, the native habitat in the area would be adversely affected by construction equipment, noise, and increased sedimentation. However, construction is expected to be brief (no more than one or two months), so these negative impacts would be temporary. • This work will result in permanent minor impacts to existing degraded pond habitat behind the dam and resources that use the habitat (e.g., amphibians, reptiles, and other wildlife). The current pond is subject to eutrophication and is increasingly affected by sedimentation and elevated water temperatures. Freshwater ponds are common in this region, and some pond habitat is expected to remain farther upriver of the project site, sufficient to support species currently using the pond.	• *Adverse impacts same as Alternative A for the Weweantic River and estuary.* Adverse impacts would be reduced for biological resources in the existing degraded pond habitat as compared to Alternative A. The dam would remain partly in-place, thus backwater would still exist behind the impoundment and tidal flow would remain restricted.	• *Adverse impacts same as Alternative B .*	• *Adverse impacts same as Alternative A.*	• Without restoration action, the current impounded habitat would continue to degrade instead of being replaced with native habitat with tidal flow. The current pond habitat supports a range of freshwater species (e.g., amphibians, reptiles, wildlife) that over time would be impacted as the impoundment will continue to infill with sediment and be subject to eutrophication, supporting continued spread of invasive plant species. Also downstream streambank erosion will continue. The current structure is a near total barrier to fish passage, making upstream spawning habitats inaccessible to migratory fish populations. The existing dam hinders and would continue to limit tidal exchange, leading to increased instream water temperatures and dissolved oxygen levels that do not provide favorable conditions for native migratory and resident fish species.

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Physical/ Biological Resources: Beneficial Impacts	• *Beneficial impacts to physical and biological resources are expected to be long-term, direct, and major.* Benefits include restoring full tidal exchange between the Weweantic River and the estuary, benefiting natural physical riverine processes. Full fish passage would be restored, allowing access to habitats available from the Weweantic River through the estuary and into Buzzards Bay, including upstream riffle habitats largely inaccessible to fish below the dam. This alternative benefits native species by restoring historic habitat conditions in place of the currently degraded pond habitat. With project implementation, the basin will revert to an upper estuarine environment.	• *Minor beneficial impacts to physical and biological resources* • *Fewer beneficial impacts to native habitat compared as to Alternative A because of the continued restriction of tidal flow. Under this alternative, full fish passage would not be restored. Instead, repairing the dam and installing a Denil fishway at the spillway would provide for partial fish passage at the dam, primarily benefiting river herring (both alewife and blueback); other species would utilize the ladder with less frequency and success.*	• *Fewer beneficial impacts to native habitat compared to Alternative A because the backwater will still exist behind the impoundment and tidal flow will be restricted.* • *With the nature-like fishway crest set at the elevation of the low-level outlet, tidal inundation would be partially restored to the impoundment, including higher than average tides and storm surges, but not normal tidal fluctuation.* • This alternative would create tidal backwater conditions in the lower impoundment.	• *Fewer beneficial impacts to native habitat compared to Alternative A* because the dam would remain partly in-place, thus backwater would still exist behind the impoundment and tidal flow would be restricted. Daily high tides (e.g., Mean High Water) would not access the impoundment but would intercept the upper portion of the extended riffle; however, the typical high tide and the annual highest high tide (demarcated onsite by BBC staff (approx. 4.0 ft., NAVD88) would fully inundate the extended riffle and part of the impoundment.	• In the short term, the current degraded habitat would remain and support freshwater-dependent aquatic species, including amphibians, reptiles, and other wildlife. This benefit would diminish over time as habitat conditions continue to degrade as a result of sedimentation and eutrophication.

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
		• *Greater beneficial impact to the freshwater pond habitat as compared to Alternative A.* Habitat behind the impoundment may be improved for warmwater fishes and also may be enhanced by the fish accessing the pond through the fish ladder. • This alternative would result in no direct impact, positive or negative, to the downstream riffle which is currently serving as spawning habitat for smelt and other species.			
Endangered Species: Adverse Impacts	• Red-bellied cooter (turtle) habitat may be affected, but is not expected to be adversely affected by the restoration actions. The existing freshwater habitats behind the dam will return to a low-brackish tidal river, but upstream freshwaters will not be affected.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No adverse effects*

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
	The closest known critical habitat for cooter is located more than 9 miles away from the project site. • None of the habitats used by state-listed threatened and endangered (T&E) species are present within the project site, and thus no adverse effects on T&E species are expected.				
Endangered Species: Beneficial Impacts	• Several state-listed rare plants known to inhabit the estuarine area would gain new potential habitat upstream with the barrier removal.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No beneficial impacts*
Essential Fish Habitat: Adverse Impacts	• *Adverse impacts to essential fish habitat (EFH) areas are expected to be short-term, direct, and minor.* NOAA RC submitted an EFH consultation to NMFS' OHC to consider potential adverse effects on EFH (see Appendix A). Any OHC recommendations will be used in preparing the final project design. . Based on their initial analysis, the Trustees do not anticipate adverse effects to EFH from the project.	• Same as Alternative A	• Same as Alternative A	• Same as Alternative A	• *No adverse impacts*

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Essential Fish Habitat: Beneficial impacts	• *Beneficial impacts to EFH are expected to be long-term, direct, and moderate to major.* Removing the dam would increase freshwater habitat for anadromous fish spawning, improve water quality in the Weweantic Estuary, and likely support increased fish species richness throughout the river reach influenced by the dam removal.	• Fewer beneficial impacts compared to Alternative A because fish passage will be restored but the dam will not be removed.	• Beneficial impacts greater than Alternative B but less than Alternative A, because fish passage will be restored and tidal inundation would be partially restored to the impoundment.	• Same as Alternative C	• *No beneficial impacts*
Air Quality: Adverse impacts	• *Short-term, minor, adverse air quality impacts would result from emissions and dust from construction equipment used to remove the dam.* These emissions would likely be short-term, localized increases compared with daily commuter or commercial activity in the region. During implementation, the contractor would use BMPs to manage equipment exhaust, noise, and dust as much as possible. These BMPs could include minimizing the time during which engines run, planning removal actions to maximize efficiencies with heavy equipment use, and using efficient engine technologies.	• Same as Alternative A, except that the impacts would occur over a 2-month construction period instead of a 1-month construction period.	• Same as Alternative A	• Same as Alternative A	• *No adverse impacts*

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Air Quality: Beneficial impacts	• No beneficial impacts	• No beneficial impacts	• No beneficial impacts	• No beneficial impacts	• No beneficial impacts
Water Quality: Adverse impacts	• *Adverse impacts to water quality are expected to be short-term, direct, and minor to moderate.* Water quality would be negatively affected during construction activities as some debris from the dam and sediment built up behind the dam will be released downstream. As construction is expected to take a month, these negative impacts would be temporary.	• Fewer short-term impacts compared to Alternative A, because construction activities to promote fish passage would have fewer water quality impacts than dam removal.	• Same as Alternative B	• Same as Alternative B	• No adverse impacts
Water quality: Beneficial impacts	• *Moderate to major beneficial, long-term direct and indirect biological and water quality impacts are expected from the restoration actions.* Long- term effects are expected to be beneficial: removing the dam would allow the Weweantic River to resume flowing unobstructed to the Weweantic estuary, and would also re-establish tidal exchange between the estuary and the mouth of the river. Improving flow and restoring tidal exchange would lead to improved water quality by reducing impacts of eutrophication and sedimentation, and improving habitat for vegetation.	• No beneficial impacts because the fish ladder does not improve tidal exchange.	• Same as Alternative A, with a smaller degree of water quality benefit because there would not be full, unrestricted tidal exchange.	• Same as Alternative C	• No beneficial impacts

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Social and Economic Resources: Adverse impacts	• *Adverse impacts are expected to be short-term and long-term, direct, and minor.* Based on the age of the dam, it is considered a historic structure. A Project Notification Form and supporting materials have been to the SHPO and THPOs for consultation in accordance with Section 106 of the NHPA. Any adverse effects to historic resources due to project implementation will be addressed through mitigation measures identified as stipulations in a signed MOA between MHC and any other consulting parties. • Construction would take place over one month. Use of heavy equipment would be managed to reduce impacts from noise and dust to neighboring communities. • Recreational fishing associated with the freshwater pond habitat would be affected if the impoundment is removed.	• Adverse impacts are expected to be short- term direct, and minor. Construction would take place over two months. Use of heavy equipment would be managed to reduce impacts from noise and dust to neighboring communities.	• Same as Alternative B	• Same as Alternative B	• Adverse impacts are associated with current conditions. The current dam structure is not stable and poses a safety hazard. The owner is required to conduct regular safety inspections and maintenance under the Dam Safety requirement, this requirement would continue under the No Action alternative and represents a long-term safety hazard and cost.

Attribute	Alternative A (Preferred Alternative)	Alternative B	Alternative C	Alternative D	Alternative E (No Action)
Social and Economic Resources: Beneficial impacts	• *Major beneficial, long-term direct and indirect socioeconomic impacts are expected from the restoration actions.* • Direct socioeconomic benefits include improved safety: the dilapidated structures would be completely removed from the river, which also means that the dam would no longer be subject to dam safety regulations. Removing the dam will improve a wide range of recreational activities including boating and kayaking, use of the bridge and walking path, and recreational fishing and wildlife viewing.	• Fewer long-term benefits compared to Alternative A. The dam would be repaired, but recreational activities associated with dam removal would not occur.	• Same as Alternative B	• Same as Alternative B	• *No beneficial impacts*
Sea-level Rise and Carbon Sequestration Considerations	• This alternative allows for the potential for tidal habitat to adapt, via upstream shift, to regional increases in sea- level rise and in-stream water temperatures. • The increase in a restored tidal marsh and healthier freshwater wetland will increase the likelihood of carbon sequestration.	• Similar to but less than Alternative A, because full tidal exchange, upstream shift would be restricted, as compared to full dam removal. Less tidal marsh and freshwater wetland would be restored, and thus, carbon sequestration would likely be less.	• Same as Alternative B	• Same as Alternative B	• Without restoration, the natural tidal regime is restricted by the dam, and sediments and fish would not able to pass freely between the Weweantic River and the Weweantic estuary. The dam also inhibits wetland and marsh habitats from remaining resilient in the face of sea-level rise. Lower functioning wetlands would remain.

5. Conservation Moorings Restoration: Environmental Effects Analysis

5.1 Project Alternatives

This section provides a summary of alternatives that the Trustees have considered for the Conservation Moorings and Eelgrass Restoration Project. NEPA requires that any Federal agency proposing a major action consider a reasonable set of alternatives to the proposed action. To warrant detailed evaluation by the Trustees, an alternative must be reasonable and meet the purpose and need of a project (Refer to Section 1.4). Screening criteria are used to determine whether an alternative is reasonable.

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 4.3.1 of the PRP/EA. The implemented Conservation Moorings Restoration Project will address injuries to eelgrass or other aquatic habitat:

- Restore or enhance historic eelgrass habitat that was affected by the oiling;
- Address the same or similar aquatic habitat types injured by the oiling;
- Increase eelgrass, fish, and wildlife habitat for species injured by the oil spill; and
- Provide or enhance ecological services that include multiple biological, physical and chemical processes.

The Trustees have considered two alternatives for this NEPA analysis:

1) the proposed action (Preferred Alternative); and

2) No Action (or maintaining existing habitat and hydrologic conditions).

The ecological, economic, and social impacts of each of these alternatives are discussed in Section 5.2.

5.1.1 Proposed Action Alternative (Preferred Alternative)

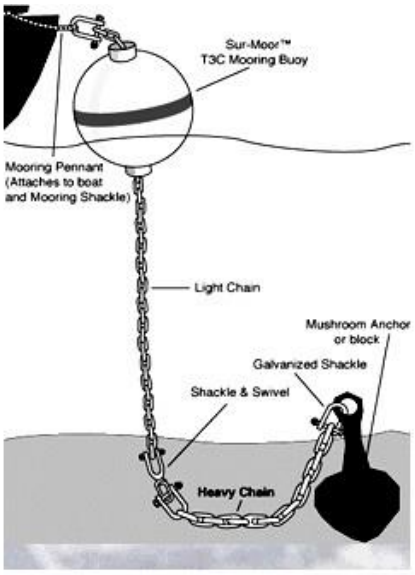
This project, referred to as Conservation Boat Moorings Restoration (SA-10) in the B-120 Buzzards Bay PRP/EA, was identified as a Tier 1 preferred alternative to address shoreline and aquatic resource injuries resulting from the 2003 Buzzards Bay oil spill.

Eelgrass (*Zostera marina*) is a native, meadow-forming marine vascular plant that is part of a group of aquatic plant species known commonly as sea grasses. Eelgrass beds are recognized as a critical nursery habitat for a variety of marine fish and macroinvertebrate species. In Massachusetts, eelgrass is nearly always found subtidally in shallow southern New England coastal waters. Conversely, eelgrass beds generally have been declining over the past several

decades, and at a relatively high rate in Massachusetts and other nearby coastal waters, due to excess nitrogen releases and estuarine and marine water quality degradation and other anthropogenic stressors including boating activities and boat moorings.

The vast majority of recreational boat moorings in Massachusetts are typically constructed of a large weighted block or mushroom-style weight that anchors the mooring, and a heavy chain that adds additional weight and drag to account for changing tidal heights, winds, and tidal current direction (see Figure 10). The mooring block causes a loss of eelgrass due to its surface area footprint and may cause tidal flow scour resulting from bottom shear stress. The length of a chain leading to a boat connection is typically of adequate length to amply account for variable tide ranges, causing the chain to drag on the substrate and often carving a broad, circular pattern into the eelgrass bed as the anchored boat swings on the mooring, ripping up plants. This physical action also increases the exposed edge of the eelgrass meadow while providing a sink for detritus. The combined effect of the block and chain may also increase sediment resuspension within the eelgrass bed, diminishing water clarity and light quality on the edge of the scar, and further degrading the eelgrass habitat (Evans et al, undated).

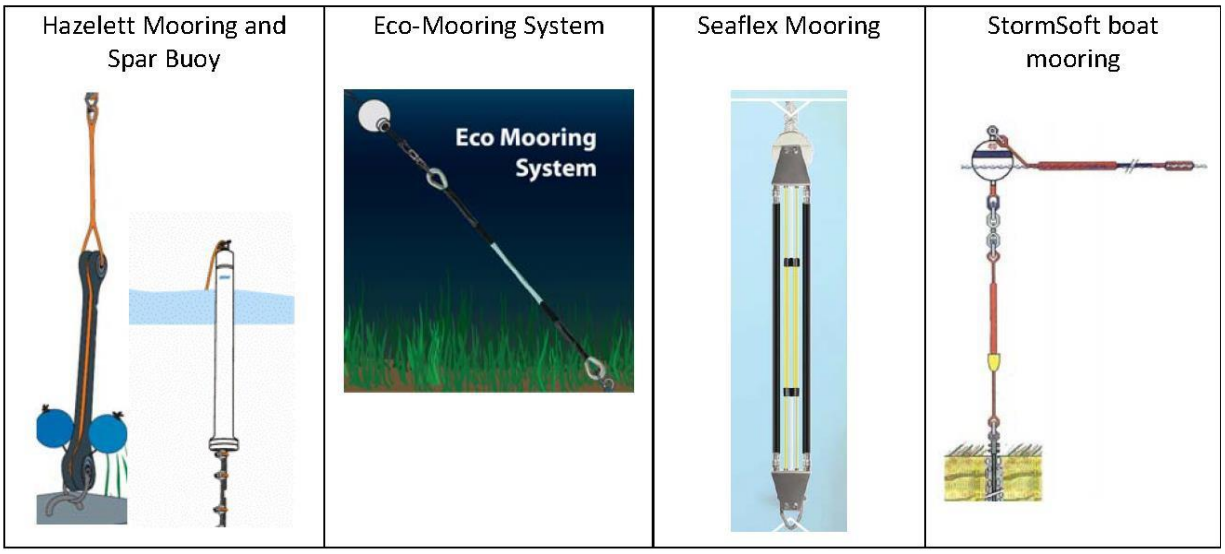
Figure 10. Conventional Mooring Diagram



Source: Urban Harbors Institute 2013, Figure 2.

Evans et al. (Undated) also describe alternative mooring systems called conservation moorings that “replace the block with a helical anchor that is screwed into the substrate, resulting in minimal footprint impact (see Figure 11). The reinforced, expandable elastic “rode” or band is fixed to the anchor and replaces the traditional metal chain, and is attached to a float, preventing the attached rode from dragging on and scouring the eelgrass bed and substrate. If installed and maintained correctly, this system has limited potential to contact the marine bottom substrate and, therefore, minimizes direct impacts to eelgrass beds otherwise caused by conventional boat moorings.” Maintenance of conservation moorings typically include periodic or seasonal cleaning of the rode of any biofouling organisms that may colonize and weigh down the structure.

Figure 11. Four Types of Conservation Moorings, where Chains or Cables are Suspended to avoid Scarring Eelgrass Habitat



Source: Urban Harbors Institute 2013.

For over a decade, the MA DMF has been monitoring boat moorings that were replaced with new conservation moorings (i.e., floating, flexible rods and helical anchors). There are different designs including Eco-Mooring, Hazelett, Seaflex, and others.[2] To date, Eco-Mooring and Hazelett conservation mooring system types have been installed in several harbors in Massachusetts including Gloucester, Manchester-by-the-Sea, Long Island – Boston, Wareham, West Falmouth, and Quissett Harbor. The MA DMF continues to routinely monitor a percentage of the installed moorings in each of these harbors. MA DMF divers measure the area of the scar, eelgrass density and percent cover inside and outside of the scar. The Trustees have found that when the moorings are installed, maintained correctly, and the rode is suspended at all times, eelgrass can revegetate a mooring scar typically in one-to-three growing seasons.

The objective of this grant program is to replace approximately 25 to 30 conventional chain moorings with innovative floating rode moorings ($2,000 to $3,000 each) in Buzzards Bay coastal sites where existing moorings are known to be causing scouring and eelgrass loss.

Through mooring replacement and committed routine maintenance (e.g., bio-fouling removal), effects on eelgrass will be lessened or eliminated. Bottom habitat scars left by the former conventional moorings will be revegetated and further marine bottom sediment scour and disturbances will be avoided with the installation of the conservation moorings. The potential risks of this alternative are limited if remaining coalesced eelgrass beds surround the encompassing area such that animal grazer access is limited, thereby sustaining healthy plants to expand and revegetate the scarred sites.

[4]The mention of a commercial product or company does not imply endorsement of this product or company by the Trustees.

For this project, the MassDEP will provide programmatic support for the proposal solicitation and a contract award management. MassDEP will use a standard Grant Announcement and Application (GAA) template and process developed for the Commonwealth's Natural Resources Damages Program to solicit competitive grant proposals and evaluate potential sites and projects. The GAA template includes eligibility and evaluation criteria that are specific to the purpose of the aquatic injury restoration associated with the B-120 Buzzards Bay source of funding. Briefly, proposed projects must be located in the embayments of the Buzzards Bay watershed at a location with existing conventional moorings that are currently located within an eelgrass meadow with demonstrable scars based on survey data. DMF will participate in the proposal review and project selection process, provide technical input on contract scopes of work and budgets to awardees, as well as provide oversight during project implementation, including site visits as needed before and after mooring installation, and technical guidance to awardees on mooring monitoring requirements and methods.

5.1.2 No Action Alternative

With the No Action alternative for this project, the Trustees would not use funds made available through the oil spill settlement for addressing aquatic and shoreline resource injury restoration category. No actions to restore eelgrass or eliminate factors influencing eelgrass loss would be implemented, and eelgrass restoration would be dependent on existing municipal programs to better manage, maintain, and/or replace traditional moorings or restore eelgrass using other methods. Because many factors contribute to eelgrass decline, it is unlikely that its distribution will increase without active intervention from restoration practitioners. The No Action alternative assumes that existing conventional moorings will continue to remain in-place and continue to adversely impact eelgrass beds. Additionally, funds are limited, and therefore, are not typically available to municipalities; costly conservation measures typically are not installed unless unique fund sources become available, and if they are, the funds are highly competitive. Therefore, the Trustees do not consider the No Action Alternative to fulfill the purpose and need identified in the Final PRP/EA and this SEA.

5.1.3 Other Alternatives Considered and Rejected

Transplanting: Transplanting eelgrass can be an effective restoration method and has been used in Buzzards Bay in the past. Eelgrass from a location with healthy populations is removed and transplanted in the area being restored. In this restoration scenario, the Trustees would identify sites to be restored and potential source locations and hire eelgrass restoration experts to transplant eelgrass to the targeted restoration areas. Because most of Buzzards Bay was historically populated with eelgrass, in theory most locations should support the species. However, many historic eelgrass beds have been lost due to environmental stressors such as poor water quality caused by turbidity, eutrophication, and physical disturbances such as scouring and removal from boat props. Restoration practitioners have found that a key factor to successful transplanting is to first ensure that the site targeted for restoration provides suitable habitat and that any stressors that can cause eelgrass to die have been eliminated or significantly reduced. Transplanting eelgrass is a labor-intensive process that requires divers to plant individual eelgrass

units by hand. Due primarily to the environmental sensitivities, transplanting eelgrass has a high rate of failure and requires careful site-selection and monitoring to ensure success. Further, transplanting causes damage to the "donor" site by removing significant areas of eelgrass (recent projects in Buzzards Bay have transplanted two or more acres), leaving the donor site vulnerable to sedimentation or other pressures which could result in lost eelgrass area or cover. Given the uncertainties and the harm to existing eelgrass caused by this alternative, the Trustees do not consider this method as a cost-effective alternative to fulfill the purpose and need identified in the Final PRP/EA and this SEA.

Seeding: Eelgrass can be propagated by distributing seeds on the substrate. Restoration practitioners have tried a variety of application methods, including broadcasting seeds from boats, injecting seeds into the sediment, or using simple technologies such as tape to plant the seeds just below the sediment surface. Similar to transplanting, success is dependent, at least in part, on site suitability and restoration should be targeted to areas where conditions are likely to support eelgrass. Restoration success using seeding methods are often unsuccessful. In some cases, the restoration failed because seeded eelgrass growing in areas otherwise devoid of seagrass attracts foragers and the new grass seedlings were eaten before the plants had time to grow and become established. Due to the uncertainty associated with seeding, and questions about the best methods to ensure restoration success, the Trustees do not consider this method as a viable, cost-effective alternative to fulfill the purpose and need identified in the Final PRP/EA and this SEA.

Nursery Plant Installation: Installing nursery plants is similar to transplanting, but plant stocks are grown in a nursery from seed rather than plants being taken from an existing eelgrass bed. Nursery plant eelgrass restoration projects in the Buzzards Bay area have had limited success in the past, likely for many of the reasons identified for both transplanting and seeding: poor water quality, eutrophication, and grazing and herbivory by crabs and other animals. Given the limited success of past restoration actions using the nursery plant installation method, and the uncertainty about identifying suitable restoration locations, the Trustees do not consider this method as a cost-effective alternative to fulfill the purpose and need previously identified in the Final PRP/EA and this SEA.

5.2 Environmental Consequences

This section evaluates the potential environmental effects of the proposed action and No Action alternatives described in Section 5.1. The direct and indirect effects on the physical, biological, social, and economic environments for are compared in Table 5. The cumulative effects analysis for all three projects described in this document is presented in Section 6.

Table 5. Comparison of Environmental Consequences of Alternatives for the Conservation Moorings Restoration Project

Attribute	Preferred Alternative	No Action Alternative
Physical/Biological Resources: Adverse Impacts	• *Adverse impacts to benthic areas are expected to be short-term, direct, and minor.* Replacing existing moorings with conservation moorings would require the use of equipment and divers, and would disturb the area immediately surrounding the mooring anchor point during installation. Because the project will target areas where existing conventional moorings have already caused damage to seagrass, the additional, short-term damage would be minimal compared with existing conditions. Some non-mobile benthic fauna may be buried or crushed when the moorings are reinstalled, but the area affected would be essentially limited to the footprint of the mooring apparatus and would be very short-term. Further, the benthic fauna in the designated restoration areas is expected to be common in the surrounding areas, and the individual mooring apparatus footprints are very small in comparison of the similar bottom types in Buzzards Bay. No population level impacts are expected.	• If the restoration projects are not undertaken, there would be no short-term impacts to benthic areas from replacing existing moorings. However, eelgrass would continue to decline in the absence of restoration. In the identified municipal waters where eelgrass coverage is low, it is unlikely eelgrass would rebound without active restoration efforts. Eelgrass was historically abundant throughout Buzzards Bay but has declined dramatically since the 1950s, in part because of increased sedimentation, nutrient loading, and erosion in the watershed (BBNEP 2016a).
Physical/Biological Resources: Beneficial Impacts	• *Beneficial impacts to benthic areas are expected to be long-term, direct, and moderate.* As mentioned in Section 5.1.1, the new moorings are expected to facilitate scarred areas being re-vegetated within 1-3 growing seasons following installation of the conservation moorings, once disturbance from the conventional moorings ends. Overall, the project would benefit eelgrass and benthic habitats.	• No beneficial impacts.
Endangered Species: Adverse Impacts	• No effect to T&E listed species, their habitats, or proposed or designated critical habitats are expected from implementation of this project. None of the habitats used by T&E species are present at the potential project sites. The Trustees will consult with USFWS to confirm that no adverse effects to federally-listed terns or plovers would be result once individual project locations have been selected for implementation.	• No adverse effects.
Endangered Species: Beneficial Impacts	• No beneficial impacts to T&E species are expected.	• No beneficial impacts.

Attribute	Preferred Alternative	No Action Alternative
Essential Fish Habitat: Adverse Impacts	• *Adverse impacts to essential fish habitat (EFH) areas are expected to be short-term, direct, and minor and limited only to the construction period and footprint.* The NOAA RC submitted an EFH consultation to NMFS' OHC to consider potential adverse effects on EFH (see Appendix A). The OHC response suggests that the project implementation should have benefits to eelgrass bed EFH. Based on their initial analysis, the Trustees do not anticipate adverse effects to EFH in the project area.	• Adverse impacts of conventional moorings on EFH would continue.
Essential Fish Habitat: Beneficial Impacts	• *Beneficial impacts to EFH are expected to be long-term, direct, and moderate.* These projects are expected to result in benefits to EFH habitat by increasing seagrass cover which provides food, shelter, and nursery habitat for EFH species and improves local water quality.	• No beneficial impacts.
Air Quality: Adverse Impacts	• *Short-term, minor air quality impacts would result from the emissions generated by the vehicles used to transport the mooring equipment during replacement activities.* These emissions are expected to be minimal when compared to the daily commercial and recreational boating activities in the project area.	• No adverse impacts.
Air Quality: Beneficial Impacts	• No beneficial impacts	• No beneficial impacts
Water Quality: Adverse impacts	• *Adverse impacts to water quality are expected to be short-term, direct, and minor.* Water quality may be negatively affected briefly during construction activities as a result of sediment disturbance.	• Adverse impacts of conventional moorings and associated loss of eelgrass would continue.
Water Quality: Beneficial impacts	• *Beneficial impacts to water quality are expected to be long-term, direct and indirect, and minor to moderate.* Conventional moorings scour the bottom substrate, eliminating eelgrass and mobilizing sediment. Conservation moorings will eliminate bottom substrate scouring, providing a two-fold benefit: the eelgrass would return to scarred areas and less sediment would be mobilized as a result of mooring boats in marinas. Overall, the project is expected to have a net benefit to water quality and the benthic ecosystem.	• No beneficial impacts.
Social and Economic Resources: Adverse Impacts	• *Short-term, minor adverse impacts* would include maintenance required to limit bio fouling on the new devises. This maintenance is required on a regular basis, but is short-term and considered a part of routine marina maintenance.	• No adverse impacts.

Attribute	Preferred Alternative	No Action Alternative
Social and Economic Resources: Beneficial Impacts	• *Beneficial, long-term direct and indirect, minor socioeconomic impacts are expected from the restoration actions.* The short-term direct benefits would be the additional income for workers conducting the restoration actions. Equipment, such as boats used during moorings replacement actions at 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 eelgrass and improved habitat, which acts as nursery and forage habitat and stabilizes sediments and shorelines, thus supporting recreational fishing and tourism which benefits local populations.	• No beneficial impacts.
Sea-level Rise and Carbon Sequestration Considerations	• This project would benefit marine habitat resiliency, as eelgrass captures and sequesters carbon, while also supporting better water quality and providing habitat for aquatic species. Sea-level rise may enhance beds, locally, with greater circulation, depending on local site conditions. By reversing damage to eelgrass, eelgrass habitat area would increase, and those areas supporting eelgrass will have higher resiliency to environmental changes such as water quality and habitat loss compared with areas with damaged or lost eelgrass habitat. • However, rising Bay temperatures may affect sustainability of sea grass beds. Healthier beds are typically found in deeper waters where cooler summertime water temperatures persist. Thus, the level of habitat resiliency will likely depend on specific project locations, local conditions, and the rate of change in water column temperature and sea-level rise.	• Without restoration, eelgrass beds would remain damaged and likely would continue to degrade. Scars in eelgrass beds can expand, even outside the area with direct disturbance, as scars lead to increased sedimentation and turbidity. Areas with damaged eelgrass would be less-resilient to sea-level rise and other environmental stresses, and would likely have less capacity to sequester carbon.

6. Cumulative Impacts

The CEQ defines cumulative effects as, "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Past, present, and reasonably foreseeable future projects in the Buzzards Bay area were documented in Section 6.4 of the Final PRP/EA (released in September 2014), together with an analysis of cumulative impacts for the programmatic environmental assessment.

The adverse cumulative impacts from historical practices include overfishing, shoreline development, and historical pollution of Buzzards Bay. These historical practices have been controlled to some extent by federal, state, and local governance mechanisms in recent years, but the area is still in the process of recovery from these past actions. Buzzards Bay also continues to experience long-term, moderate water quality degradation from shoreline and watershed development that leads to excess nitrogen and phosphorus pollution (BBNEP Undated).

The Buzzards Bay National Estuary Program (NEP), established in 1988, has played an important coordinating role for current and future restoration actions in Buzzards Bay and the surrounding watershed. The Buzzards Bay NEP first developed a Comprehensive Conservation and Management Plan (CCMP) in 1991, which was recently updated in 2013 (BBNEP 2013). The 2013 CCMP provides a blueprint of ongoing and future actions "to help guide municipalities and watershed partners in their ongoing efforts to protect and restore water quality and living resources in the bay and surrounding watershed." Although there is no readily available funding in place to implement all the recommended actions, the Buzzards Bay NEP has historically been able to coordinate activities and obtain funding from a variety of sources for categories of activities in the plan, making these activities reasonably foreseeable over the next few decades. For example, the Buzzards Bay NEP, through the MA EOEEA, coordinated the award of almost $800,000 in federal funds in January 2016 for six projects in the Buzzards Bay watershed, focused on improving water quality, including one project in the Town of Falmouth to expand an oyster reef to serve as a biological filter. The three restoration projects described in this Draft SEA are all consistent with the goals and objectives of the 2013 CCMP, and would contribute to the cumulative beneficial impact of the full range of actions planned for Buzzards Bay under the 2013 CCMP. Lastly, the Draft SEA included an opportunity for the public to provide input on other potential proactive or compensatory habitat and water quality restoration projects that could be considered in fully assessing the cumulative impacts resulting from these projects.

6.1 Round Hill Salt Marsh Restoration Project

The analysis of cumulative impacts for the Round Hill Salt Marsh Restoration Project focuses on past, present, and reasonably foreseeable future actions in the proposed action area that could also influence the salt marsh and beach resources affected by this project. The Massachusetts

Environmental Policy Act (MEPA) database and the MA DER project map were queried for all projects in the municipality of Dartmouth that involved salt marsh or beach restoration, as well as the surrounding municipalities of Westport, New Bedford, and Fairhaven. Because salt marsh and beach restoration projects typically require some type of state agency involvement or permitting, the MEPA database is a valuable informational source for identifying related restoration-type projects. Ten relevant past salt marsh restoration projects are situated in proximity to the proposed action area:

- The Nonquitt Marsh tidal marsh restoration project was funded by the New Bedford Harbor NRDA Trustee Council (planning and design) and is a 60 + acre estuary and marsh complex located on the west side of Round Hill Point, less than a mile from the Round Hill Salt Marsh Restoration Project site.
- The Dartmouth Cow Yard Salt Marsh at Little River was a tidally restricted marsh. It is located within approximately two miles of the Round Hill Salt Marsh Restoration Project site. Replacement of undersized culverts improved tidal exchange and marsh health at this site.
- The Padanaram salt marsh restoration project was funded by the New Bedford Harbor NRDA Trustee Council and is a 7-acre salt marsh and tidal pond complex located less than 3 miles from the Round Hill Salt Marsh Restoration Project site.
- The Star-of-the-Sea Drive project in Dartmouth restored flow to a 5-acre marsh by removing a collapsed culvert that blocked a tidal creek between the marsh and Apponagansett Bay.
- At Pierce Mill Park in New Bedford, MA, wetlands were restored on-site as compensation for isolated wetlands filled during park construction.
- Winsegansett West Salt Marsh Restoration in Fairhaven restored wetlands at multiple sites through increasing tidal flow.
- The Marsh Island Salt Marsh Restoration Project in Fairhaven involves restoration of 12 acres of wetlands on a previously filled site, with funding from the New Bedford NRDA Trustee Council. This project is in progress.
- West Island Beach Salt March Restoration Project in Fairhaven involved restoration of 9 acres of salt marsh through restoring tidal connection.
- At the Allens Pond Wildlife Sanctuary in South Dartmouth, culverts were replaced to enhance tidal influence to 7 acres of upstream coastal wetlands.
- Within the Nasketucket Bay State Reservation, a restoration project restored 4.5 acres of degraded salt marsh by replacing a severely under-sized culvert with a larger pipe to enhance tidal influence within upstream wetlands.
- Mattapoisett Neck Marsh was restored through improving tidal flow to the 21-acre marsh.

Additional beach and coastal bank maintenance and restoration projects, including projects to add beach sand, install native vegetation, and maintain rip-rap were also identified in the proximity to the proposed action area:

- The Bill Curtis Beach Project, Westport, MA;

- Alteration of Coastal Bank (SE 80-1681), Westport, MA; and
- Proposed Bank Restoration, Westport, MA.

Given the historical loss of salt marsh wetlands around Buzzards Bay, restoring additional salt marsh area at the Round Hill Salt Marsh Restoration Project site would result in a moderate positive effect on salt marsh-dependent species because of the increase in habitat area, with the greatest area provided by the preferred Alternative A, in comparison to Alternatives B-D. The Trustees' preferred alternative for the Round Hill Salt Marsh Restoration Project would have an additional cumulative long-term net benefit by enhancing wetland resources at the site, because the project will improve tidal exchange for the Meadow Shores marsh and increase the health and longevity of the marsh. Recreational use benefits would also result from the project as a result of beach nourishment at the town-owned public beach at Round Hill, and possibly other active beaches available for public recreational use in the area.

6.2 Horseshoe Pond Dam – Weweantic River Restoration Project

The analysis of cumulative impacts for the Horseshoe Pond Dam – Weweantic River Restoration Project focuses on past, present, and reasonably foreseeable future actions in the proposed action area that could also influence diadromous fish populations and native freshwater and estuarine habitat resources affected by this project. A search of the MEPA database and the MA DER project map for relevant projects in Buzzards Bay tributaries indicates that there are multiple relevant stream restoration projects that could benefit the same fish populations as the proposed action:

- The Red Brook Habitat Restoration project, which began in 2006 and is scheduled for completion in 2017, has included removal of three small dams and enhancement of instream habitat. The Red Brook flows into Buttermilk Bay, which is adjacent to Buzzards Bay and approximately eight miles from the Horseshoe Pond Dam – Weweantic River Restoration Project site.
- The Coonamessett River Restoration, scheduled for completion in 2017, includes the removal of a small dam at the downstream end of the project area, restoring natural wetland and riverine habitat, and replacing an undersized culvert. The Coonamessett River empties into Vineyard Sound, which is hydrologically connected to Buzzards Bay.
- The Acushnet River Sawmill project, a nature-like fishway completed in 2007, restored a former herring run to the Acushnet River, which flows into Buzzards Bay. The project, in association with the upriver Hamlin Street NLF built in 2007 and New Bedford Reservoir technical fishway built in 2000, provides herring access to more than 220 acres of quiescent, lentic habitat for spawning and rearing.
- Removal of the Rattlesnake Brook Dam will open Rattlesnake Brook to access by river herring, trout, and American eel from Assonet Bay to ~1 mile of upstream cold water habitat in the upper watershed. Assonet Bay is hydrologically connected to Buzzards Bay.

Given the historical loss of unimpeded migratory fish passage in Buzzards Bay, restoring additional fish passage and native freshwater and estuarine habitat resources on the Weweantic River would result in a moderate, long-term positive effect on diadromous fish species because of the increase in habitat area opened up through dam removal. The Horseshoe Pond Dam – Weweantic River Restoration Project would contribute to a minor cumulative adverse effect on impounded, warm-water pond habitat that would be eliminated if the dam removal alternative is implemented. In contrast, Alternatives B through E would result in long-term, sustained degraded water quality habitat, to varying degrees depending on the alternative.

6.3 Conservation Moorings Restoration Project

The Conservation Moorings Restoration Project is intended to provide much needed funding for projects in Buzzards Bay. Use of conservation moorings has been ongoing in Massachusetts for more than a decade, but in areas other than Buzzards Bay to replace traditional boot moorings with conservation moorings. The past, present, and expected future use of traditional boat moorings in Buzzards Bay is associated with adverse impacts to eelgrass beds. This project is relatively small (25 to 30 moorings) as compared to the use of hundreds or thousands of traditional moorings in Buzzards Bay.

The specific sites for the Conservation Moorings Restoration Project will be selected through a competitive grants process. Therefore, the past, present and reasonably foreseeable future actions that will affect these specific site locations include all Buzzards Bay commercial, recreational, and restoration activities that were described in the programmatic restoration plan. Because the conservation moorings will be installed at active marinas and boat docking sites, these areas have been and will continue to be subject to boat traffic disturbances. The Trustees' proposed Conservation Moorings Restoration Project would have a negligible impact on these current and anticipated future actions. Increases in eelgrass coverage would have a net positive benefit on localized benthic and fishery resources through increasing the diversity of benthic habitats and increasing the amount of a scarce habitat type (eelgrass).

7. Climate Change Considerations

The B-120 Buzzards Bay Draft SEA that was released to the public for review and comment in January 2017 included this document section to consider the applicability of the CEQ Guidance for evaluating climate changes that may affect restoration actions. However, during the interim period between the release of the Draft SEA for public review and comment and the preparation and release of this Final SEA, the CEQ formally withdrew the August 5, 2016 guidance for federal departments and agencies regarding the inclusion of the effects of climate change in NEPA reviews (Refer to Federal Register 81: 51866, dated August 5, 2016). The rescinding of the CEQ Guidance by Executive Order 13783, "Promoting Energy Independence and Economic Growth", was signed on March 28, 2017, and serves as basis for the changes made to this document section.

To comply with Executive Order 13783 and the related rescission of the 2016 CEQ climate change guidance, NOAA has removed direct references to the CEQ guidance that were included in the Draft SEA. However, as noted in footnotes in previous sections of this Final SEA, NOAA decided to retain information and discussion on sea-level rise and carbon sequestration considerations and the environmental consequences relating to the decisions on the preferred and selected restoration actions identified in this Final SEA (Refer to footnotes on pages 8 and 23 of this document). The decision to retain this information is based on: the practical inability of distinguishing between the analysis developed pursuant to the August 2016 CEQ guidance, and analysis that may have arisen independent of and prior to the CEQ guidance; and the impacts of sea-level rise and effects of or on carbon sequestration remain valid, are highly relevant to coastal habitat restoration, and are helpful in informing the public and decision makers in implementing the restoration actions in this Final SEA.

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Appendix A: Essential Fish Habitat (EFH) consultation

This appendix includes the letter sent from the Trustees to the National Marine Fisheries Service (NMFS) together with EFH worksheets for each of the three projects included in this SEA (Round Hill Salt Marsh Restoration, Horseshoe Pond Dam – Weweantic River Restoration, and Conservation Moorings Restoration). The NMFS response letter is also included.

UNITED STATES DEPARTMENT OF COMMERCE
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November 30, 2016

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

RE: EFH consultations for Buzzards Bay restoration projects

Dear Ms. Tuxbury:

The National Oceanic and Atmospheric Administration (NOAA) Restoration Center is submitting these materials on behalf of the B-120 Buzzards Bay Trustee Council ("Council"), providing assessment materials and seeking fonnal Essential Fish Habitat (EFH) consultation by the Office of Habitat Conservation on three proposed projects to address aquatic and shoreline resource injuries resulting from the 2003 Buzzards Bay oil spill. These materials are submitted by NOAA in compliance with the consultation requirements of §305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)). The Council appreciates your timely review, and recommendations on potential measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from these proposed projects.

The Council, 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 which identified multiple Tier-I preferred restoration projects, including salt marsh, diadromous fish passage and eelgrass restoration.

The proposed restoration projects, described herein, were designated as Readiness Category II projects in the PRP/EA, as specific site information had not yet been completed or secured for project alternative evaluation, and thus, further site-specific information and assessment would be required to conclude a federal agency determination under the National Environmental Policy Act (NEPA). Since the release of the Final PRP/EA, the Council has worked diligently with project proponents and partners including the Town of Dartmouth, Massachusetts Division of Ecological Restoration and the Buzzards Bay Coalition to complete supplemental site assessments and project planning to advance preferred project alternatives and EFH assessment of the proposed action.

The Council seeks to complete NEPA responsibilities by addressing EFH for these three proposed aquatic and shoreline resource restoration projects. The enclosed materials include EFH assessment worksheets for the projects proposed in the Towns of Dartmouth (Round Hill salt marsh restoration), Wareham (Horseshoe Pond dam removal and diadromous fish passage restoration), or in the case of conservation mooring installations and eelgrass restoration, various embayment locations throughout Buzzards Bay. The enclosed materials include project narratives, figures, proposed project location coordinates, and EFH species information for each proposed project

location. The Council seeks to release a Draft Supplemental EA (SEA} to the public in early 2017, addressing the aforementioned preferred alternatives and proposed action, including EFH assessment documentation. Results of this public review and comment will then be used to complete a Final SEA detailing the restoration project alternatives and action selected for implementation.

We anticipate that these projects may 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, NOAA and co-trustees have identified alternatives where potential adverse effects on EFH may result but are expected to be minimal, including avoidance or minimization of impacts to wetlands and submerged aquatic vegetation. The long-term benefits associated with the proposed restoration projects are expected to outweigh short-term or temporary negative impacts associated with project implementation. Each of these projects is expected to result in a net enhancement of EFH at each project site.

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

Sincerely,

James G. Turek
Restoration Ecologist
NOAA Restoration Center

cc:

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M. Garcia-Seranno, K. Pelto - MA DEP
M. Kay- RIDEM

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: Round Hill Salt Marsh Restoration Project DATE: November 2016

PROJECT NO.:_____LOCATION: Dartmouth, MA

PREPARER: Buzzards Bay B-120 Trustee Council

Project Description

Summary: Located in the Town of Dartmouth, MA, on the state's southeastern Buzzards Bay coastline, the proposed Round Hill Salt Marsh Restoration Project is situated within a larger Town-owned beach property and contains approximately 15 acres of historically filled salt marsh and salt pond complex. Private properties (residences and golf course) are located to the north and east, and the 39-acre Meadow Shores marsh system immediately to the west. A Town beach and associated parking lot are located to the immediate south of the project site. Site coordinates are: 41° 32'25.47" 70° 56' 37.49."

The project has secured funding through the New Bedford Harbor Trustee Council (NBHTC – including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), and Commonwealth of Massachusetts represented by the Massachusetts Department of Environmental Protection (MA DEP)), the Buzzards Bay B-120 Trustee Council (BBTC – including NOAA, USFWS, and Commonwealth of Massachusetts and State of Rhode Island), and an U.S. Department of Interior Storm Sandy grant. The NBHTC and BBTC funds for the project are to address natural resource injuries resulting from polychlorinated biphenyl contamination of the New Bedford Harbor Environment and the 2003 Buzzards Bay oil spill. Project partners include the Town of Dartmouth, Massachusetts Division of Ecological Restoration (MA DER), NOAA, and USFWS.

Historic maps and a 1928 aerial photograph depicting this area confirm the project site was coastal wetland prior to the early 1900s. With previous private ownership, various development activities occurred at the filled marsh between 1928 and 1937. Up to six feet of local farm soils and dredged soils were placed within tidal wetlands on-site. Today, a non-functioning wooden culvert remains beneath Ray Peck Drive that formerly connected the site to the Meadow Shores Marsh. The primary source of tidal hydrology for this salt marsh complex (including both Meadow Shores Marsh and the to-be-restored Round Hill Salt Marsh Restoration Project acreage), is an inlet that hydrologically connects Meadow Shores marsh and Buzzards Bay (Figure 1). This inlet has been documented to migrate (similar to other coastal inlets in southern New England) and seasonally close to tidal flushing due to the periodic inability of the marsh's tidal prism to overcome the deposition of sand from westward longshore transport.

Figure 1: Tidal inlet channel at barrier beachfront, with flood tide to Meadow Shores marsh, August 14, 2014

Restoration Actions: Restoration actions will include removing fill material from an upland-freshwater wetland complex to support marsh habitat on the 11.6 acre area (Figure 2). The newly graded habitat will be replanted with native salt marsh plants. The non-functioning culvert under Ray Peck Drive will be replaced with a larger, properly-sized culvert to allow unimpeded tidal exchange with the restored Round Hill Salt Marsh (Figure 3). The Meadow Shores Marsh tidal inlet at the Dartmouth Beach will be repositioned, and the existing inlet will be plugged with sand fill to re-establish a more tidally-efficient inlet and tidal exchange with the marshes (Figure 4). The Town of Dartmouth will routinely monitor and the channel and if necessary, re-position the channel location as part of it agreed-upon site maintenance activities. The channel position will be adjusted to maintain optimal tidal exchange and minimize risk to residential properties to the southwest.

Project Benefits: This site presents a rare opportunity to restore 11.6-acres of publicly-owned salt marsh and enhance another 70 acres of contiguous salt marsh and barrier beach coastal ecosystem including the 39-acre Meadow Shores salt marsh. This project will directly restore salt marsh functions and values lost from the site for nearly 100 years, and will protect and enhance the ecological integrity and health of the larger Meadow Shores Marsh. The project will significantly enlarge this valuable tidal system, enhancing the tidal inlet, and improving ecological services and societal values that the marsh complex provides to the Buzzards Bay environment. These benefits include: improving project area resiliency and adaptability to sea-level rise by expanding estuarine habitat and flood storage capacity and facilitating landward marsh migration; providing enhanced primary production, detrital export, sediment trapping, and coastal fish and wildlife habitats; contributing valuable public stewardship and educational opportunities based on the site location adjacent to the Town beach; and providing additional passive recreational opportunities with construction of a walking trail, observation platform, and educational signage.

Figure 2: Aerial view of proposed Round Hill Salt Marsh Restoration Project, Meadow Shores Marsh, tidal inlet and surrounding properties and communities

Figure 3: Aerial view of project area, dated August 22, 2016, depicting proposed marsh restoration area, Meadow Shores marsh, tidal inlet channel and location of existing defunct culvert

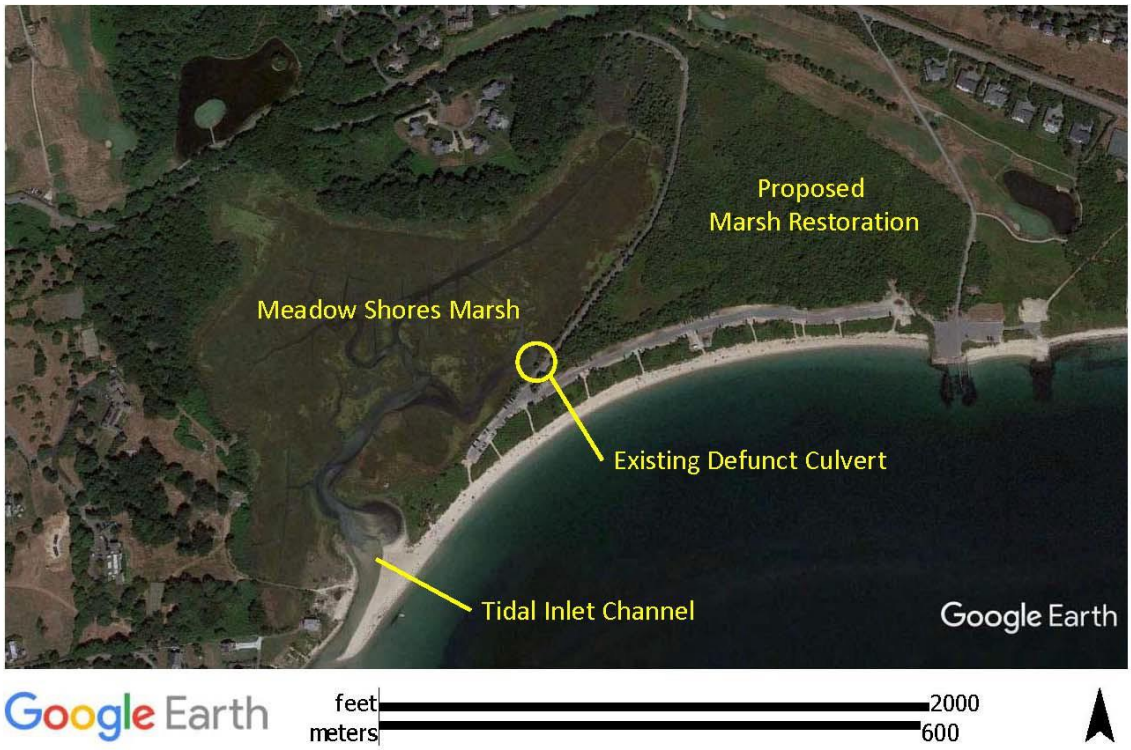
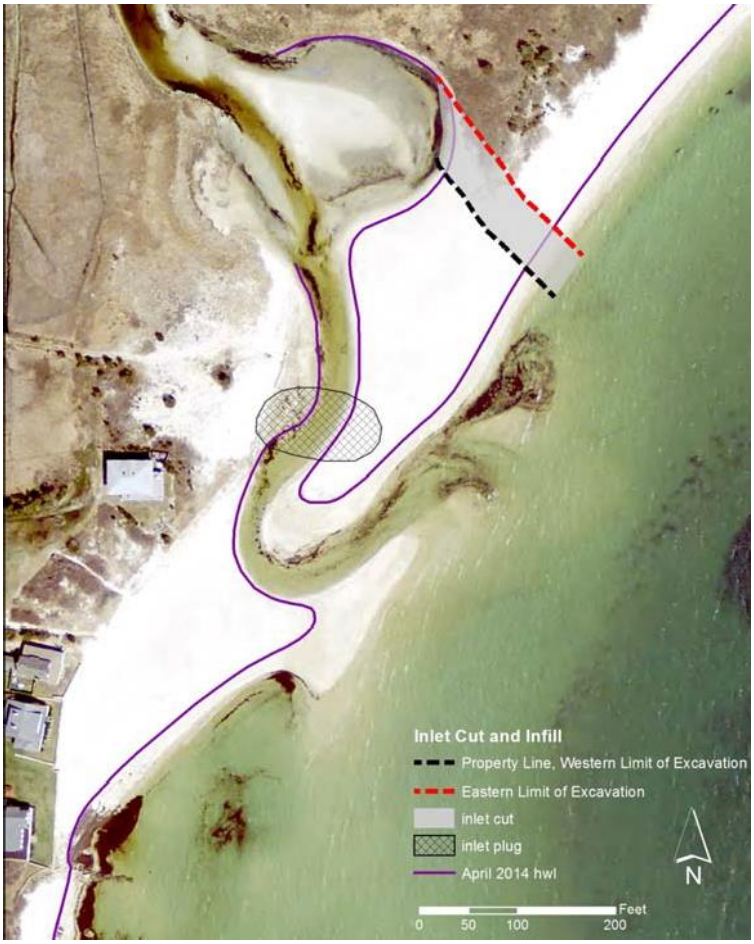


Figure 4: Aerial view of the Meadow Shores Marsh existing inlet and approximate locations of proposed repositioned inlet channel and sand-fill plug in existing channel



This restoration project will directly result in the restoration of salt marsh providing important ecological services and values to the local community. The goal of restoring salt marsh is to address natural resource injuries that have resulted from contaminant releases to the New Bedford Harbor and Buzzards Bay environments. The proposed project was identified as one of 69 restoration opportunities within the New Bedford Harbor Salt Marsh Restoration Plan (MWRP, 2002). The restoration of 11.6 acres of former salt marsh and enhancement of the 70-acre Meadow Shores coastal wetland and barrier beach system are also consistent with additional Federal plans including the objectives of the National Wildlife Refuge System, the North American Waterfowl Management Plan, Partners in Flight, U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan by restoring significant coastal marine habitat for migratory birds, estuarine and anadromous fishes, and other estuarine and marine wildlife. This marsh restoration supports the need to strategically conserve and restore important coastal habitat areas outside of the USFWS Refuge system and aid in addressing "gaps" along migratory routes. Further, this project will promote the integration of natural and built infrastructure by incorporating a properly-sized culvert beneath Ray Peck Drive that will support and enhance tidal flushing and sustain the newly restored

wetland. Restoration of habitat by removing fill from the former salt marsh will increase the tidal prism of the Meadow Shores Marsh complex and extend the long-term viability of the system by enhancing tidal inlet stability. Including long-term maintenance plans for the primary tidal inlet, with a no groin structures will reduce permanent impacts to regulated coastal beach resource and conjointly serve to protect the health and functioning of the larger existing system and the restored marsh. Additionally, by restoring wetland habitat, the project increases the long-term coastal resiliency by providing opportunity for tidal wetland migration with respect to anticipated sea-level rise. Incorporating restored wetland acreage directly south of the built-environment (residential homes and a private golf-course), this project will provide a buffer and greater protection from coastal storms and surges.

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 the 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 the 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 located in Dartmouth, MA, with intertidal and salt marsh habitats. Sub-tidal waters are located nearshore bordering the project site.
What are the sediment characteristics?	Sediment conditions in the marsh area are influenced by marsh habitat and fill material used to create the existing wetland habitat. Sediments in the inlet channel and Meadow Shores Marsh channel and offshore are predominantly sands, and dynamic, with tidal exchange through the channel inlet.
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 Department of Environmental Protection (MA DEP) online mapping tool, there is no SAV present in the Round Hill Salt Marsh restoration area or in or near the existing tidal inlet channel (State of Massachusetts, 2015). Eelgrass beds have been previously mapped offshore, situated 200 feet or more from the Bay-side of the marsh inlet channel.
What is typical salinity and temperature regime/range?	According to the National Wetlands Inventory (NWI) dataset describing Buzzards Bay, salinity may exceed 30 ppt. Water temperatures are typically 5–20°C. These conditions describe the Buzzards Bay EFH habitat adjacent to the proposed marsh restoration.
What is the normal frequency of site disturbance, both natural and man-made?	The proposed salt marsh restoration site has not been substantially altered since the area was filled in the 1920s. The Meadow Shores marsh was last directly affected by the construction of infrastructure associated with the former airfield; plus mosquito ditching occurred in Meadow Shores marsh in past decades. The inlet channel currently undergoes natural migration and closes on a seasonal, low-flow discharge basis due primarily to the reduced tidal prism with the partially filled salt marsh system, and the installation of an offshore breakwater.
What is the area of proposed impact (work footprint and far afield)?	The proposed Round Hill restoration site will include restoring 11.6 acres of an upland-freshwater wetland complex to salt marsh, and excavating a new ~0.4-acre tidal inlet connecting Buzzards Bay to Meadow Shores Marsh and the proposed restoration site. A ~0.25-acre sand-fill plug at the barrier beach would be placed strategically in the existing channel as part of the inlet channel relocation project.

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)			There is limited EFH within the proposed project footprint including the tidal inlet and creek channel in Meadow Shores marsh. There is EFH for the following 11 species for all life stages within 5,000 meters the proposed project footprint: Atlantic cod, Atlantic herring, Atlantic wolf fish, haddock, little skate, ocean pout, red hake, silver hake, window pane flounder, winter flounder, and winter skate. These life stages may use habitats at the depth, salinities, and temperatures that may be present within 5,000 meters of the project site. In this section, we describe the anticipated impacts of the proposed action on the environment at the project site and nearby Buzzards Bay that will have greater connectivity to the project site through the marsh restoration and restored inlet channel. Direct activities at the site will include removing fill material from the existing 15-acre upland-freshwater wetland complex and regrading and revegetating the project site with native salt marsh vegetation. A new culvert will be installed to reconnect the Meadow Shores Marsh tidal creek with the tidal creek constructed in the marsh restoration site. Additionally, the channel inlet connecting the marsh with Buzzards Bay will be repositioned to create a hydraulically-efficient channel on Town-owned property. Work is expected to take 5 to 6 months and will be completed during winter months when activities will be least likely to disturb wildlife and recreational activities. No work will occur during the spring and summer when piping plover may be nesting near the site. Any disturbance caused by marsh restoration would be localized, relative to the total habitat area. The work period for relocating the inlet channel is expected to be between November and March. Negligible effects to EFH are anticipated.
Will benthic community be disturbed?	**X**		Minor disturbances to the marsh tidal creek and inlet channel are expected to have very localized, minor disturbances to the benthic community. The proposed construction of the inlet repositioning and the culvert replacement will affect small areas of sandy channel bottom. These areas would be expected to rapidly re-colonize with benthic macro-invertebrates soon after the project construction is completed.
Will SAV be impacted?		**X**	No SAV would be affected. Based on available MA DEP information, the nearest SAV beds are more than 200 feet from the inlet channel and bordering beach. No sediment dispersal to these sites is expected.
Will sediments be altered and/or sedimentation rates change?	**X**		Intertidal and supra-tidal sands will be disturbed to relocate the inlet channel. The repositioned, straighter channel may initially result in an increase of sediment transport to sub-tidal waters. However, the channel is expected to rapidly reach hydrodynamic equilibrium, with net transport of materials into the Meadow Shores Marsh and, to a lesser extent, the marsh restoration site.
Will turbidity increase?	**X**		Minor, temporary turbidity increases are expected at the inlet channel and in the Meadow Shores Marsh tidal creek where the new culvert will be installed. The turbidity increases would cease once construction is of the inlet channel and culvert installation are completed.

Will water depth change?		**X**	There will be no changes in sub-tidal water depths of Buzzards Bay. The tidal prism in Meadow Shores Marsh and its tidal creeks are expected to incrementally increase with a more stable tidal inlet. The proposed marsh restoration would be converted from upland and low-value freshwater wetland to salt marsh subject to diurnal flooding.
Will contaminants be released into sediments or water column?		**X**	No release of contaminants is expected.
Will tidal flow, currents or wave patterns be altered?	**X**		Project site: Tidal flow and exchange with Buzzards Bay will be improved. The current tidal inlet between Buzzards Bay and Meadow Shores Marsh has migrated over time and is long, sinuous and narrow, restricting tidal exchange. Restoration actions will include repositioning the tidal channel to a location on town property where the channel will be wider and more efficient, improving tidal exchange between the marsh and the Bay.
Will ambient salinity or temperature regime change?	**X**		No ambient salinity changes are expected. Water temperature changes in the Meadow Shores Marsh will likely incrementally decrease with the reconstructed tidal inlet which is expected to increase tidal exchange between the Bay and marsh.
Will water quality be altered?	**X**		Project construction of the inlet channel, culvert replacement, and fill removal may result in short-term releases of sediment. Water quality is not expected to be altered, although tidal waters in Meadow Shores Marsh may benefit from slightly colder seasonal water temperatures and increased dissolved oxygen levels.

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 no EFH within the proposed project footprint. There is EFH for the following 11 species for all life stages within 5,000 meters the proposed project footprint: Atlantic cod, Atlantic herring, Atlantic wolf fish, haddock, little skate, ocean pout, red hake, silver hake, windowpane flounder, winter flounder, and winter skate (see Attachment 1). These life stages may use habitats at the depth, salinities, and temperatures that may be present at the project site and will benefit from the increased connectivity to the marsh habitat.
Spawning	**X**		Minor beneficial impacts to winter flounder and windowpane flounder are expected. These species may use the increased tidal exchange and channel depth to access Meadow Shores Marsh and the proposed marsh restoration for spawning, foraging, and shelter. Juvenile flounder may seasonally use these marshes as a nursery.
Nursery	**X**		
Forage	**X**		
Shelter	**X**		
Will impacts be temporary or permanent?			Beneficial impacts to adjacent EFH are expected to be net positive over the lifetime of the project.
Will compensatory mitigation be used?		**X**	No compensatory mitigation is proposed.

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)	**X**	**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	Restoring historical salt marsh conditions and improving the tidal exchange channel will improve habitat conditions for all species. By removing soil fill and re-establishing a native salt marsh plant and animal community, the project will provide habitats for Buzzards Bay species. Further, repositioning the tidal channel will improve connectivity between the bay and the marsh, increasing the habitat area available to migratory species and other NOAA-trust resources present in the proposed project area. Winter and windowpane flounder may use Meadow Shores Marsh and the restored marsh as seasonal spawning, nursery, shelter, or foraging habitats. River herrings and American eel may also use these marshes for shelter and foraging. Populations of quahog and soft-shell clam are expected to increase in abundance and density within the marsh creek benthic habitat.
Blueback herring	
Rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
Blue mussel	
Soft-shell clam	
Quahog	
Other species: Winter flounder, windowpane flounder, Black sea bass	

References

State of Massachusetts. 2015. OLIVER: MassGIS's Online Mapping Tool. Available: http://maps.massgis.state.ma.us/map_ol/oliver.php Accessed on December 3, 2015.

MWRP. 2002. New Bedford Harbor Environment Wetlands Restoration Plan. Submitted to the New Bedford Harbor Trustee Council by the Massachusetts Wetland Restoration Program. August 2002.

Attachment 1

We generated the Species List 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 Round Hill Salt Marsh Restoration Project location, there is no EFH designated in the project footprint; EFH designations have been identified in the surrounding area (5,000 m from the project site).

Table A1: EFH species and life stages found within the proposed Round Hill Salt Marsh Restoration Project footprint

Species	Life Stages	Type	Fishery Management Council
No EFH is listed within the project footprint.			

Table A2: EFH species and life stages found within 5,000 meters of the proposed Round Hill Salt Marsh Restoration 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 wolffish	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
Red hake	All, adult, eggs, juvenile, larvae	EFH	NEFMC
Silver hake	All, adult, eggs, juvenile, larvae	EFH	NEFMC
Window pane 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: Horseshoe Pond dam removal, Weweantic River restoration

DATE: November 2016

PROJECT NO.:_____LOCATION: Wareham, MA, Weweantic River, head-of-tide, upper estuary

PREPARER: Buzzards Bay B-120 Trustee Council

Project Description

This project would involve the removal of the existing Horseshoe Pond dam concrete spillway at the head of the Weweantic River estuary, and partial width removal of a remnant legacy dam situated ~170 linear feet upstream of the Horseshoe Pond dam (Figure 1). Site coordinates are: 41° 45' 46.52" 70° 44' 56.14." The project will also involve the repair of an existing bridge over the dam spillway (Figure 2), filling of a defunct mill raceway and converting the filled area to a vegetatively stabilized condition, and construction of two canoe and kayak launches with one located on the upriver side of the dam and one along the estuary. The purpose of this project is to restore connectivity of the Weweantic River and self-sustaining populations of diadromous fishes on the river. The project would also increase the coastal resiliency of the Weweantic River estuary and allow for unimpeded tidal marsh migration. The project proponent is the Buzzards Bay Coalition; the Buzzards Bay B-120 Trustee Council (BBTC including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), Commonwealth of Massachusetts, represented by the Massachusetts Department of Environmental Protection (MA DEP), and State of Rhode Island) is a project partnering entity. The BBTC proposes to fund the design and implementation of the dam removal for ecological restoration to address aquatic and shoreline resource injuries resulting from the 2003 Buzzards Bay oil spill (NOAA et al. 2014).

Construction activities would include:

- removing the concrete spillway (both vertical and horizontal extents);
- saw-cutting the dam and extended decking apart from remaining bridge, removing the structural component that extends from the bridge to the spillway;
- removing the remnant spillway sluice gate mechanisms;
- removing the concrete apron under the bridge, and with placement of suitable natural substrate in this reach;
- managing sediment, as needed;
- removing a portion of the upriver legacy dam (full vertical extent, partial horizontal extent);
- repairing and remodeling the bridge;
- installing two foot paths and two canoe and kayak launches;
- managing invasive plant species bordering the impoundment and in vicinity of the new boat launches;
- constructing a cut-off wall at the upstream end of the raceway to prevent seepage, filling the raceway, and covering and vegetatively stabilizing the defunct structure; and
- grading, capping, and stabilizing the left-side riverbank downstream of the bridge where erosion is on-going.

In addition, temporary construction access roads, soil erosion and sediment controls, site protection measures and water management practices will be installed, managed and maintained throughout the project construction period.

Figure 1: Aerial photo depicting Horseshoe Pond, dam and downstream Weweantic River estuary (photo source: GoogleEarth)

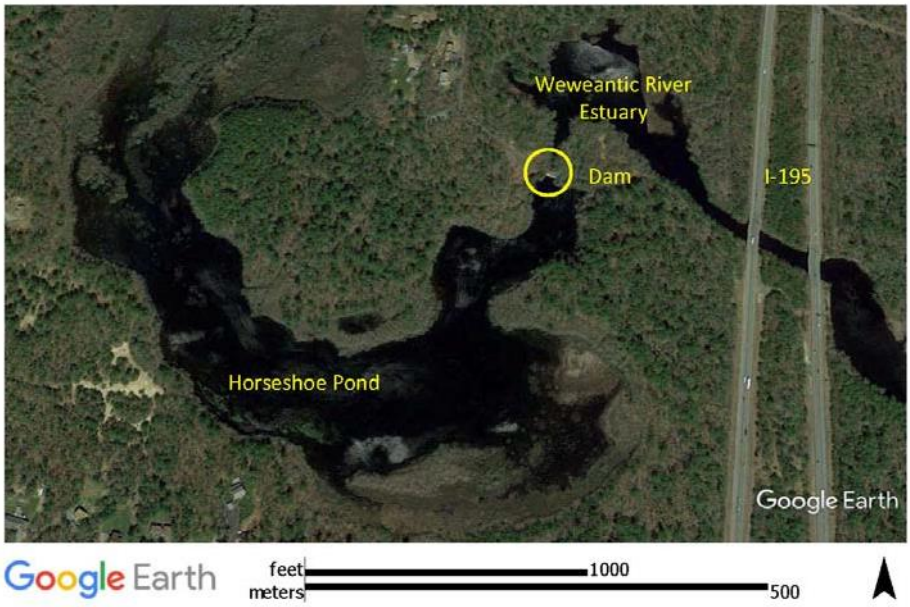
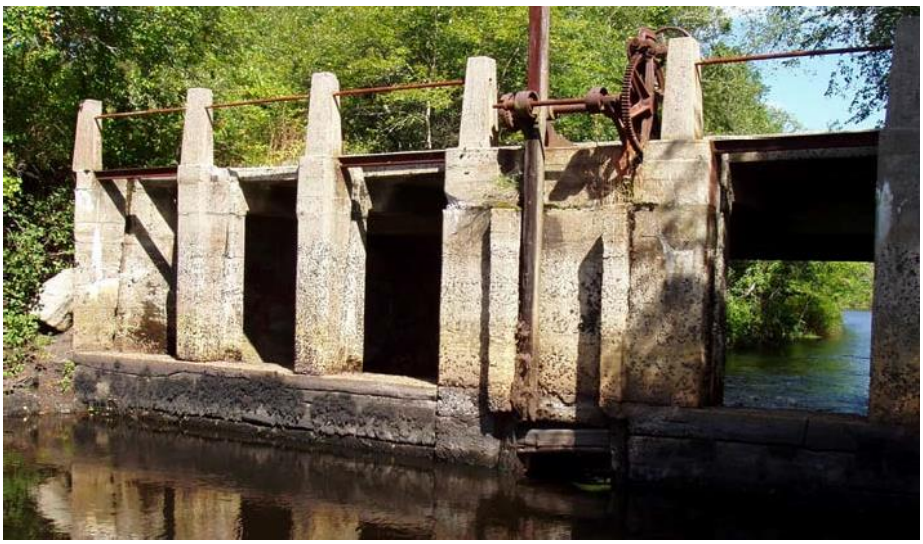


Figure 2: Horseshoe Pond dam spillway looking downriver at Weweantic River estuary



The removal of both the spillway and a significant portion of the upriver legacy stone dam would lower normal water surface elevations approximately 3.6 to 4.5 feet at the dam, restore free-flowing conditions to the impoundment, and restore full tidal fluctuation to the lower third of the impoundment, some of which will remain as a broad pool. The project will restore full tidal exchange to the site: MHW (0.56' NAVD88), the typical high tide measured at the site (approx. 2.5' NAVD88), and the highest tide of the year (approx. 4' NAVD88) would affect the lower portion of the impoundment with dam removal. Dam removal gives greater access to riffles outside of the tidally exchange area, and will be expected to be used by spawning river herring, rainbow smelt, and sea lamprey.

The natural sediment transport regime, which is both fluvially and tidally-influenced, would be fully restored. The upper portion of the impoundment is stabilized by vegetation and the low gradient longitudinal profile indicates minimal potential for channel incision (i.e., headcutting) in the upper impoundment. The lower impoundment would likely remain a depositional setting with tidal fluctuation and result in limited sediment mobilization. Based on preliminary discussions with MassDEP regarding sediment analytical results, this project would include active sediment management (e.g., stabilization in-place and/or excavation, relocation and stabilization) for a portion of the impounded sediment and adjacent soils immediately upstream of the dam between the spillway and legacy dam, where elevated contaminants were detected in previous sampling and analysis efforts. Some of this material will be excavated and placed preferentially in the former millrace, or as necessary, disposed of off-site. Adjacent soils, in the vicinity of the proposed canoe and kayak launch upstream of the dam, may need to be stabilized with stone or other to prevent sediment disturbances. The eroding leftbank immediately downstream of the dam will need to be stabilized.

Bathymetric cross-sectional surveys and hydraulic modeling of this project indicate no substantial changes to upstream infrastructure including Fearing Hill Road Bridge. Public access to the impoundment would be enhanced with the repair of the remaining bridge spanning the spillway, creation of a trail canoe and kayak launch into the impoundment from the southwestern side of the dam, and creating a second trail canoe and kayak launch northwest of the dam to the downstream tidal area.

This alternative restores full fish passage to the site. This alternative avoids any changes or impacts to the existing smelt spawning riffle, but more importantly, does not constrain smelt spawning to the existing riffle that is exposed to tidal fluctuation and creates access to new potential spawning habitat beyond the tidal fluctuation. This project design also provides for coastal adaptation, of tidal habitat and the multi-species fishery at large, in response to regional increases in sea-level rise and water temperatures.

Pond habitat for warm water fishes in the former impoundment would be diminished; however, river habitat for resident and migratory fish would be substantially expanded with re-exposure of formerly inundated areas upstream, the return of free-flowing conditions, and extension of the natural channel. With the predicted reduction in normal water surface elevation, existing shallow open water (±5 ac) and floating vegetation (±17 ac) areas would be eliminated and convert to other wetland types, including a significant increase in forested wetland (±9 ac) and scrub wetland vegetation (±7 ac) (Princeton Hydro, 2016). There is potential for a secondary riffle to be exposed in the lowered impoundment upstream that may provide additional riffle habitat for rainbow smelt spawning that would not be affected by tidal dewatering, and thereby minimize the likelihood of egg exposure and resulting mortality. Other riffles with potential spawning habitat are also located farther upstream.

Control of invasive non-native species will target identified stands of common reed (*Phragmites australis*) within the impoundment to prevent continued expansion. In addition, stands of Japanese knotweed (*Fallopia japonica*), an annual plant species in the vicinity of the proposed pond canoe and kayak launches, will be removed and managed. Wetland function related to water quality protection and enhancement would improve substantially: with less backwaterinh, shorter retention time, less direct insolation, and greater canopy cover adjacent to the channel, instream/estuary water temperatures would be more moderated and dissolved oxygen levels would increase through the former impoundment and into downstream reaches.

It is anticipated that this work will be conducted over a 2-3-month period. The work will be conducted during a period of low-river flow and it is anticipated that all in-channel work would proceed in the wet. If

regulators require greater water control, the millrace would be used to temporarily divert the river flows around the project construction work area, by using an upstream coffer dam and perhaps piping extending from upstream of the legacy dam. Post-construction, the new channel invert extending from the former spillway through the lowered legacy dam breach, which is situated in elevation below mean low water, would serve as the surface water elevation control. A smaller reach of the upriver area would remain as a ponded condition, based on the bathymetric survey analysis and hydraulic modeling (Princeton Hydro 2016).

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 the 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 the 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 at the head-of-tide of the tidally influenced Weweantic River near the confluence with the Weweantic estuary. The project would affect both intertidal flats and sub-tidal waters of the upper estuary. Dam removal will allow tidal waters to extend further upriver, increasing inter-tidal and sub-tidal habitats.
What are the sediment characteristics?	Sediment conditions vary throughout the project area. Behind the dam, fine-grained sediments have accumulated to create a deep sediment bed – up to 6 feet deep and containing organic and inorganic sediments. The tidal area downstream of the dam includes sand, rock and cobble benthic habitat, and local banks have incurred erosion from disturbed, exposed banks.
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 280 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).
What is typical salinity and temperature regime/range?	The Buzzards Bay Coalition (BBC) has monitored water salinity immediately downstream of the dam site. Salinity ranges from near 0 to ~15 + ppt, with average salinity typically less than 10 ppt. Water temperatures is typically range from <5 to more than 20°C.
What is the normal frequency of site disturbance, both natural and man-made?	The site has been disturbed by the dam and former mill and mill features such as the defunct raceway on river right. The project area was historically disturbed by the mill activities, but is now protected as open-space lands available to the public. The BBC, as owners of the property, seeks to restore the river connectivity by removing the dam and improving the ecological health of these protected lands. Once restoration activities are completed, the property including the upper estuary is expected to be protected from further man-made disturbances. Natural disturbances that are expected to occur include plant and animal community changes due to sea-level rise and increases in water salinity. *Spartina alterniflora*-dominated marsh and brackish marsh species are expected to colonize the restored estuary upriver of the dam site.
What is the area of proposed impact (work footprint & far afield)?	The proposed restoration will directly affect <0.25 acres of in-water habitat, but would indirectly affect 91 $\pm$ acres of existing non-tidal pond and freshwater wetland habitats.

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)			There is negligible EFH located within the project construction footprint. There is EFH for the following nine species for all life stages within 5,000 meters of the proposed project footprint: Atlantic cod, Atlantic herring, Atlantic wolffish, haddock, little skate, red hake, windowpane flounder, winter flounder, and winter skate. Multiple life stages of these species may use habitats at the depth, salinities, and temperatures that may be present within 5,000 meters of the project site. In this section, we describe the anticipated impacts of the proposed action on the environment at the project site and in adjacent areas of Buzzards Bay that will have greater connectivity to the project site through the dam removal. Work activities at the site will include removing the existing spillway and partial removal of the upriver stone legacy dam, and removing the dam concrete apron. In addition, downstream riverbanks will be stabilized, invasive species will be removed, the existing bridge over the dam will be repaired for public access, and two canoe and kayak launches will be installed. Disturbance caused by restoration actions will be localized and small relative to the total habitat area available: the work area is ~0.25 acres, although the upriver impounded area is 91 + acres. The proposed dam removal, riverbank stabilization and other project components are expected to be completed within a 2-3-month work period. Conversion of freshwater pond and vegetated wetlands to tidal wetlands through community succession will occur over a longer time period, likely several years until the tidal wetland community becomes well established.
Will benthic community be disturbed?	**X**		There will be negligible disturbances to the benthic community immediately downstream of the dam. There may be localized disturbances in the inter-tidal zone; these work disturbances would be temporary and short-term. Indirect release of upriver sediments once the dam is removed is expected to occur over a longer time period, and may have impact on the benthic community in the vicinity of the dam site.
Will SAV be impacted?		**X**	No SAV will be affected by the project. Based on available database information (State of Massachusetts Online Mapping Tool, 2015), no SAV is present in the proposed project location.
Will sediments be altered and/or sedimentation rates change?	**\X**		Sediments in the impoundment are expected to be released to the downstream estuary with dam removal. Sediment transport rates will increase; however, with bi-directional tidal flow, a rapid release of sediment is not expected. There will a short-term increase in sediment mobilization into the Weweantic estuary following construction. This will be mitigated by sediment management actions at the project site. In the long-term, the estuary will benefit from restoration of natural sediment transport conditions.
Will turbidity increase?	**X**		Turbidity will increase temporarily during restoration actions at the project site and due to transport of sediments from the Horseshoe Pond.

Will water depth change?	**X**		Water depths upriver of the dam are expected to become affected by tides. An increase in water depths is expected during high tide events especially during spring and king tides. There will be no substantial change in water depth in the downstream estuary, as a result of this project.
Will contaminants be released into sediments or water column?		**X**	Minimal to no contamination is expected to be released. The Trustees are aware that some sediment contamination exists in the area, but they do not expect the project to disturb those sediments. To avoid any potential problems, the project will include active sediment management, including excavation, stabilization and/or relocation, as warranted. A sediment characterization and management study (Princeton Hydro, 2014) was completed for the project, and concluded that contaminants are present at levels below standards for exposure risks. Any sediment or soil contaminant management associated with the project will need to meet state and federal regulations before the project would be permitted and implemented.
Will tidal flow, currents or wave patterns be altered?	**X**		Tidal exchange will be restored to the Weweantic River upriver of the dam site. The upriver area was historically tidal, but the dam has prevented regular diurnal tidal exchange.
Will ambient salinity or temperature regime change?	**X**		By removing the dam, the warm water pond created behind the dam will be converted and return to a tidal riverine system, thus water temperatures will decrease and salinity will likely increase with this hydro-reconnection project. This project would restore an important habitat type that is lacking due to dams or other barriers on natural streams and rivers.
Will water quality be altered?	**X**		Water quality including increased turbidity may be negatively affected during restoration activities in the short-term, particularly with impoundment sediment release. In the long-term, water quality will be improved due to restored tidal hydrologic conditions and tidal marsh community upriver of the dam site.

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 no EFH located within the project footprint. There is EFH for the following nine species for all life stages within 5,000 meters of the proposed project footprint: Atlantic cod, Atlantic herring, Atlantic wolffish, haddock, little skate, red hake, windowpane flounder, winter flounder, and winter skate (see Attachment 1). 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**	There is no current EFH within the proposed project footprint. Project actions include removing the dam that currently separates upstream habitats from the estuary and Buzzards Bay. Project actions will provide increased habitat for EFH species such as upstream spawning or nursery habitats, improved water quality, and restored tidal exchange. No current EFH habitat will be adversely impacted by project actions. Species such as winter flounder may use the restored habitat for seasonal foraging and shelter.
Nursery	**X**		
Forage	**X**		
Shelter	**X**		
Will impacts be temporary or permanent?			Beneficial impacts to adjacent EFH are expected to be net positive over the lifetime of the project.
Will compensatory mitigation be used?		**X**	No compensatory mitigation is proposed. Removing the dam and restoring tidal exchange will restore the historical tidal regime and additional restoration actions will improve wetland habitat conditions.

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	This dam removal and habitat restoration will improve water quality and expansion of habitat for estuarine and diadromous fish species. Restoring connectivity to the upper Weweantic River will provide habitat that has been unavailable to migratory fish species since the dam was constructed. The project is expected to have net beneficial impacts to NOAA-trust resources including managed species such as alewife and blueback herring, American eel, and Atlantic menhaden (summer-fall seasonal use). Spawning by rainbow smelt is known to occur immediately downstream of the dam (B. Chase, MA DMF, pers. commun).
Blueback herring	
Rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
Blue mussels	
Soft-shell clams	
Quahog	
Other species: Sea lamprey	

References

National Oceanic and Atmospheric Administration (NOAA), United States Fish and Wildlife Service, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. 2014. Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill Shoreline, Aquatic and Natural Resource Use Injuries: Massachusetts and Rhode Island.

Princeton Hydro. 2016. Alternatives analysis for the Weweantic river restoration project Horseshoe mill dam fish passage feasibility study Wareham, Massachusetts. Prepared for: Buzzards Bay

Coalition. Submitted By: Princeton Hydro, LLLC.Princeton Hydro. 2014. Weweantic River Restoration Project/Horseshoe Pond Dam Feasibility Study Sediment Characterization & Management. Prepared for Buzzards Bay Coalition. Prepared by Princeton Hydro Engineering, PC.

Attachment 1

We generated the Species List 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 Horseshoe Pond Dam – Weweantic River Restoration Project location, there is no EFH designated in the project footprint, but we did identify EFH designations in the surrounding area (5,000 m from the project site).

Table A1: EFH species and life stages found within the proposed Horseshoe Pond Dam – Weweantic River Restoration Project footprint

Species	Life Stages	Type	Fishery Management Council
No EFH is listed within the project footprint.			

Table A2: EFH species and life stages found within 5,000 meters of the proposed Horseshoe Pond Dam – Weweantic River Restoration 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
Window pane 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: Conservation Moorings, Eelgrass Restoration DATE: November 2016

PROJECT NO.:_____LOCATION: Coastal waters throughout Buzzards Bay, MA

PREPARER: Buzzards Bay B-120 Trustee Council

Project Description

The "Conservation Hazelett mooring systems" project (hereafter called Conservation Moorings, Eelgrass Restoration Project") was identified in the B-120 Buzzards Bay Final Programmatic Restoration Plan and Environmental Assessment (PRP/EA) as a Tier 1 preferred alternative (project SA-10 in the PRP/EA) to address shoreline and aquatic resource injuries resulting from the 2003 Buzzards Bay oil spill. Eelgrass (*Zostera marina*) is a meadow-forming marine vascular plant that is part of a group of aquatic plant species commonly referred as 'sea grasses'. Eelgrass beds are recognized as a critical nursery habitat for a variety of marine fish and macro-invertebrate species. In Massachusetts, eelgrass is nearly always found subtidally in shallow southern New England coastal waters. Eelgrass has generally been declining, and at a high rate in Massachusetts and other nearby coastal waters due to water quality degradation and other anthropogenic stressors.

The vast majority of recreational boat moorings in Massachusetts are typically constructed of a large block or mushroom-style weight that anchors the mooring, and a lengthy, heavy chain that adds additional weight and drag to account for changing tidal heights, winds, and tidal current direction. The block itself causes a loss of eelgrass due to its surface area footprint and may cause scouring resulting from bottom shear stress. The length of chain is designed to amply account for variable tide ranges, causing the chain to drag on the substrate, particularly during low-tide cycle periods and often carving a broad, circular pattern into the eelgrass bed as the anchored boat swings on the mooring, ripping up plants. This physical action also increases the exposed edge of the eelgrass meadow while providing a sink for detritus. The combined effect of the block and chain may also increase sediment resuspension within the eelgrass bed, diminishing water clarity and light quality on the edge of the scar, and further degrading the eelgrass habitat.

Alternative mooring systems, called "conservation moorings," are proposed to replace the block with a helical anchor that is screwed into the substrate, resulting in minimal footprint impact. A reinforced, expandable elastic rode or band is fixed to the anchor and replaces the traditional metal chain, and is attached to a float, preventing the attached rode from dragging on and scouring the eelgrass bed and substrate. If installed and maintained correctly by limiting bio-fouling of the rode, this system has limited potential to make contact with the marine bottom substrate and, therefore, minimizes direct impacts to eelgrass beds otherwise caused by conventional boat moorings.

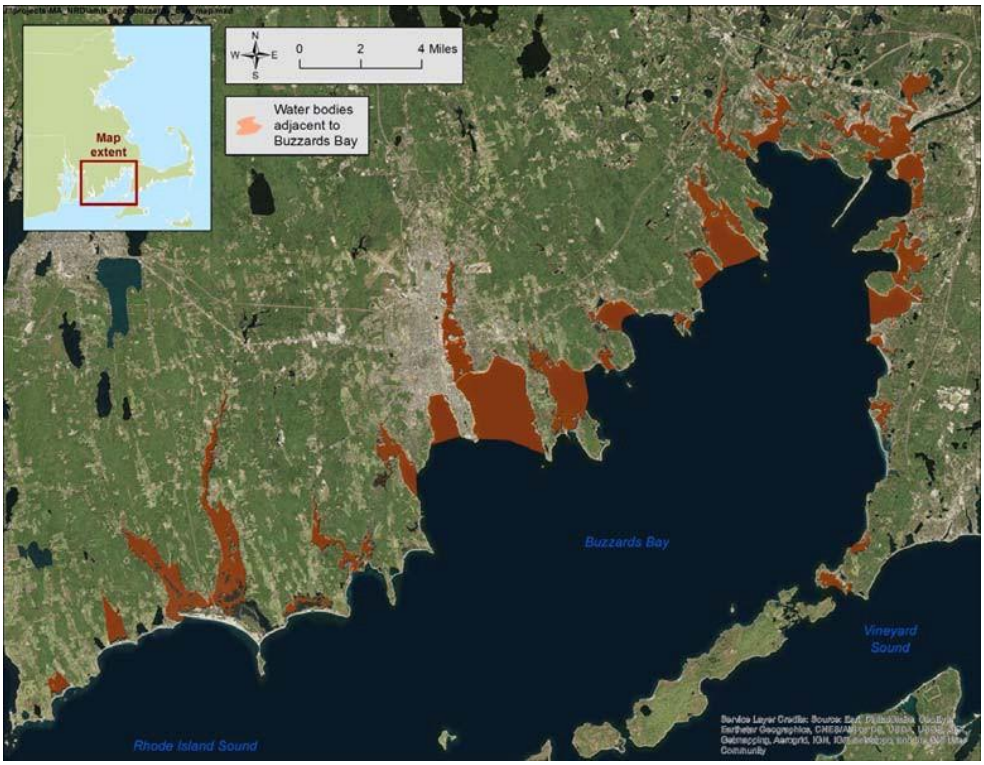
For over a decade, the Massachusetts Division of Marine Fisheries (DMF) has been monitoring boat moorings that were replaced with new conservation moorings (i.e., floating, flexible rodes and helical anchors). There are different designs such as Eco-Mooring, Hazelett, Seaflex, and others. To date, Eco-mooring and Hazelett conservation mooring systems have been installed in several towns and harbors in Massachusetts, including Gloucester, Manchester-by-the-Sea, Long Island – Boston, Wareham, West Falmouth, and Quissett Harbor. DMF continues to monitor a percentage of the installed moorings in each of these harbors. DMF divers typically measure the area of the pre-project scar and eelgrass density and percent cover inside and outside of the scar. DMF has found that when the moorings are installed and

maintained correctly and when the rode is floating at all times, eelgrass can revegetate a mooring scar in one to three growing seasons.

The Massachusetts Department of Environmental Protection (MassDEP) will provide programmatic support for the proposal solicitation and contract award management. The DMF will participate in the proposal review and project selection process; provide technical input on contract scopes of work and budgets to awardees; and provide oversight during project implementation, including site visits as needed before and after mooring installation, and technical guidance to awardees on mooring monitoring requirements and methods. The objective of this grant program is to replace approximately 25 to 30 conventional chain moorings with innovative floating rode moorings ($2,000 to $3,000 each) in harbors of Buzzards Bay where existing moorings are known to cause scouring and eelgrass loss. Through mooring replacement and committed routine maintenance (e.g., bio-fouling removal), effects on eelgrass will be largely eliminated. Bottom habitat scars left by conventional moorings are expected to be revegetated and further marine bottom sediment scour and disturbances will be avoided.

MassDEP will use a standard Grant Announcement and Application (GAA) template and process developed for the Commonwealth's Natural Resources Damages Program to solicit and evaluate potential sites and projects. The GAA template includes eligibility and evaluation criteria that will be customized to fit the aquatic resource restoration purpose associated with the Buzzards Bay B-120 funding source. Overall, proposed projects must be located in embayments of the Buzzards Bay watershed with existing moorings that are currently located within an eelgrass meadow with demonstrable scars based on survey data. Figure 1 illustrates the areas in Buzzards Bay where marinas exist; this EFH assessment is based on the habitat present at these locations and potential projects with very similar construction and outcome, since the individual project locations have not yet been determined.

Figure 1: Bays and inlets of Buzzards Bay with marinas, representing areas where conservation moorings may be implemented for eelgrass restoration



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 the 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 the 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 sites are sub-tidal habitats located in coastal waters with existing marinas in Buzzards Bay (Figure 1).
What are the sediment characteristics?	Sediment conditions vary based on each site; prevalent sandy bottom sediments are more likely the characteristic of these beds. Conservation moorings will be placed in areas with existing, damaged eelgrass beds affected by traditional moorings; thus, sediment conditions will be those associated with eelgrass habitat.
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.	Yes, conservation moorings will be installed at locations where traditional moorings have damaged SAV (principally eelgrass beds). The spatial extent of eelgrass will vary with each location, although priority areas are coalesced beds where traditional moorings have damaged these beds. All efforts will be made to minimize additional damage to the eelgrass bed during mooring replacement, maintenance and performance monitoring.
What is typical salinity and temperature regime/range?	According to the National Wetlands Inventory (NWI) dataset describing Buzzards Bay and harbors typically have salinity exceeding 30 ppt. Water temperatures are typically 5–20°C.
What is the normal frequency of site disturbance, both natural and man-made?	Areas selected for this project will be those that have been subject to disturbance from the installation of traditional boat moorings, and a chronic, recurring problem. These areas are subject to regular boat traffic.
What is the area of proposed impact (work footprint & far afield)?	The State of Massachusetts has estimated that the average scar caused by traditional moorings is 41 m^2. The Trustees will fund replacements of 25 to 30 conservation moorings, with the potential to restore 1,025–1,230 m^2 of damaged eelgrass habitat. The footprint of each conservation mooring apparatus is similar to or smaller than traditional moorings, and replacements will be made within the existing mooring footprint, thus minimizing disturbance.

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 removing existing, traditional moorings that cause eelgrass scaring and replacing them, in the same location, with a conservation mooring. Work on a mooring installation will take place over a day to several days, and will be timed to minimize impacts to species and recreation. The exact timing for each replacement will be determined based on when applications are submitted, projects awarded funding, and installation crews are scheduled. Disturbance caused by mooring replacements will be localized and very small – moorings footprints are typically smaller than 1 m^2 – relative to the total habitat area available. Project implementation will take place in active marinas, where boat traffic is common and thus disturbance caused by mooring replacements will be negligible compared with typical daily activities.
Will benthic community be disturbed?	**X**		Sediments and the resident benthic community will be temporarily disturbed when existing moorings are removed and replaced with conservation moorings. Long-term conditions are expected to improve existing conditions once the conservation moorings are in place and eelgrass beds are expected to recover.
Will SAV be impacted?	**X**		SAV will be beneficially affected. Moorings will be replaced in areas where existing eelgrass has been scarred by traditional moorings. The adverse impact to existing beds will be minimized, and the long-term goal is to reduce or eliminate disturbances to coalesced beds caused by mooring chains so that eelgrass can fully re-colonize the scars.
Will sediments be altered and/or sedimentation rates change?	**X**		Sediments in each project footprint area will be disturbed by mooring replacements. Disturbances will be limited to the mooring apparatus footprint and will be short-term; there will be no permanent change to existing sediment conditions. Long-term eelgrass will re-colonize scars caused by mooring-chain drag and improve or maintain existing sediment quality.
Will turbidity increase?	**X**		Localized turbidity may increase temporarily during removal of existing moorings and installation of the new mooring helical. The conservation moorings will lead to reduced turbidity in the future.
Will water depth change?		**X**	The project will result in no change in water depths.
Will contaminants be released into sediments or water column?		**X**	No substantial release of contaminants is expected as a result of the conservation mooring installations.
Will tidal flow, currents or wave patterns be altered?		**X**	Minor changes in tidal flow, currents may result as increased coalesced eelgrass beds re-colonize targeted restoration sites.
Will ambient salinity or temperature regime change?		**X**	No changes to temperature or salinity will result from the project.
Will water quality be altered?	**X**		Localized, temporary turbidity increases may occur as a result of the existing mooring removals and installation of the conservation mooring replacements. Longer-term, water quality will be improved as eelgrass re-colonizes mooring scars and form coalesced, dense beds.

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 within the potential project footprints and within 5,000 meters of the potential project areas: American plaice, Atlantic cod, Atlantic herring, Atlantic wolffish, haddock, little skate, ocean pout, pollock, red hake, sea scallop, silver hake, white hake, windowpane flounder, winter flounder, winter skate, and yellowtail flounder (see Attachment 1). These life stages may use eelgrass, sand, or gravel habitats at the depth, salinities, and temperatures that may be present at the Buzzards Bay mooring project sites.
Spawning		**X**	This project may temporarily impact eelgrass, sand, or gravel used for spawning by listed EFH species, although work is expected to occur during non-spawning periods by fish species such as winter flounder. Projects and localized, temporary impacts will occur in areas where existing moorings impact eelgrass and will replace existing structures at the same location.
Nursery	**X**		This project will temporarily impact eelgrass, sand, or gravel bottom used as nursery habitat by some of the listed EFH species. Eelgrass beds may act as nursery habitat, but restoration will take place in damaged eelgrass beds in embayments and harbors and existing marinas. In general, eelgrass beds provide valuable fish nursery habitat through providing additional structural cover or foraging opportunities, so the long-term effects on nursery habitat are expected to be positive.
Forage	**X**		This project may temporarily impact sand and gravel bottom or eelgrass that some of the listed EFH species use for foraging. In general, eelgrass beds are known to improve fish foraging habitat by providing habitat, food sources and cover during foraging, so the long-term effects on foraging habitat are expected to be positive.
Shelter	**X**		This project may temporarily impact eelgrass, sand, or gravel bottom that some of the listed EFH species use for sheltering habitat. The project aims to increase eelgrass habitat, which, in general, improves fish shelter habitat. The long-term effects for sheltering habitat are expected to be positive.
Will impacts be temporary or permanent?			Adverse impacts from project installation will be temporary. Beneficial impacts will be permanent, assuming the conservation moorings are properly installed and maintained, and eelgrass re-colonization occurs and beds are 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. The proposed conservation mooring installations will be voluntary and non-prescriptive, focusing on previously approved traditional mooring installations that have adversely affected existing eelgrass beds.

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, and overall should have net benefits. 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	Revegetated eelgrass beds will improve bottom habitats, water quality, and fishery resources in Buzzards Bay. The project is not expected to have any substantial, permanent negative impact to NOAA-trust resources present in the proposed project area. Eelgrass was historically widespread throughout Buzzards Bay and has been declining due to human actions. Conventional boat moorings cause scaring in and loss of eelgrass beds. Replacing traditional moorings with conservation moorings will lead to reduced disturbance and increased eelgrass cover.
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, striped bass, bluefish, tautog, scup	

References

National Oceanic and Atmospheric Administration (NOAA), United States Fish and Wildlife Service, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. 2014. Final Programmatic Restoration Plan and Environmental Assessment

for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill Shoreline, Aquatic and Natural Resource Use Injuries: Massachusetts and Rhode Island.

Attachment 1

We generated the Species List 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 Conservation Moorings Restoration Project potential project footprint locations, there are no differences between the EFH designations identified within the potential project footprints compared with the surrounding area (i.e., within 5,000 m of potential project sites).

Table A1: EFH species and life stages found within the proposed Conservation Moorings Eelgrass Restoration Project potential project footprints

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 Wolffish	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
Window Pane 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

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

DEC 21 2016

Mr. James Turek
Restoration Ecologist
NOAA Restoration Center
28 Tarzwell Drive
Narragansett, RI 02882

RE: Essential Fish Habitat Assessment and Consultation on Buzzards Bay Restoration Projects

Dear Mr. Turek:

We have reviewed the Essential Fish Habitat (EFH) assessment, dated November 30, 2016, and supplemental information provided on December 1, 2016, for three proposed restoration projects occurring within Buzzards Bay, in various embayments, Dartmouth, and Wareham Massachusetts. The three projects include the restoration of eelgrass habitat through the replacement of conventional moorings with conservation moorings at various locations throughout Buzzards Bay, the restoration of tidal wetlands at Round Hill, and the restoration of diadromous fish passage at Horseshoe Pond Dam.. We concur with your determination that the proposed projects should result in a net enhancement of EFH at each project site.

In accordance with the requirements of 50 CFR 600.920(h), we have made a preliminary determination that the proposed projects should not result in more than minimal adverse impacts to EFH and should result in enhancement of EFH at each project site. However, pursuant to 50 CFR 600.920(l), further consultation with us should be completed once the proposed projects and construction methodologies are fully developed.

If you have questions or need additional information regarding this EFH consultation, please contact Alison Verkade (alison.verkade@noaa.gov/ 978-281-9266).

Sincerely,

Christopher Boelke
New England Field Office Supervisor
for Habitat Conservation

cc: John Catena, RC

Appendix B: Endangered Species Act Consultation

This appendix includes letters sent by NOAA as lead federal agency, on behalf of the Trustees, to the U.S. Fish and Wildlife Service to initiate consultation of potential effect or determination of no effect to federally-listed species that may result from two of the projects included in this SEA (Round Hill Salt Marsh Restoration and Horseshoe Pond Dam – Weweantic River Restoration). The Section 7 consultation with or by USFWS continues for these two projects and will be based upon final design plans that incorporate measures to avoid adverse effects to ESA-listed species. NOAA previously made a 'No Effect' determination on the Conservation Moorings Restoration, based on technical input from USFWS staff.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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Fax: +1 401-782-3201

December 21, 2016

Tom Chapman, Supervisor
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

RE: Section 7 Consultation, Round Hill Salt Marsh, Dartmouth, MA

Dear Mr. Chapman:

The National Oceanic and Atmospheric Administration (NOAA) is submitting this consultation letter on behalf of and in coordination with the B-120 Buzzards Bay Natural Resource Damage Assessment (NRDA) Trustees (hereafter, the "Trustees") which include the U.S. Fish and Wildlife Service (USFWS), NOAA, the Commonwealth of Massachusetts and the State of Rhode Island. The Trustees are currently preparing and planning to release a Supplemental Environmental Assessment (SEA) to address potential impacts associated with the **Round Hill Salt Marsh Project** previously identified in the *Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill, Shoreline, Aquatic and Natural Resource Use Injuries, Massachusetts and Rhode Island* as a Readiness Category II project requiring further analysis (NOAA et al. 2014). The purpose of this letter is to complete and document the analysis of the anticipated effects of this salt marsh restoration action on species protected under the Endangered Species Act.

The proposed Round Hill Salt Marsh Restoration Project is located in the Town of Dartmouth, MA and along the southeastern Buzzards Bay coastline in Bristol County. The marsh is situated within a larger land parcel with Town-owned beach and approximately 15 acres of historically filled salt marsh and salt pond complex. The project site is situated immediately east of Meadow Shores Marsh, a largely unaltered salt marsh with tidal creek and ditch network connecting with Buzzards Bay. A more complete description of project actions, including location, timing, and a description of the habitat, is included below and in the attachment.

The Bouchard B-120 NRDA Trustees carefully reviewed the U.S. Fish and Wildlife (USFWS) New England Field Office Endangered Species Consultation website in September 2016 for federally-listed threatened and endangered species. According to the USFWS website, four species are listed and may be found in or near the project area: piping plover, which use coastal beach and intertidal habitats; roseate tern, which use coastal beaches and open Atlantic Ocean habitats; red knot, which use coastal beaches, rocky shores, and mud flats; and northern long-eared bat, which use terrestrial forest habitats. The Trustees have considered whether the project

could have any effect on these listed species, their habitats, or proposed or designated critical habitats (Table 1).

Table 1. ESA species potentially associated with the project area

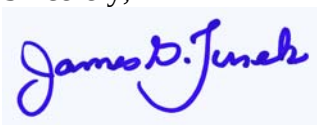
Species	Potential for Round Hill Salt Marsh Restoration to have an Effect
Piping plover	Project may affect but not likely to adversely affect. The project would occur in an area known to be used by piping plover and would take place in the vicinity of known plover nesting area. Conversely, the proposed construction activities for the Meadow Shores Marsh inlet channel repositioning at the barrier beach is expected to occur during the time period of October – March when piping plover are not present in this area. The effect on plover nesting habitat is expected to be insignificant.
Roseate tern	No effect. No known roseate tern occurrences have been documented in the project area. Proposed construction activities for the inlet channel repositioning at the barrier beach is expected to occur during the time period of October – March when roseate tern are not present in this area. The project is expected to result in enhancement of habitat for fishes such as Atlantic silverside and bay anchovy which may be used by terns as forage species.
Red knot	No effect. No known red knot occurrences have been documented in the project area. Proposed construction activities for the inlet channel repositioning at the barrier beach is expected to occur during the time period of October – March when red knot are not present in this area.
Northern long-eared bat	No effect. The project is not expected to substantially impact forest habitat. The proposed project site consists of a disturbed wetland-upland complex with red cedar and red maple scattered across the site. Most of these trees have diameter at breast height of <8 inches. The trees would be removed during the period of October – December, followed by excavation of fill soils to restore salt marsh habitat. Northern long-eared bats are not expected to be present in this site, and if remotely present, would likely be using larger, nearby trees as hibernacula.

The proposed project action is focused primarily on restoring a complex of degraded freshwater wetland and upland regrowth habitat; the project would also include construction activities to re-position the Meadow Shores inlet channel to improve tidal exchange between the salt marsh and Buzzards Bay, and restore a tidal hydrology to the marsh restoration site via a new culvert installation under Ray Peck Drive. Work on the tidal inlet is expected to occur primarily on Town-beach property, with the inlet to be relocated approximately 300 feet east of its current location. Inlet channel construction work is expected to occur during the period of October – March, and any requisite maintenance on the tidal inlet would be expected to similarly occur during this time period before the seasonal arrival of piping plover, which have been previously observed at the Round Hill beach. By re-establishing the inlet channel with a greater tidal prism attributed to the 11.6-acre restored marsh, the inlet migration across the beach is expected to occur at lower frequency and rate in comparison to current conditions.

Based on this information, we conclude that the Round Hill Salt Marsh Restoration Project may have an effect but is not likely to adversely affect piping plover. Further, the project is not likely to adversely affect northern long-eared bat, and would have no effect on other listed threatened or endangered species, their habitats, or proposed or designated critical habitats. We request that the USFWS consider this determination and provide us with a written response on this evaluation.

Please refer to the supplemental details about the proposed project, attached. Should you require additional information regarding the project, please do not hesitate to contact me at 401-782-3338, James.G.Turek@noaa.gov. Thank you for your timely consideration and response.

Sincerely,



James Turek
Restoration Ecologist
NOAA Restoration Center

cc: M. Sperduto, E. Derleth – USFWS
S. Block – NOAA
K. Pelto, M. Garcia-Serrano – MADEP
G. Keer – MA DF&W
M. Kay - RIDEM

Round Hill Salt Marsh Restoration Project Description

Summary: Located in the Town of Dartmouth, MA, on the state's southeastern Buzzards Bay coastline, the proposed Round Hill Salt Marsh Restoration Project is situated within a larger Town-owned beach property and contains approximately 15 acres of historically filled salt marsh and salt pond complex. Private properties (residences and golf course) are located to the north and east, and the 39-acre Meadow Shores marsh system immediately to the west. A Town beach and associated parking lot are located to the immediate south of the project site. Site coordinates are: 41^{o} 32'25.47" 70^{o} 56' 37.49".

The project has secured funding through the New Bedford Harbor Trustee Council (NBHTC – including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), and Commonwealth of Massachusetts represented by the Massachusetts Department of Environmental Protection (MA DEP)), the Buzzards Bay B-120 Trustee Council (BBTC – including NOAA, USFWS, and Commonwealth of Massachusetts and State of Rhode Island), and an U.S. Department of Interior Storm Sandy grant. The NBHTC and BBTC funds for the project are to address natural resource injuries resulting from polychlorinated biphenyl contamination of the New Bedford Harbor Environment and the 2003 Buzzards Bay oil spill. Project partners include the Town of Dartmouth, Massachusetts Division of Ecological Restoration (MA DER), NOAA, and USFWS.

Historic maps and a 1928 aerial photograph depicting this area confirm the project site was coastal wetland prior to the early 1900s. With previous private ownership, various development activities occurred at the filled marsh between 1928 and 1937. Up to six feet of local farm soils and dredged soils were placed within tidal wetlands on-site. Today, a non-functioning wooden culvert remains beneath Ray Peck Drive that formerly connected the site to the Meadow Shores Marsh. The primary source of tidal hydrology for this salt marsh complex (including both Meadow Shores Marsh and the to-be-restored Round Hill Salt Marsh Restoration Project acreage), is an inlet that hydrologically connects Meadow Shores marsh and Buzzards Bay (Figure 1). This inlet has been documented to migrate (similar to other coastal inlets in southern New England) and seasonally close to tidal flushing due to the periodic inability of the marsh's tidal prism to overcome the deposition of sand from westward longshore transport.

Figure 1: Tidal inlet channel at barrier beach, flood tide to Meadow Shores Marsh, August 14, 2014

Restoration Actions: Restoration actions will include removing fill material from an upland-freshwater wetland complex to support marsh habitat on the 11.6 acre area (Figure 2). The newly graded habitat will be replanted with native salt marsh plants. The non-functioning culvert under Ray Peck Drive will be replaced with a larger, properly-sized culvert to allow unimpeded tidal exchange with the restored Round Hill Salt Marsh (Figure 3). The Meadow Shores Marsh tidal inlet at the Dartmouth Beach will be repositioned, and the existing inlet will be plugged with sand fill to re-establish a more tidally-efficient inlet and tidal exchange with the marshes (Figure 4). The Town of Dartmouth will routinely monitor and the channel and if necessary, re-position the channel location as part of it agreed-upon site maintenance activities. The channel position will be adjusted to maintain optimal tidal exchange and minimize risk to residential properties to the southwest. The following is a list of proposed project activities:

- Removal and off-site disposal of fill soils from the historical wetland site at the Round Hill project site, grading and re-vegetation of the graded area with native salt marsh plants to restore 11.6 acres (4.7 hectares) of salt marsh;
- Installation of a larger-sized box culvert under Ray Peck Drive to replace the existing, non-functional wooden culvert and to restore the tidal connection between the Round Hill and Meadow Shores marshes;
- Excavation of marsh channels and pools within Round Hill marsh to restore marsh habitats and hydrologic connectivity;
- Installation of a footpath along a portion of the marsh the construction of a marsh overlook platform, and the installation of public educational signage focusing on the marsh restoration;
- Repositioning of the existing Meadow Shores marsh inlet: the existing inlet will be filled with sand and a new, more easterly inlet will be excavated. The new geomorphologically-designed channel will be relocated such that the distance from Buzzards Bay into the marsh is shorter to allow improved tidal exchange, and to keep the channel away from residential properties and features to the west. Because the channel migrates over time, the Town of Dartmouth will monitor and re-position the inlet channel location as part of its permitted maintenance activities. The channel position will be adjusted to maintain optimal tidal exchange and minimize risks to residential properties; and
- Planned periodic maintenance of the Meadow Shores marsh inlet.

This proposed project would result in the restoration of 11.6 acres (4.7 hectares) of coastal salt marsh in support of the functioning health and resilience of the Round Hill and Meadow Shores marshes; and Dartmouth, New Bedford, and Buzzards Bay environs. This preferred alternative also includes an operations and maintenance (O&M) plan to address the uncertainty of inlet migration, and includes a non-structural maintenance-based approach that addresses the potential risk of inlet closure and protects the health and functioning of both the 39-acre (15.8-hectare) Meadow Shores and 11.6-acre Round Hill marshes.

Evaluation of the Meadow Shores marsh inlet migration and infilling potential was completed to determine the potential frequency of inlet closure and provide guidance for the development of a preferred non-structural approach to re-establishing an excavated channel (ACRE 2016). The inlet would be relocated through the barrier beach to maintain tidal exchange to ensure a hydraulically

efficient inlet to service the existing and restored salt marshes. The analysis of historical shoreline and inlet conditions and past inlet closures as well as the modeling of an enhanced tidal prism resulting from the 11.6-acre restoration suggests that the potential inlet migration may occur at an estimated rate of 50 ft. per year, and inlet maintenance and repositioning may be needed once every 8 years, on average. To provide a conservative estimate, the project team expects that channel and inlet maintenance may be needed once every four years, to serve as a basis for anticipated timeframe for potential maintenance and maintenance cost needs.

Planned maintenance of the Meadow Shores marsh inlet would initially be implemented during project construction, with the repositioning of the primary tidal channel and mouth of the inlet as far eastward and within town property boundaries as feasible, representing a condition similar to the 1934 (hydraulically more efficient) location (see Figure 23 in ACRE 2016). Based on a regulatory-defined, designated westerly limit of the inlet, the project team collaborated with the expert project coastal engineer and local community to establish a threshold location where a westerly migrating channel inlet will be repositioned to the preferred channel location, if the inlet periodically or episodically reaches the threshold location. With this maintenance action, excavated beach sands would be used to plug the westerly migrating channel and re-establish the inlet at the preferred inlet location. This channel maintenance approach has been successfully completed at other coastal and saltmarsh sites in Massachusetts with similar needs, including Allens Pond (Dartmouth), Ellisville Harbor Marsh (Plymouth), Edgartown Great Pond and Tisbury Great Pond (Martha's Vineyard) and Hummock Pond (Nantucket).

The preferred project inlet alternative would result in no permanent beach resource impacts, unlike permanent impacts that would result from stone groin structure placement associated with Alternative D. The disturbances associated with the preferred alternative would be temporary with a frequency of the maintenance to potentially occur once every 4 to 8 + years. Overall, advantages of the preferred alternative include:

- The design avoids the direct loss of subtidal, intertidal, beach and dune resources, as there is no direct and permanent placement of hardened groin structures to stabilize the inlet.
- Re-establishment of the inlet would comply with any time-of-year restrictions to minimize temporary impacts to protected bird nesting habitat along the barrier beach.
- There would be no structures to risk interference with longshore sediment transport and the risk of down-gradient beach loss as with the inlet with groin structures alternative. The non-structure alternative is also the preferred alternative for addressing state and federal regulations.
- Implementation of this design alternative may still require formal agreement with the adjacent private landowner, but the agreement would focus only on access and movement of sand and not the permanent placement of a hardened structure; this alternative is supported by the adjacent property owner.
- The lack of a hardened structure (one that may interfere with the public's ability to access the beach and tide water uses as required by MA Chapter 91 public rights) also removes a requirement to design and maintain a public access feature around or over the inlet in compliance with MA State regulations.
- This design alternative minimizes the potential for loss of marsh integrity and ecological functioning from a prolonged channel inlet closure, and protects a more natural approach to

restoring tidal exchange, migration potential, and coastal resilience, as compared to the groin alternative.

Project Benefits: This site presents a rare opportunity to restore 11.6-acres of publicly-owned salt marsh and enhance another 70 acres of contiguous salt marsh and barrier beach coastal ecosystem including the 39-acre Meadow Shores salt marsh. This project will directly restore salt marsh functions and values lost from the site for nearly 100 years, and will protect and enhance the ecological integrity and health of the larger Meadow Shores Marsh. The project will significantly enlarge this valuable tidal system, enhancing the tidal inlet, and improving ecological services and societal values that the marsh complex provides to the Buzzards Bay environment. These benefits include: improving project area resiliency and adaptability to climate change by expanding estuarine habitat and flood storage capacity and facilitating landward marsh migration in the face of sea-level rise; providing enhanced primary production, detrital export, sediment trapping, and coastal fish and wildlife habitats; contributing valuable public stewardship and educational opportunities based on the site location adjacent to the Town beach; and providing additional passive recreational opportunities with construction of a walking trail, observation platform, and educational signage.

Figure 2: Aerial view of proposed Round Hill Salt Marsh Restoration Project, Meadow Shores Marsh, tidal inlet and surrounding properties and communities

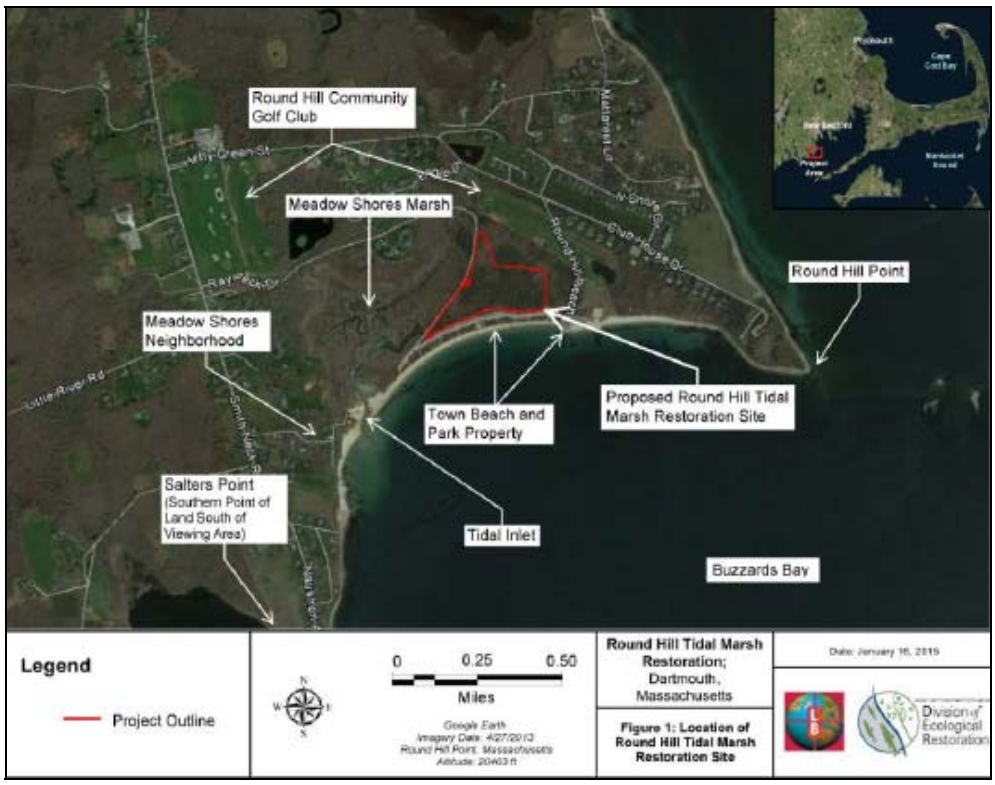


Figure 3: Aerial view of project area, dated August 22, 2016, depicting proposed marsh restoration area, Meadow Shores marsh, tidal inlet channel and location of existing defunct culvert

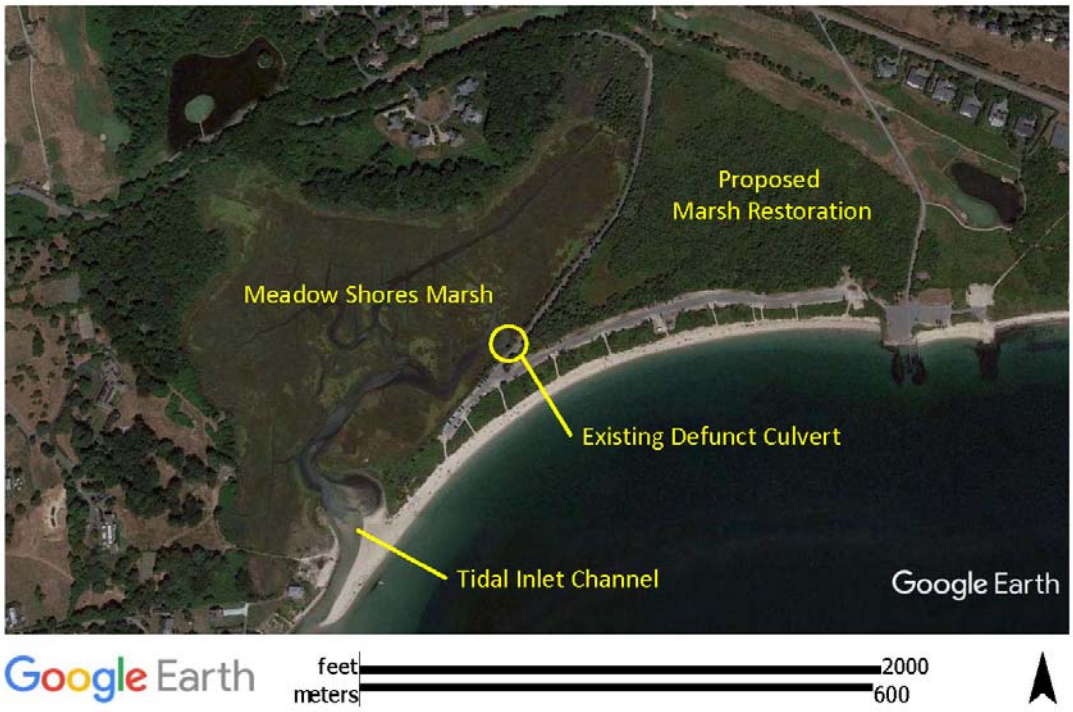
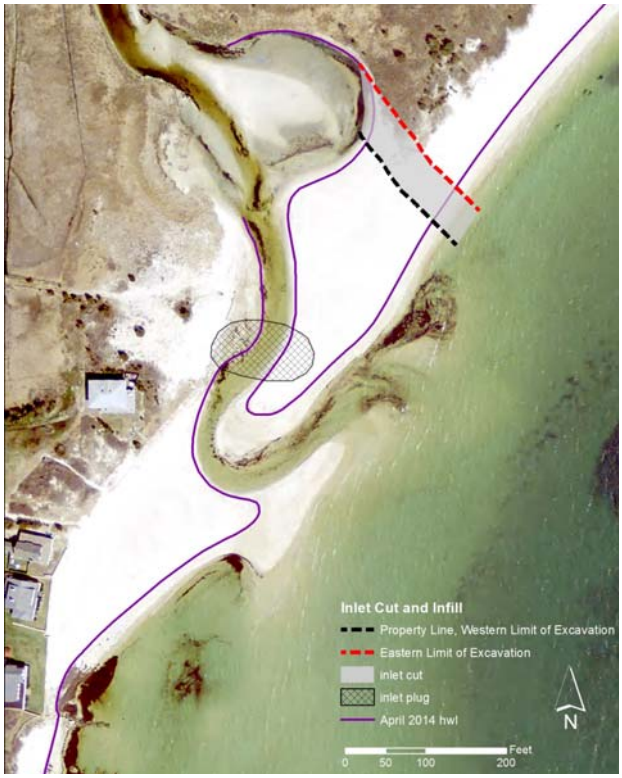


Figure 4: Aerial view of the Meadow Shores Marsh existing inlet and approximate locations of proposed repositioned inlet channel and sand-fill plug in existing channel



This restoration project will directly result in the restoration of salt marsh providing important ecological services and values to the local community. The goal of restoring salt marsh is to address natural resource injuries that have resulted from contaminant releases to the New Bedford Harbor and Buzzards Bay environments. The proposed project was identified as one of 69 restoration opportunities within the New Bedford Harbor Salt Marsh Restoration Plan (MWRP, 2002). The restoration of 11.6 acres of former salt marsh and enhancement of the 70-acre Meadow Shores coastal wetland and barrier beach system are also consistent with additional Federal plans including the objectives of the National Wildlife Refuge System, the North American Waterfowl Management Plan, Partners in Flight, U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan by restoring significant coastal marine habitat for migratory birds, estuarine and anadromous fishes, and other estuarine and marine wildlife. This marsh restoration is intended to support the need to strategically conserve and restore important coastal habitat areas outside of the USFWS Refuge system and aid in addressing "gaps" along migratory routes.

This project is also expected to promote the integration of natural and built infrastructure by incorporating a properly-sized culvert beneath Ray Peck Drive that will support and enhance tidal flushing and sustain the newly restored wetland. Restoration of habitat by removing fill from the former salt marsh will increase the tidal prism of the Meadow Shores Marsh complex and extend the long-term viability of the system by enhancing tidal inlet stability. Including long-term maintenance plans for the primary tidal inlet, with a no groin structures will reduce permanent impacts to regulated coastal beach resource and conjointly serve to protect the health and functioning of the larger existing system and the restored marsh. Additionally, by restoring wetland habitat, the project increases the long-term coastal resiliency by providing opportunity for tidal wetland migration with respect to climate change and anticipated sea-level rise. Incorporating restored wetland acreage directly south of the built-environment (residential homes and a private golf-course), this project will provide a buffer and greater protection from coastal storms and surges.

References

MDFW. 2016. Massachusetts Division of Fisheries & Wildlife (DFW) Habitat Conservation Plan for Piping Plover. Prepared by Massachusetts Division of Fisheries & Wildlife, Westborough, MA and ICF International, Fairfax, VA. Available: http://www.mass.gov/eea/docs/dfg/nhesp/species-and-conservation/masswildlife-final-piping-plover-hcp.pdf Accessed October 27, 2016

NOAA, USFWS, MEOEEA, and RIDEM. 2014. Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill Shoreline, Aquatic and Natural Resource Use Injuries Massachusetts and Rhode Island. National Oceanic and Atmospheric Administration, United States Fish and Wildlife Service, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. Available at: https://casedocuments.darrp.noaa.gov/northeast/buzzard/pdf/B-120-Final-PRP-EA-and-FONSI-09-30-14.pdf Accessed November 1, 2016

MWRP. 2002. New Bedford Harbor Environment Wetlands Restoration Plan. Submitted to the New Bedford Harbor Trustee Council by the Massachusetts Wetland Restoration Program. August 2002.

UNITED STATES DEPARTMENT OF COMMERCE
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December 21, 2016

Tom Chapman, Supervisor
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

RE: Section 7 Consultation, Horseshoe Pond Dam and Weweantic River, Wareham, MA

Dear Mr. Chapman:

The National Oceanic and Atmospheric Administration (NOAA) is submitting this consultation letter on behalf of and in coordination with the B-120 Buzzards Bay Natural Resource Damage Assessment (NRDA) Trustees (hereafter, the "Trustees") which include the U.S. Fish and Wildlife Service (USFWS), NOAA, the Commonwealth of Massachusetts and the State of Rhode Island. The Trustees are currently preparing and planning to release a Supplemental Environmental Assessment (SEA) to the public address potential impacts associated with the **Horseshoe Pond Dam and Weweantic River Restoration Project** previously identified in the *Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill, Shoreline, Aquatic and Natural Resource Use Injuries, Massachusetts and Rhode Island* as a Readiness Category II project requiring further analysis (NOAA et al. 2014). The purpose of this letter is to complete and document the analysis of the anticipated effects of this fish passage and river restoration action on species protected under the Endangered Species Act.

The proposed Horseshoe Pond Dam – Weweantic River Restoration Project is located in the Town of Wareham, MA along the northern Buzzards Bay shoreline in Plymouth County. The dam is located within a 35-acre property owned by the Buzzards Bay Coalition. The existing dam structure is dilapidated and is situated at the mouth of the Weweantic River, the largest tributary to Buzzards Bay. The Weweantic River historically supported important migratory fish runs (Princeton Hydro, 2016), and removing the defunct concrete dam spillway will restore unimpeded fish passage and other important ecological functions. A more complete description of project actions, including location, timing of work, and a description of the habitat, is included below and in the accompanying attachment.

The Trustees reviewed the USFWS New England Field Office Endangered Species Consultation website for any federally-listed threatened and endangered species that may be known to use the site or found in the vicinity of the site. According to the website, five species are listed and may be present in the Town of Wareham in Plymouth County: piping plover, which use coastal beaches; northern red-bellied cooter, which use inland ponds and rivers; roseate tern, which use coastal beaches and open-(Atlantic) ocean habitats; red knot, which use coastal beaches and rocky shores, and sand and mud flats; and northern long-eared bat, which use terrestrial caves and forest habitats.

The Bouchard B-120 NRDA Trustees then evaluated whether the project could have any effect on these listed species, their habitats, or proposed or designated critical habitats (Table 1).

Table 1. ESA **species potentially associated with the project area**

Species	Potential for Horseshoe Dam Removal Project to have an Effect
Piping plover	No effect. The project would not affect any coastal beach habitat.
Northern red-bellied cooter	May affect, but not likely to adversely affect. Although the dam removal project would alter an impoundment and river, the site is more than 9 miles (14.9 km) away from the nearest known designated critical habitat for this species (Figure 1). Northern red-bellied cooter are expanding in range and have been observed in the Weweantic River watershed and in ponds in the vicinity of the project site. The Trustees and Buzzards Bay Coalition (BBC) seek to engage in further consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) to obtain additional information about known locations of and habitat use by Northern red-bellied cooter to make a final impact determination. Given the timing of construction in summer and fall, and the uncertainty in habitat use by the species, the proposed dam removal and river restoration is not expected to adversely affect this species.
Roseate tern	No effect. The project does not affect any coastal beach or open ocean habitats.
Red knot	No effect. The project does not affect any coastal beach, rocky shore, or tidal sand or mud flat habitat.
Plymouth redbelly turtle	Not likely to adversely affect. The project would not affect critical habitat for the redbelly turtle. The existing impoundment is very shallow, and would be affected by a new hydrologic regime influenced by tides. The upper basin would largely remain freshwater habitat, while the lower basin would be low-brackish habitat with full dam removal. Wetland plant communities would be expected to undergo succession to community favoring the restored hydrology and predicted salinity regime.
Northern long-eared bat	Not likely to adversely affect. The project would have minimal impact to forested habitats. If tree removal for construction access is required, this would occur to a very limited extent in the area immediately adjacent to the dam. Although some mature trees and saplings, particularly red maple and black gum along the pond shoreline, may incur mortality through diurnal tidal flooding of a portion of the basin area, forested habitat is expected to characterize upper basin areas that are currently impounded. Dead standing trees bordering the basin may benefit bats by providing quality bat roosting habitat.

The proposed project action is focused on removing an existing dilapidated concrete dam spillway structure at the head-of-tide. Construction work will be completed over an approximate 1 to 2-month period during August-October and will be timed to avoid or minimize impacts to any sensitive species or life stages. The existing freshwater habitat behind the dam would return to a tidal river with low salinities typically less than 5 parts per thousand in the lower basin. Further upriver, freshwater tidal and non-tidal conditions would result including a free-flowing lower perennial river. As noted in Table 1, habitats used by the federally-listed threatened or endangered species are likely limited at the project site; inland pond and river habitat used by northern red-bellied cooter may be available. Conversely, the project site is located more than 9 miles (14.9 km) miles away from designated critical habitat for this species, and no conclusive evidence is available to indicate cooter are present in or near the project area. The Trustees will seek further coordination with and input from the state's Natural Heritage and Endangered Species Program on potential effects to Northern red-bellied cooter.

Based on the current information, we conclude that the Horseshoe Pond Dam – Weweantic River Restoration Project will have no effect on piping plover, roseate tern, or red knot, their habitats, or proposed or designated critical habitats. The project may affect but is not likely to adversely affect

Northern red-bellied cooter, Plymouth redbelly turtle, nor Northern long-eared bat. The Trustees and their contractors will work to minimize any impacts during restoration activities.

Please refer to the supplemental details about the proposed project in the attachment. Should you seek any additional information, please do not hesitate to contact me at 401-782-3338, James.G.Turek@noaa.gov.

Sincerely,

James Turek
Restoration Ecologist
NOAA Restoration Center

ATTACHMENT
Horseshoe Pond Dam – Weweantic River Restoration Project

This project would involve the removal of the existing Horseshoe Pond dam concrete spillway at the head of the Weweantic River estuary, and partial width removal of a remnant legacy dam situated ~170 linear feet upstream of the Horseshoe Pond dam (Figure 1). Site coordinates are: 41^{o} 45' 46.52" 70^{o} 44' 56.14". The project will also involve the repair of an existing bridge over the dam spillway (Figure 2), filling of a defunct mill raceway and converting the filled area to a vegetatively stabilized condition, and construction of two canoe and kayak launches with one located on the upriver side of the dam and one along the estuary. The purpose of this project is to restore connectivity of the Weweantic River and self-sustaining populations of diadromous fishes on the river. The project would also increase the coastal resiliency of the Weweantic River estuary and allow for unimpeded tidal marsh migration. The project proponent is the Buzzards Bay Coalition; the Buzzards Bay B-120 Trustee Council (BBTC including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), Commonwealth of Massachusetts, represented by the Massachusetts Department of Environmental Protection (MA DEP), and State of Rhode Island) is a project partnering entity. The BBTC proposes to fund the design and implementation of the dam removal for ecological restoration to address aquatic and shoreline resource injuries resulting from the 2003 Buzzards Bay oil spill (NOAA et al. 2014).

The removal of both the spillway and a significant portion of the legacy dam would lower normal water surface elevations approximately 3.6 to 4.5 ft at the dam, restore free-flowing conditions to the impoundment, and restore full tidal exchange to the lower third of the impoundment, some of which is expected to remain a broad pool. With the predicted reduction in normal water surface elevation, existing shallow open water (±5 ac) and floating vegetation (±17 ac) areas would be eliminated and convert to other wetland types, including a significant increase in forested wetland (±9 ac) and scrubshrub wetland vegetation (±7 ac) (Appendix D in Princeton Hydro, 2016).

Figure 1: Aerial photo depicting Horseshoe Pond, dam and downstream Weweantic River estuary (photo source: GoogleEarth)

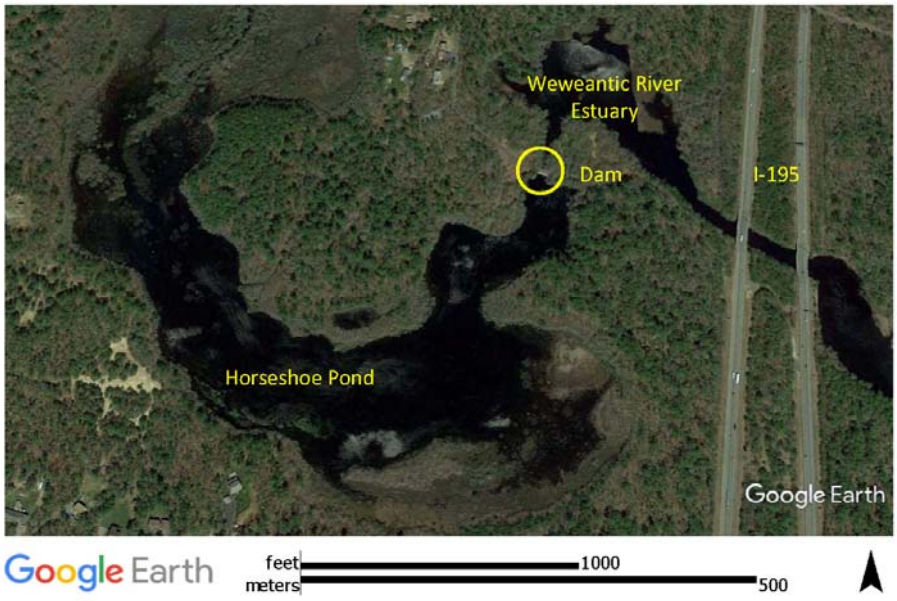


Figure 2: Horseshoe Pond dam spillway looking downriver at Weweantic River estuary

This alternative restores full tidal exchange to the site including measured mean high water (MHW) (0.56 ft, NAVD88), atypical high tide of approximately 2.5 ft, NAVD88, and the highest tide of the year of approximately 4 ft, NAVD88 that would affect the lower half of the impoundment. This increase in tidal fluctuation may kill off some mature and immature trees and saplings, particularly red maple and black gum, in a portion of the impoundment area. However, as noted above, additional forested habitat is expected to re-establish in areas in the upper basin that are currently impounded.

With the dam removal alternative, a greater extent of riffle habitat will be restored upriver of the tidally influenced area. The natural sediment transport regime, which is both fluvially and tidally influenced, would also be restored. The upper portion of the impoundment is stabilized by riparian and wetland vegetation and the low-gradient longitudinal profile of the affected impoundment area suggest minimal potential for channel incision (i.e., headcutting) in the upper impoundment. The lower impoundment would likely remain a depositional setting with tidal exchange and result in minimal sediment mobilization. While some sediment mobilization is possible in the central portion of the existing impoundment area, this alternative would result in minor sediment mobilization.

Based on preliminary discussions with Massachusetts Department of Environmental Protection regarding sediment analysis results, this alternative would include active sediment management (e.g., stabilization in-place and/or excavation, relocation and stabilization) for the impounded sediment and adjacent soils immediately upstream of the dam between the spillway and the legacy dam, where elevated contaminants have been detected in previous sampling and analysis. Some of this sediment will be excavated, placed, and dewatered preferentially in the former millrace with lower end closed off from releases, or as necessary, the sediments would be placed away from the proposed channel for permanent stabilization. Adjacent soils, in the vicinity of the proposed canoe/kayak launch upstream of the dam, may need to be stabilized with stone or other natural materials to prevent soil or sediment mobilization. The soils forming the eroded left bank immediately downstream of the dam would need to be regraded and vegetatively stabilized.

The topographic cross-sections and profile data collected from the impoundment and the use of one-dimensional hydraulic modeling of the dam removal alternative reveal no changes to existing upstream public infrastructure including the Fearing Hill Road Bridge. Public access to the restored site would be enhanced with the repair of the existing bridge infrastructure spanning the spillway, creation of a trail canoe and kayak launch at the restored river reach along the southwestern side of the dam, and construction of another trail with canoe and kayak launch northwest of the dam along the downstream estuarine area.

This alternative restores full migratory fish passage at the site, and access to upriver spawning and rearing habitats. This alternative also avoids any changes or impacts to the existing boulder and cobbly riffle immediately downstream of the dam that is used as spawning habitat by migratory fishes such as rainbow smelt (*Osmerus mordax*).This alternative affords the greatest potential for adaptation of tidal habitats in response to the predicted regional effects of climate change such as sea-level rise and water temperature changes.

Freshwater pond habitat for warmwater fishes would be diminished with this alternative; however, riverine habitat for resident and migratory fishes would be substantially increased with restoration of formerly inundated upriver areas, the return of free-flowing riverine conditions, and natural river channel connectivity. There is potential for a secondary riffle to be exposed within the restored area upstream of the dam removal site that may provide additional riffle habitat for migratory fish spawning. Other riffles with potential spawning habitat would also be restored upriver with this project alternative.

Secondary ecological benefits will result from this project alternative. State-listed rare plants identified in the tidal estuary downstream, including Parker's pipewort (*Eriocaulon parkeri*) State endangered, pygmyweed (*Crassula aquatica*) State threatened, Eastern grasswort (*Lilaeopsis chinensis*) on the state "watch-list," and salt reedgrass (*Spartina cynosuroides*) State threatened, will gain new potential habitat upstream with the dam removal alternative. Control of invasive plant species will target existing stands of common reed (*Phragmites australis*) bordering the impoundment to manage expansion by this non-native species. In addition, the stands of Japanese knotweed (*Fallopia japonica*) in the vicinity of the proposed pond canoe and kayak launches will be removed and managed to prevent spread by this invasive annual species Wetland functions related to water quality protection and enhancement would improve substantially: with less impoundment, lower retention time, increased flow, and an increase in canopy cover of woody riparian vegetation adjacent to the channel, instream temperatures would be more moderated and dissolved oxygen levels would increase in the restored river reach.

It is anticipated that this work will be conducted over a relatively short-term (one to two months) period. The work would be conducted during the low-flow period, and it is anticipated that all in-channel work would proceed in the wet. However, if greater river flows are present during construction, the mill race could be used to temporarily divert flows around the river channel work area, by temporarily using an upstream coffer dam and/or culvert extending from upstream of the legacy dam. Post-construction, the new channel extending from the former spillway through the lowered legacy dam breach would act as the freshwater surface water elevation control and the impoundment would be substantially reduced in area. A small portion of the upstream reach would remain ponded based on the channel longitudinal profile information and hydraulic modeling results.

This alternative provides the safest conditions for the public, and long-term maintenance would be associated only with the maintenance and repairs to the footbridge.

References

NOAA, USFWS, MEOEEA, and RIDEM. 2014. Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill Shoreline, Aquatic and Natural Resource Use Injuries Massachusetts and Rhode Island. National Oceanic and Atmospheric Administration, United States Fish and Wildlife Service, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. Available at: https://casedocuments.darrp.noaa.gov/northeast/buzzard/pdf/B-120-Final-PRP-EA-and-FONSI-09-30-14.pdf. Accessed 11/1/2016

Princeton Hydro. 2016. Alternatives Analysis for the Weweantic River Restoration Project Horseshoe Mill Dam Fish Passage Feasibility Study Wareham, Massachusetts. Prepared for the Buzzards Bay Coalition by Princeton Hydro, LLC.

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

December 21, 2016

Tom Chapman, Supervisor
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

RE: Section 7 Consultation, No Effect Verification,
Conservation Moorings Project, Buzzards Bay

Dear Mr. Chapman:

The National Oceanic and Atmospheric Administration (NOAA) is submitting this consultation letter on behalf of and in coordination with the B-120 Buzzards Bay Natural Resource Damage Assessment (NRDA) Trustees (hereafter, the "Trustees") that include the U.S. Fish and Wildlife Service (USFWS), NOAA, the Commonwealth of Massachusetts and the State of Rhode Island. The Trustees are currently preparing a Supplemental Environmental Assessment (SEA) to address potential impacts associated with the **Conservation Moorings Restoration Project** previously identified in the *Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill, Shoreline, Aquatic and Natural Resource Use Injuries, Massachusetts and Rhode Island* as a Readiness Category II project requiring further analysis (NOAA et al. 2014). The purpose of this letter is to complete and document the analysis of the anticipated effects of this restoration action on species protected under the Endangered Species Act.

The proposed Conservation Moorings Restoration Project will replace existing, traditional moorings with technologically-advanced moorings called conservation moorings. Mooring replacements will be made in Buzzards Bay where existing moorings are known to cause scouring and scars in eelgrass (*Zostera marina*) beds that are important aquatic habitats in Buzzards Bay. Specific mooring replacement locations will be selected through a competitive solicitation and state-grant award process. This project is expected to be implemented at existing marinas affecting eelgrass beds in coastal embayments of Buzzards Bay in Bristol, Plymouth, and Barnstable Counties in Massachusetts. A more complete description of project actions including location, timing, and a description of the habitat, is included below and in the attachment.

The Trustees carefully reviewed the U.S. Fish and Wildlife Service, New England Field Office Endangered Species Consultation website in October 2016 for federally-listed threatened and endangered (T&E) species identified in the Buzzards Bay area where the project activities may occur. According to the USFWS website, seven species are listed and may be present in one or more of the project counties: piping plover, which use coastal beaches; northern red-bellied

cooter, which use inland ponds and rivers; roseate tern, which use coastal beaches and open Atlantic Ocean habitats; red knot, which use coastal beaches and rocky shores, and sand and mud flats; northeastern beach tiger beetle, which use coastal beaches; sandplain gerardia which is found in open areas with dry, sandy soils; and northern long-eared bat, which use terrestrial caves and forest habitats. The Trustees then evaluated whether the project could have an effect on these listed species, their habitats, or proposed or designated critical habitats (Table 1).

Table 1. Potential project effects on T&E species

Species	Potential for Conservation Moorings Restoration Project to have an effect
Piping plover	No effect; the project is not expected to affect any coastal beach habitat used by piping plover.
Northern red-bellied cooter	No effect; the project would not affect island ponds or rivers.
Roseate tern	No effect; the project is not expected to affect any coastal beaches. Although terns utilize open-water harbor areas for foraging, the project is not expected to have an adverse effect on tern foraging habitat in these areas.
Red knot	No effect; the project is not expected to affect any coastal beaches, rocky shores, or sand and mud flats.
Northeastern beach tiger beetle	No effect; the project is not expected to affect coastal beaches.
Sandplain gerardia	No effect; the project is not expected to affect open areas with dry, sandy soils.
Northern long-eared bat	No effect; the project would not affect any terrestrial caves or forest habitats.

The proposed project is focused on areas in existing marinas where eelgrass beds have been damaged by traditional moorings. Surrounding habitats will be minimally disturbed including sandy beaches or rocky coastlines, as the project will take place in developed areas where active marinas, boat traffic and other human impacts are already common. As noted in Table 1, none of the habitats used by the listed T&E species are present at the potential project sites, with the exception of foraging habitat for terns in open-water harbor areas, but would not be expected to be adversely affected by the project. Based on this information, we conclude that the Conservation Moorings Restoration Project will have “no effect” on the T&E listed species, their habitats, or any proposed or designated critical habitats. Therefore, the Trustees have not prepared a Biological Assessment or pursued further consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act. Note, additional supporting details about the proposed project are provided in the attachment.

Sincerely,

James Turek
Restoration Ecologist
NOAA Restoration Center

cc: M. Sperduto – USFWS
K. Pelto, M. Garcia-Serrano – MADEP
M. Kay - RIDEM

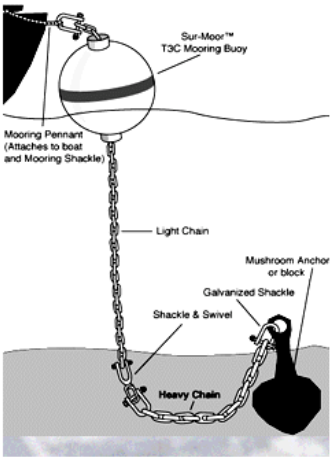
ATTACHMENT
Conservation Moorings Restoration Project Description

This project, referred to as Conservation Boat Moorings Restoration (SA-10) in the B-120 Buzzards Bay PRP/EA, was identified as a Tier 1 preferred alternative to address shoreline and aquatic resource injuries resulting from the 2003 Buzzards Bay oil spill.

Eelgrass (*Zostera marina*) is a native, meadow-forming marine vascular plant that is part of a group of aquatic plant species known commonly as sea grasses. Eelgrass beds are recognized as a critical nursery habitat for a variety of marine fish and macroinvertebrate species. In Massachusetts, eelgrass is nearly always found subtidally in shallow southern New England coastal waters. Conversely, eelgrass beds have been generally been declining over the past several decades, and at a relatively high rate in Massachusetts and other nearby coastal waters, due to excess nitrogen releases and estuarine and marine water quality degradation and other anthropogenic stressors including boating activities and boat moorings.

The vast majority of recreational boat moorings in Massachusetts are typically constructed of a large weighted block or mushroom-style weight that anchors the mooring, and a heavy chain that adds additional weight and drag to account for changing tidal heights, winds, and tidal current direction (see Figure 1). The mooring block causes a loss of eelgrass due to its surface area footprint and may cause tidal flow scour resulting from bottom shear stress. The length of a chain leading to a boat connection is typically of adequate length to amply account for variable tide ranges, causing the chain to drag on the substrate and often carving a broad, circular pattern into the eelgrass bed as the anchored boat swings on the mooring, ripping up plants. This physical action also increases the exposed edge of the eelgrass meadow while providing a sink for detritus. The combined effect of the block and chain may also increase sediment resuspension within the eelgrass bed, diminishing water clarity and light quality on the edge of the scar, and further degrading the eelgrass habitat (Evans et al, undated).

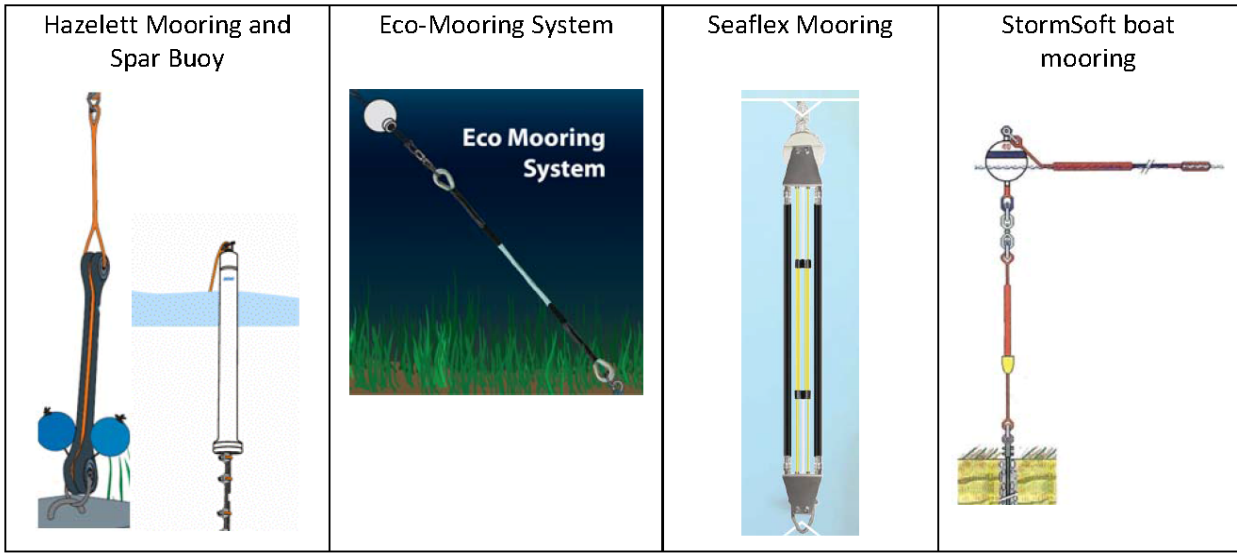
Figure 1. Conventional Mooring Diagram



Source: Urban Harbors Institute 2013, Figure 2.

Evans et al. (Undated) also describe alternative mooring systems called conservation moorings that "replace the block with a helical anchor that is screwed into the substrate, resulting in minimal footprint impact (see Figure 11). The reinforced, expandable elastic "rode" or band is fixed to the anchor and replaces the traditional metal chain, and is attached to a float, preventing the attached rode from dragging on and scouring the eelgrass bed and substrate. If installed and maintained correctly, this system has limited potential to contact the marine bottom substrate and, therefore, minimizes direct impacts to eelgrass beds otherwise caused by conventional boat moorings." Maintenance of conservation moorings typically include periodic or seasonal cleaning of the rode of any biofouling organisms that may colonize and weigh down the structure.

Figure 11. Four Types of Conservation Moorings, where Chains or Cables are Suspended to avoid Scarring of Eelgrass Habitat



Source: Urban Harbors Institute 2013.

For over a decade, the Massachusetts Division of Marine Fisheries (DMF) has been monitoring boat moorings that were replaced with new conservation moorings (i.e., floating, flexible rods and helical anchors). There are different designs including Eco-Mooring, Hazelett, Seaflex, and others[1]. To date, Eco-Mooring and Hazelett conservation mooring system types have been installed in several harbors in Massachusetts including Gloucester, Manchester-by-the-Sea, Long Island – Boston, Wareham, West Falmouth, and Quissett Harbor. The DMF continues to routinely monitor a percentage of the installed moorings in each of these harbors. DMF divers measure the area of the scar, eelgrass density and percent cover inside and outside of the scar. The Trustees have found that when the moorings are installed, maintained correctly, and the rode is suspended at all times, eelgrass can revegetate a mooring scar typically in one to three growing seasons.

[1]The mention of a commercial product or company does not imply endorsement of this product or company by the Trustees.

The objective of this grant program is to replace approximately 25 to 30 conventional chain moorings with innovative floating rode moorings ($2,000 to $3,000 each) in Buzzards Bay coastal sites where existing moorings are known to be causing scouring and eelgrass loss. Through mooring replacement and committed routine maintenance (e.g., bio-fouling removal), effects on eelgrass will be lessened or eliminated. Bottom habitat scars left by conventional moorings will be revegetated and further marine bottom sediment scour and disturbances will be avoided.

For this project, the MassDEP will provide programmatic support for the proposal solicitation and contract award management. MassDEP will use a standard Grant Announcement and Application (GAA) template and process developed for the Commonwealth's Natural Resources Damages Program to solicit competitive grant proposals and evaluate potential sites and projects. The GAA template includes eligibility criteria and evaluation criteria that are customized to fit the aquatic resource restoration purpose associated with the B-120 Buzzards Bay source of funding. Briefly, proposed projects must be located in the embayments of the Buzzards Bay watershed at a location with existing conventional moorings that are currently located within an eelgrass meadow with demonstrable scars based on survey data. DMF will participate in the proposal review and project selection process, provide technical input on contract scopes of work and budgets to awardees, as well as provide oversight during project implementation, including site visits as needed before and after mooring installation, and technical guidance to awardees on mooring monitoring requirements and methods.

References

NOAA, USFWS, MEOEEA, and RIDEM. 2014. Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill Shoreline, Aquatic and Natural Resource Use Injuries Massachusetts and Rhode Island. National Oceanic and Atmospheric Administration, United States Fish and Wildlife Service, Massachusetts Executive Office of Energy and Environmental Affairs, and Rhode Island Department of Environmental Management. Available:

https://casedocuments.darrp.noaa.gov/northeast/buzzard/pdf/B-120-Final-PRP-EA-and-FONSI-09-30-14.pdf.

Accessed 11/1/2016

Appendix C: Horseshoe Pond Dam Historic Consultation

This appendix includes letter, Project Notification Form and supporting documents sent from the Trustees to the Massachusetts Historical Commission (MHC) to seek consultation of potential effect to historical or archaeological resources within the Horseshoe Pond Dam project area. During the public comment period for the Draft SEA, NOAA, as lead federal agency, received a letter response from the MHC as part of the Section 106 consultation in conformance with the National Historic Preservation Act. NOAA, as LFA, and USFWS, as a federal supporting agency will continue to consult with MHC and other consulting parties to develop and implement final design plans to avoid, minimize or mitigate any adverse effects on historic resources.

UNITED STATES DEPARTMENT OF COMMERCE
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National Marine Fisheries Service
Narragansett Laboratory
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28 Tarzwell Drive
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Fax: +1 401-782-3201

December 21, 2016

Brona Simon
State Historic Preservation Officer
Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

RE: Weweantic River Restoration Project, Horseshoe Pond Dam, Station Street, Wareham, MA
Assessors Map 81, Parcel 1018; MHC #RC.53537

Dear Dr. Simon:

The B-120 Buzzards Bay Natural Resource Damage Assessment (NRDA) Trustee Council (hereafter, "Trustees"), in coordination with the Buzzards Bay Coalition (BBC), seeks to restore migratory fish passage and other ecological services associated with dam removal and river restoration at the above-referenced property, owned by the BBC. The Trustees identified this project as one of the Tier 1 preferred projects in the *Final Programmatic Restoration Plan and Environmental Assessment for the Buzzards Bay Bouchard Barge-120 (B-120) Oil Spill, Shoreline, Aquatic and Natural Resource Use Injuries, Massachusetts and Rhode Island* under the project name of "Horseshoe Pond Dam Removal and Weweantic River Restoration, Wareham, MA (SA-2)" (NOAA et al. 2014). Through this project, the Trustees are seeking to address natural resource injuries resulting from the 2003 Buzzards Bay oil spill which injured aquatic, shoreline and other natural resources and natural resource uses.

The BBC originally notified the Massachusetts Historical Commission (MHC) about this project in its December 14, 2012 letter to the MHC for project planning purposes. The MHC responded on December 26, 2012, indicating that consultation regarding historic and sensitive areas is required for this project. This letter serves to initiate this federal agency consultation process under Section 106 of the National Historic Preservation Act.

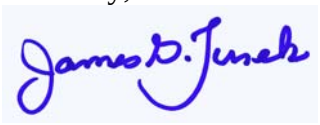
In its 2012 letter, the MHC noted that "undisturbed portions of the project area are considered by the MHC to be highly archaeologically sensitive for ancient and/or historic period archaeological resources associated with these sites." The MHC requested that the BBC submit information about the project for concurrent review including the final project design selection, when available. As requested, this letter provides updated information about the selected project alternative and preliminary information about the project design.

The Trustees and BBC, through a public review process, have selected the Dam Removal (Spillway Removal), Alternative #5, as the preferred alternative for best restoring migratory fish runs and river ecological services (Refer to Princeton Hydro, 2016; and Attachment 1 to this letter). The goal is to begin the restoration project in 2017. The major components of the selected alternative

are to remove the existing concrete dam spillway and part of the width of a remnant stone legacy dam situated approximately 170 linear feet upstream of the concrete dam; repair the existing concrete bridge; install two canoe/kayak launches; and block, fill, and revegetate the defunct mill race that is a public safety hazard. Graphics in the attached materials depict the project location and plans illustrate the proposed project footprint, including all major components; and the current site conditions.

The Trustees appreciate MHC review and response to this consultation. Please do not hesitate to contact me, should MHC seek additional project information.

Sincerely,



James Turek
Restoration Ecologist
NOAA Restoration Center

cc: M. Sperduto – USFWS
K. Pelto, M. Garcia-Serrano – MADEP
S. Quintal - BBC

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Horseshoe Pond Dam – Weweantic River Restoration Project

Location / Address: Weweantic River near Weweantic Estuary: coordinates 41°45'49.39"N; 70°44'56.19"

City / Town: Wareham, MA

Project Proponent

Name: James Turek, NOAA, on behalf of the Bouchard Barge-120 NRDA Trustees; Buzzards Bay Coalition

Address: 28 Tarzwell Drive

City/Town/Zip/Telephone: Narragansett, RI, 02882; ph: 401-782-3338

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
MADEP	B-120 Buzzards Bay NRDA funds
MADEP	WQC, Chapter 91 license
Wareham Con Comm	Order of Conditions, WPA

Project Description (narrative):

This project will remove the existing, dilapidated Horseshoe Pond dDam structure, repair the bridge, remove the dam apron, install two canoe/kayak launches, stabilize downstream streambanks, and manage invasive species.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

Yes, the existing dam spillaway and part of the remnant, legacy dam will be demolished and removed.

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

No buildings currently exist at the project location. An existing footbridge will be repaired.

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

New construction will include building two canoe/kayak launches in the project area.

APPENDIX A (continued)

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

Yes, archaeologically senstitive resoruces are known to exist in undisturbed portions of the project area.

What is the total acreage of the project area?

Woodland	acres	Productive Resources:	
Wetland 40-91	acres	Agriculture 0	acres
Floodplain	acres	Forestry 0	acres
Open space	acres	Mining/Extraction 0	acres
Developed	acres	Total Project Acreage 40-91	acres

What is the acreage of the proposed new construction? <1 for boat launch acres

What is the present land use of the project area?

Present land use is undeveloped wetland, pond, stream, and estuarine habitat.
public open space lands for recreational uses

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

See attached documentation.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of Person submitting this form: James G. Turek Date: 12/21/16

Name: James Turek, NOAA Restoration Center

Address: 28 Tarzwell Drive

City/Town/Zip: Narragansett, RI 02882

Telephone: 401-782-3338

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

Figure 1: Location of the Horseshoe Pond Dam – Weweantic River Restoration Project

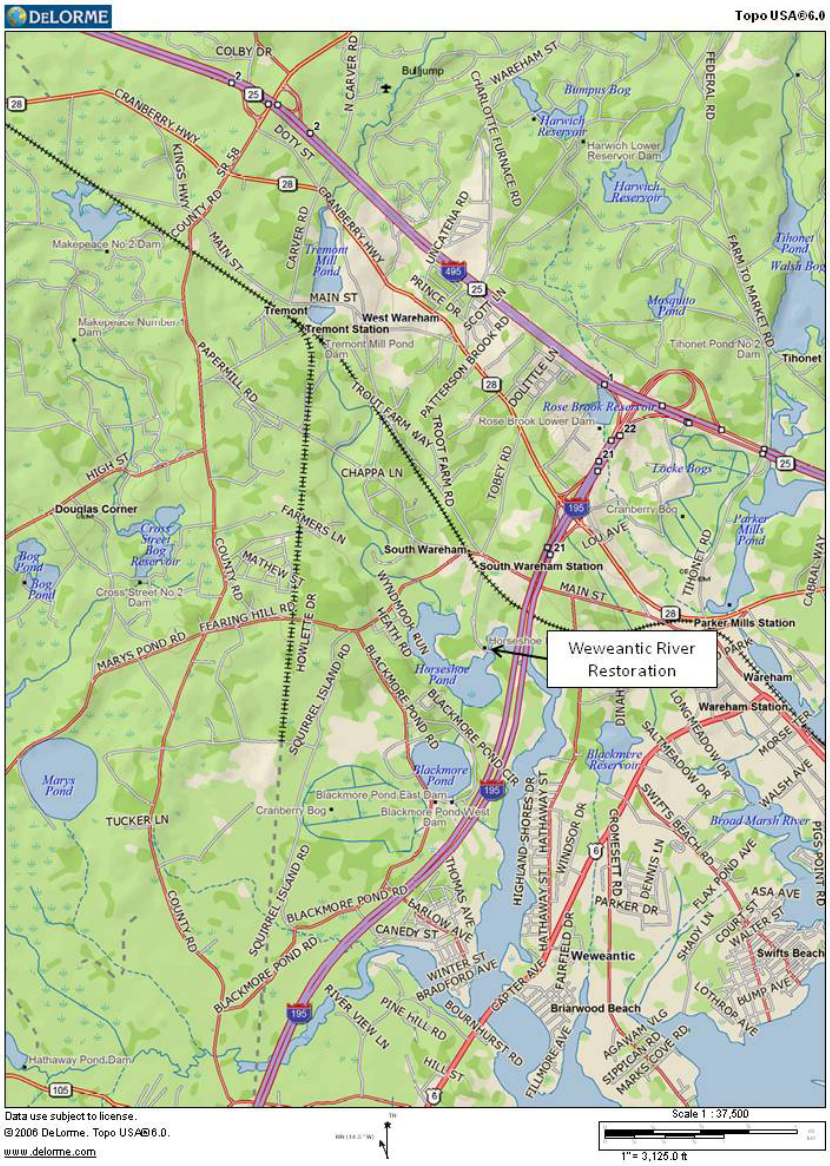
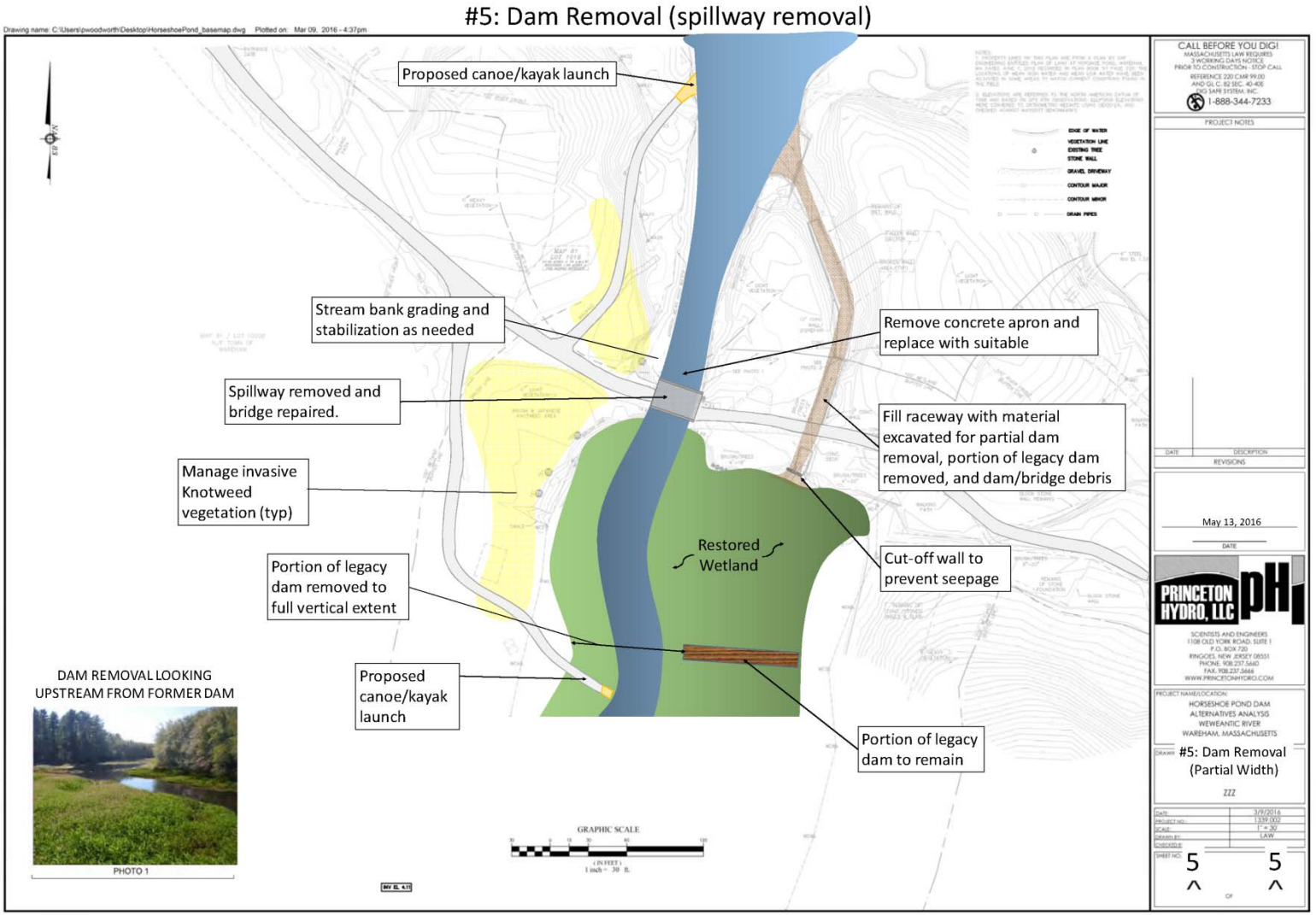


Figure 2: Horseshoe Pond dam spillway looking downriver at Weweantic River estuary

Figure 3: Horseshoe Mill Dam Spillway and Bridge from Downstream Side (left) and Former Mill Race (right)

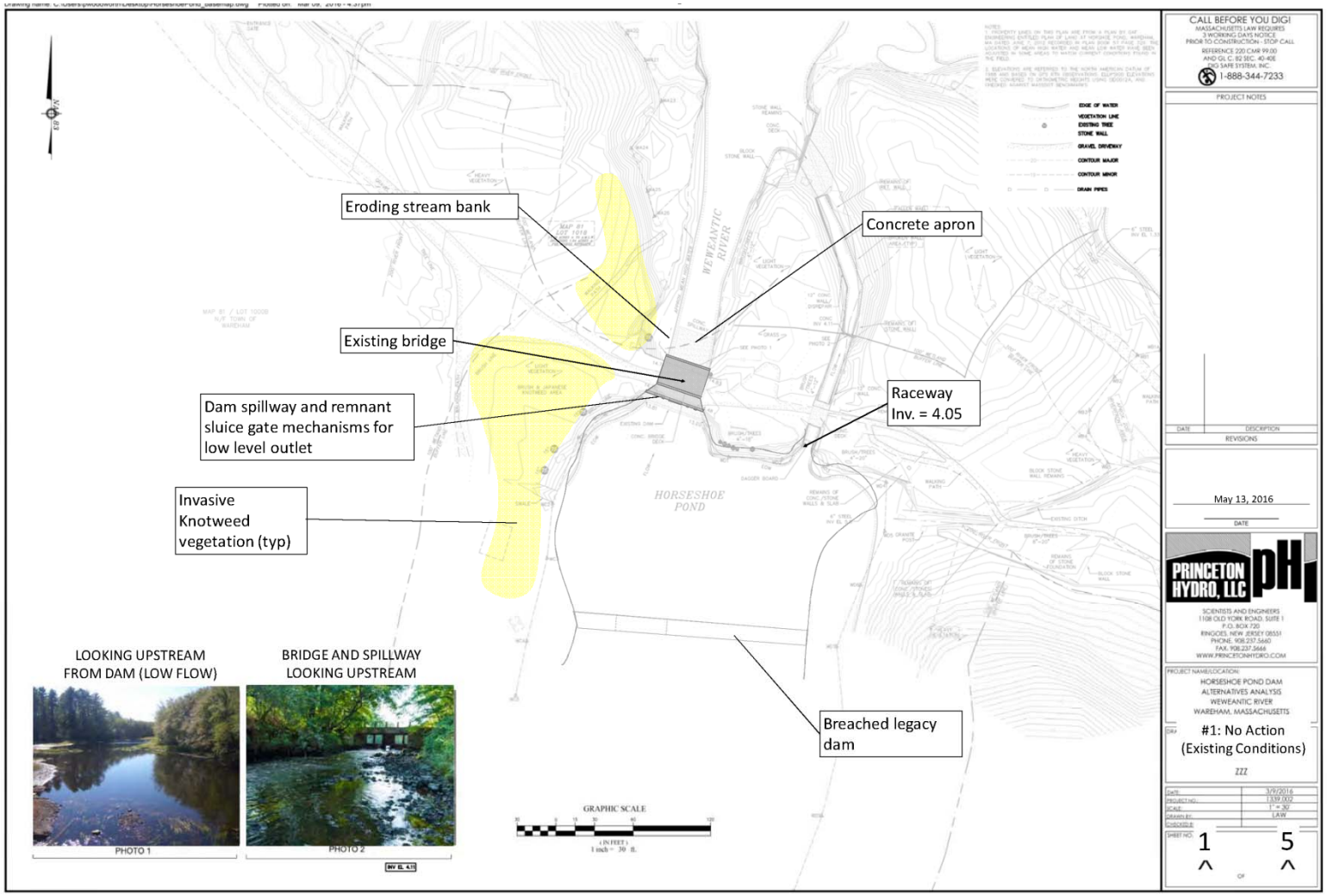
Source: Princeton Hydro (2016)

Figure 4: Horseshoe Pond Dam Removal and Weweantic River Restoration, Wareham, MA (SA-2) project



Source: Princeton Hydro, 2016, Appendix E

Figure 5: Horseshoe Pond Dam Site – Existing Conditions



Source: Princeton Hydro, 2016, Appendix E

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Project Description: This project would involve the removal of the existing Horseshoe Pond dam concrete spillway at the head of the Weweantic River estuary, and partial width removal of a remnant legacy dam situated ~170 linear feet upstream of the Horseshoe Pond dam (Figure 1). Site coordinates are: 41° 45' 46.52" 70° 44' 56.14". The project will also involve the repair of an existing bridge over the dam spillway (Figure 2), filling of a defunct mill raceway and converting the filled area to a vegetatively stabilized condition, and construction of two canoe and kayak launches with one located on the upriver side of the dam and one along the estuary. The purpose of this project is to restore connectivity of the Weweantic River and self-sustaining populations of diadromous fishes on the river. The project would also increase the coastal resiliency of the Weweantic River estuary and allow for unimpeded tidal marsh migration. The project proponent is the Buzzards Bay Coalition; the Buzzards Bay B-120 Trustee Council (BBTC including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), Commonwealth of Massachusetts, represented by the Massachusetts Department of Environmental Protection (MA DEP), and State of Rhode Island) is a project partnering entity. The BBTC proposes to fund the design and implementation of the dam removal for ecological restoration to address aquatic and shoreline resource injuries resulting from the 2003 Buzzards Bay oil spill (NOAA et al. 2014).

Construction activities would include:

- removing the concrete spillway (both vertical and horizontal extents);
- saw-cutting the dam and extended decking apart from remaining bridge, removing the structural component that extends from the bridge to the spillway;
- removing the remnant spillway sluice gate mechanisms;
- removing the concrete apron under the bridge, and with placement of suitable natural substrate in this reach;
- managing sediment, as needed;
- removing a portion of the upriver legacy dam (full vertical extent, partial horizontal extent);
- repairing and remodeling the bridge;
- installing two foot paths and two canoe and kayak launches;
- managing invasive plant species bordering the impoundment and in vicinity of the new boat launches;
- constructing a cut-off wall at the upstream end of the raceway to prevent seepage, filling the raceway, and covering and vegetatively stabilizing the defunct structure; and
- grading, capping, and stabilizing the left-side riverbank downstream of the bridge where erosion is on-going.

In addition, temporary construction access roads, soil erosion and sediment controls, site protection measures and water management practices will be installed, managed and maintained throughout the project construction period.

The removal of both the spillway and a significant portion of the upriver legacy stone dam would lower normal water surface elevations approximately 3.6 to 4.5 feet at the dam, restore free-flowing conditions to the impoundment, and restore full tidal fluctuation to the lower third

of the impoundment, some of which will remain as a broad pool. The project will restore full tidal exchange to the site: MHW (0.56 ft, NAVD88), the typical high tide measured at the site (approx. 2.5 ft, NAVD88), and the highest tide of the year (approx. 4 ft, NAVD88) would affect the lower portion of the impoundment with dam removal. Dam removal gives greater access to riffles outside of the tidally exchange area, and will be expected to be used by spawning river herring, rainbow smelt, and sea lamprey.

The natural sediment transport regime, which is both fluvially and tidally-influenced, would be fully restored. The upper portion of the impoundment is stabilized by vegetation and the low gradient longitudinal profile indicates minimal potential for channel incision (i.e., headcutting) in the upper impoundment. The lower impoundment would likely remain a depositional setting with tidal fluctuation and result in limited sediment mobilization. Based on preliminary discussions with MassDEP regarding sediment analytical results, this project would include active sediment management (e.g., stabilization in-place and/or excavation, relocation and stabilization) for a portion of the impounded sediment and adjacent soils immediately upstream of the dam between the spillway and legacy dam, where elevated contaminants were detected in previous sampling and analysis efforts. Some of this material will be excavated and placed preferentially in the former millrace, or as necessary, disposed of off-site. Adjacent soils, in the vicinity of the proposed canoe and kayak launch upstream of the dam, may need to be stabilized with stone or other to prevent sediment disturbances. The eroding left bank immediately downstream of the dam will need to be stabilized.

Bathymetric cross-sectional surveys and hydraulic modeling of this project indicate no substantial changes to upstream infrastructure including Fearing Hill Road Bridge. Public access to the impoundment would be enhanced with the repair of the remaining bridge spanning the spillway, creation of a trail canoe and kayak launch into the impoundment from the southwestern side of the dam, and creating a second trail canoe and kayak launch northwest of the dam to the downstream tidal area.

This alternative restores full fish passage to the site. This alternative avoids any changes or impacts to the existing smelt spawning riffle, but more importantly, does not constrain smelt spawning to the existing riffle that is exposed to tidal fluctuation and creates access to new potential spawning habitat beyond the tidal fluctuation. This project design also provides for coastal adaptation, of tidal habitat and the multi-species fishery at large, in response to regional effects of climate change such as sea-level rise and water temperature changes.

Pond habitat for warm water fishes in the former impoundment would be diminished; however, river habitat for resident and migratory fish would be substantially expanded with re-exposure of formerly inundated areas upstream, the return of free-flowing conditions, and extension of the natural channel. With the predicted reduction in normal water surface elevation, existing shallow open water (±5 ac) and floating vegetation (±17 ac) areas would be eliminated and convert to other wetland types, including a significant increase in forested wetland (±9 ac) and scrub wetland vegetation (±7 ac) (Princeton Hydro, 2016). There is potential for a secondary riffle to be exposed in the lowered impoundment upstream that may provide additional riffle habitat for rainbow smelt spawning that would not be affected by tidal

dewatering, and thereby minimize the likelihood of egg exposure and resulting mortality. Other riffles with potential spawning habitat are also located farther upstream.

Control of invasive non-native species will target identified stands of common reed (*Phragmites australis*) within the impoundment to prevent continued expansion. In addition, stands of Japanese knotweed (*Fallopia japonica*), an annual plant species in the vicinity of the proposed pond canoe and kayak launches, will be removed and managed. Wetland function related to water quality protection and enhancement would improve substantially: with less back-watering, shorter retention time, less direct insolation, and greater canopy cover adjacent to the channel, instream/estuary water temperatures would be more moderated and dissolved oxygen levels would increase through the former impoundment and into downstream reaches.

It is anticipated that this work will be conducted over a 2-3-month period. The work will be conducted during a period of low-river flow and it is anticipated that all in-channel work would proceed in the wet. If regulators require greater water control, the millrace would be used to temporarily divert the river flows around the project construction work area, by using an upstream coffer dam and perhaps piping extending from upstream of the legacy dam. Post-construction, the new channel invert extending from the former spillway through the lowered legacy dam breach, would serve as the surface water elevation control. A smaller reach of the upriver area would remain as a ponded condition, based on the bathymetric survey analysis and hydraulic modeling (Princeton Hydro 2016).

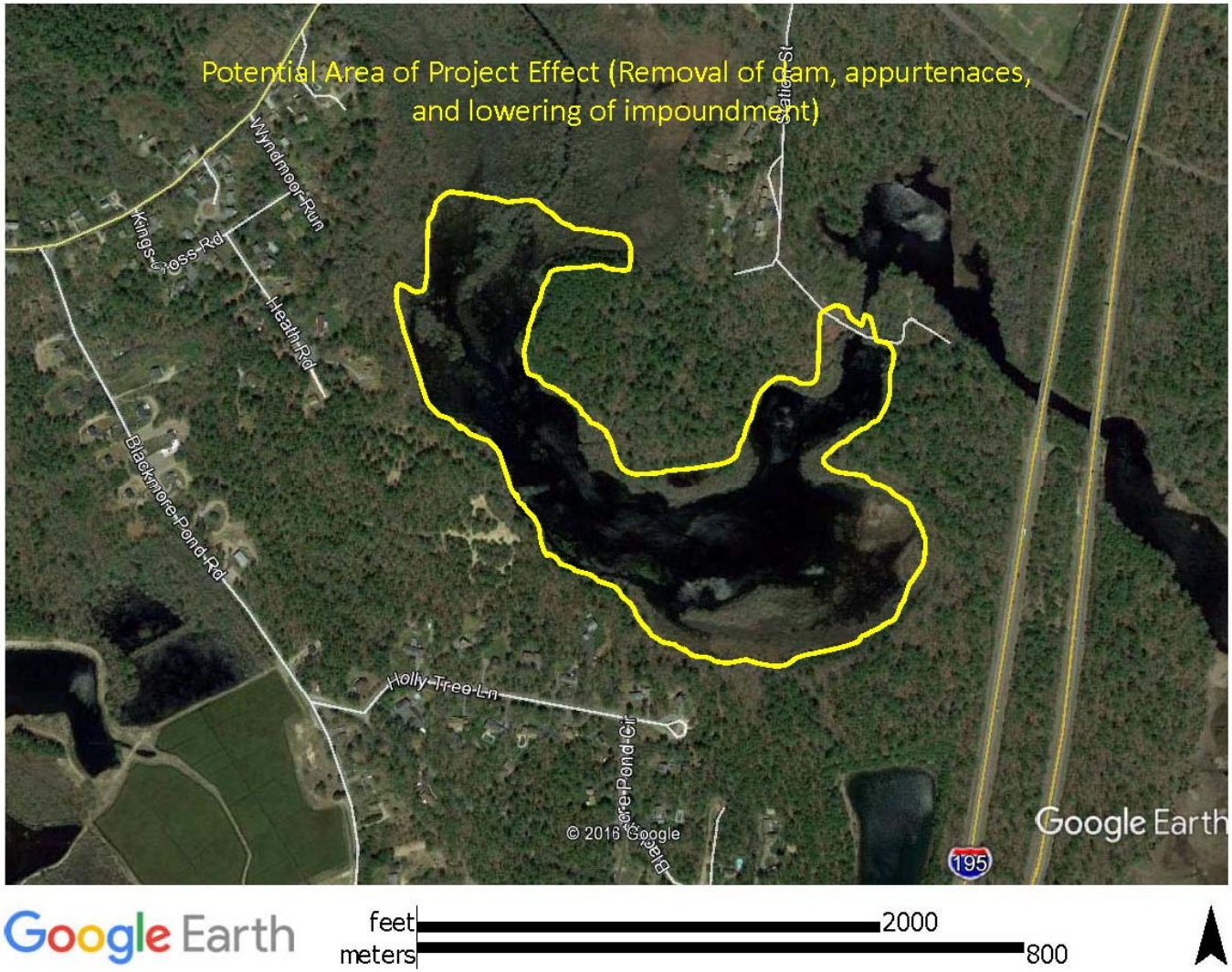
References

Princeton Hydro. 2016. Alternatives analysis for the Weweantic river restoration project Horseshoe mill dam fish passage feasibility study Wareham, Massachusetts. Prepared for: Sara H. Da Silva Quintal, Restoration Ecologist Buzzards Bay Coalition. Submitted By: Princeton Hydro, LLLC.

Buzzards Bay Coalition. December 14, 2012. Letter Re: Weweantic River Restoration Project at Horseshoe Pond, Wareham. Submitted to the Massachusetts Historical Commission. Submitted by Sara N. da Silva Quintal, Restoration Ecologist, Buzzards Bay Coalition.

The Commonwealth of Massachusetts. December 26, 2012. Letter RE: Weweantic River Restoration Project, Horseshoe Pond Dam, Station Street, Assessors Map 81, Parcel 1018, Wareham, MA. MHC #RC.53537. Submitted to Sara N. da Silva Quintal, Restoration Ecologist, Buzzards Bay Coalition. Submitted by Brona Simon, State Historic Preservation Officer, Executive Director, State Archaeologist, Massachusetts Historical Commission.

Potential Area of Project Effect



Google Earth

feet 2000

meters 800

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

January 11, 2017

James Turek
Restoration Ecologist
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Narragansett Laboratory
Restoration Center
28 Tarzwell Drive
Narragansett, RI 02882

RE: Weweantic River Restoration Project, Horseshoe Pond Dam, Station Street, Assessors Map 81, Parcel 1018, Wareham, MA. MHC # RC.53537.

Dear Mr. Turek:

Staff of the Massachusetts Historical Commission (MHC) have reviewed your letter and the revised Project Notification Form (PNF), received December 30, 2016, for the project referenced above. The project as currently proposed (alternative #5), includes removal of the existing concrete dam spillway and partial removal of a remnant stone legacy dam located upstream within the Horseshoe Pond impoundment. Repairs to the existing concrete bridge, install two canoe/kayak launches, streambank grading and stabilization, invasive vegetation management, and block, fill and revegetate the open mill raceway are also proposed.

The MHC notes that the National Oceanic and Atmospheric Administration (NOAA) is the federal agency responsible for the project (36 CFR 800.2). The MHC looks forward to NOAA's findings and determinations of eligibility and effect for the project.

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth for the currently proposed project indicates that the project area includes the Station Street Bridge over Horseshoe Pond (MHC # WRH.904) and Standard Horseshoe Manufacturing Company (MHC # WRH.HA.5) historic archaeological site. Multiple ancient Native American archaeological sites are also recorded in close proximity to the general project area, including the Conant's Hill Site (19-PL-189), listed in the National Register of Historic Places. Undisturbed portions of the project impact area are highly archaeologically sensitive for ancient and/or historic period archaeological resources associated with these sites.

The revised PNF includes insufficient information for the MHC to provide an opinion on the area of potential effect for the project. The "Potential Area of Project Effect" figure and Figure 4 (Princeton Hydro, 2016, Appendix E) included in your submittal are inconsistent in describing the project impact area. The MHC requires additional information.

Please submit scaled existing and proposed conditions project plans for the preferred project alternative, sized no larger than 11" by 17" format, to the MHC for review and comment. Project plans should show all proposed project access routes, vehicle and equipment storage, staging or laydown areas, plans and profiles for canoe/kayak launching areas, pathways and bank grading and stabilization areas. Current color photographs showing existing conditions within the proposed project impact area, including multiple views of the dams and raceways and all associated project impact areas keyed to the proposed conditions project plans should also be included in this submittal.

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The MHC requests that an intensive (locational) archaeological survey/site examination (950 CMR 70) and cultural resources survey be conducted for the project. The purpose of the archaeological survey is to locate, identify and evaluate any significant historical or archaeological resources that may be affected by the project. The cultural resources survey should produce an updated MHC Inventory form for the Station Street Bridge. The results of the surveys will provide information to assist in consultation to avoid, minimize or mitigate any adverse effects to significant historic and archaeological resources. A State Archaeologist's Permit application (950 CMR 70) should be submitted to the MHC by a professional archaeological consultant.

Updated project information should be submitted to the Wareham Historical Commission (WHC) for their review and comment. Copies of any written comments received from the WHC to NOAA should be provided to the MHC. The MHC is interested in the views and ideas of the historical commissions regarding mitigation measures for removal of the dam.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), and Massachusetts General Laws, Chapter 9, Section 26-27C (950 CMR 70-71). If you have questions, please contact Jonathan K. Patton at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Sara N. da Silva Quintal, Buzzards Bay Coalition
Victor Mastone, Massachusetts Board of Underwater Archaeological Resources
Wareham Conservation Commission
Wareham Historical Commission

Appendix D: Public Comments and Trustee Agency Responses

This appendix includes one letter and one verbal comment submitted during the 30-day public comment period. In addition to changes made in this Final SEA in response to the comments submitted, the following is a summary of the comments received and responses to these comments.

Comment 1: Relative to the Horseshoe Pond dam removal, one commenter recommended that for the preferred dam spillway removal Alternative A, the proposed active sediment should be reconsidered in relation to the latest sediment management guidance being developed jointly by the MA DER and MassDEP.

Response: The discussion of the preferred dam spillway removal Alternative A in Section 4.1.1 of the Final SEA has been revised to include this information. Once the project design phase commences, the Trustees will work collaboratively with the BBC, as managing lead for the project, and its design engineer to prepare and implement a design that fully considers both the quantity and quality of the impoundment sediments in selecting a management strategy that fully considers the state's sediment management guidance, and will be in compliance with state and federal regulations.

Comment 2: The commenter strongly supports Alternative A for the Round Hill Salt Marsh Restoration which focuses on a non-structural, planned management-based, tidal inlet approach for the project. The commenter does not believe that further consideration of project alternatives is necessary, and which may lead to additional costs, time delays and potential loss of project funds available for the project.

Response: The Trustees will work collaboratively with the project partners in designing, permitting and implementing the preferred alternative that will include management and maintenance of the tidal inlet channel, Ray Peck Drive culvert, potential invasive, non-native plant colonization and other project components. Through this alternative, the Trustees and project partners expect to secure federal, state, and local regulatory authorizations that include permit conditions identifying and requiring conformance with an Operations and Maintenance (O&M) Plan for the Meadow Shores-Round Hill Marsh Complex, including the aforementioned project components. The O&M Plan will provide clear guidance to the Town of Dartmouth in performing management activities to ensure important ecological services from the restoration are sustained and potential adverse impacts to beach, dune, and other coastal resources are minimized.

Comment 3: One commenter provided verbal comment recommending that the final design marsh surface and channel elevations for the Round Hill Salt Marsh Restoration take into account a predicted increase rates of sea-level rise to best address long-term sustainability of the marsh.

Response: The Trustees will work collaboratively with the project partners to fully consider the results of the hydrologic and hydraulic modeling completed by the project engineer for the preferred Alternative A in developing and implementing a design with final marsh surface grade elevations and tidal channel dimensions and elevations for long-term marsh sustainability. The Trustees and project partners further recognize that the porous, sand-dominated substrates to be graded will be beneficial to healthy marsh plant community development, health and growth of both the aboveground and belowground plant community, and important ecological services provided by the restored marsh for long-term functioning and sustainability, including documented and predicted rates of increasing sea-level rise.