Boston Coastal Storm Risk Management Study
Integrated Feasibility Report and Programmatic Environmental Assessment

Draft Appendix D

Natural Environment
Additional Information on Existing Conditions

July 2026

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1.0 Introduction

This appendix provides additional information on the existing natural environment and resources that may occur in the Boston Coastal Storm Risk Management (CSRM) Integrated Feasibility Report with Programmatic Environmental Assessment, Boston, Massachusetts.

2.0 Protected Species

2.1 Federally Listed Species

The U.S. Army Corps of Engineers (USACE) is mandated by Section 7 of the Endangered Species Act to consult with the Secretary of Commerce (NOAA Fisheries) and the Secretary of Interior (U.S. Fish and Wildlife Service [USFWS]) to determine if any Federally protected species may be affected by a project. There are 12 Federally listed threatened and endangered species that may occur within the Boston CSRM project area, including birds, fish, terrestrial and marine mammals, and marine reptiles (Table D2-1).

Table D2-1. List of federally threatened and endangered species possibly found within the study area. Information sourced from USFWS IPaC and NMFS Section 7 Mapper for the Greater Atlantic Region (NOAA-NMFS, 2026; USFWS, 2026). Presence is specific to the Gulf of Maine (GOM) region. Protection status listed is based on GOM Distinct Population Segments for marine species where noted with an asterisk, otherwise based on the entire species range. T=threatened; E=endangered; PT=proposed threatened; PE=proposed endangered.

Species	Status	Seasonal Presence	Characteristics
Bird			
Piping Plover *Charadrius melodus*	T	March – Sept	Nest on popular urban beaches; found in Dorchester
Roseate Tern *Sterna dougallii dougallii*	E	August	Found in all Boston neighborhoods
Insect			
Monarch Butterfly *Danaus plexippus*	PT	May-Sept	Long distance migration to/from overwintering sites; rely on milkweed
Terrestrial Mammal			
Tricolored Bat *Perimyotis subflavus*	PE	Year Round	Hibernating in caves in winter; roosting/foraging in spring – fall
Fish			
Atlantic Sturgeon* *Acipenser oxyrinchus oxyrinchus*	T	Year Round	Adult/subadults forage and migrate along the coast to/from their natal rivers
Shortnose Sturgeon* *Acipencer brevirostrum*	E	April-November	Adults forage and may migrate in ocean north of Merrimack River, MA

Marine Mammal			
Fin Whale *Balaenoptera physalus*	E	Year Round	Forage all year in MA Bay; overwinter on Stellwagen Bank Nov-March
North Atlantic Right Whale *Eubalaena glacialis*	E	Year Round	Forage Jan- April in MA Bay; Nov-Jan overwinter on Stellwagen Bank
Reptile			
Green Turtle *Chelonia mydas*	T	June-November	Feed/migrate north of Cape Cod in June; return south when waters cool
Kemp's Ridley Turtle *Lepidochelys kempii*	E	June-November	Feed/migrate north of Cape Cod in June; return south when waters cool
Leatherback Turtle *Dermochelys coriacea*	E	June-November	Feed/migrate north of Cape Cod in June; return south when waters cool
Loggerhead Turtle *Caretta caretta*	T	June-November	Feed/migrate north of Cape Cod in June; return south when waters cool

Of the protected fish species, the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipencer brevirostrum*) have populations that span the north Atlantic coast and Gulf of Maine. Though both are anadromous, the shortnose sturgeon spends most of its life in upstream rivers with little time in saltwater along the coast. This species is known to occur in the Connecticut and Merrimack Rivers with extremely rare historic appearances in tributaries of Boston Harbor. Migration of shortnose sturgeon in the Connecticut River is restricted by hydroelectric dams resulting in one of the few populations to live exclusively in freshwater (NMFS, 2023). Only one river in Massachusetts, the Merrimack, is known to support Atlantic sturgeon. Boston Harbor and its main tributaries, the Charles, Mystic, and Neponset Rivers, are not known to be current or historical diadromous fish passage for these species (MassGIS, 2023). As such, while juvenile and adult Atlantic sturgeon may be found in the harbor, no spawning adults, eggs, or larvae are expected to be present within the study area.

There are multiple whale species with critical habitat spanning the northeast Atlantic, but outside the study area. Of note is the North Atlantic Right Whale (*Eubalaena glacialis)* – a highly migratory, critically endangered species that is largely at risk from fishing gear entanglements and boat strikes. Although the project area exists within this listed species' ranges, whales rarely venture far into Boston Harbor where project work will be done. Fin whales (*Balaenoptera physalus*) are similarly listed within the study area but are unlikely to be affected by the project. Adults and juveniles of all listed sea turtle species may occur in the Gulf of Maine region in summer and early fall for foraging and migration (NOAA-NMFS, 2022a). However, they are unlikely to be present in the study

area, which is exclusively in the inner harbor and tributaries where they are considered rare.

The tricolored bat (*Perimyotis subflavus*) has been listed as proposed endangered. One of the smallest species of bats native to North America, it has an expansive range from the central U.S. to the eastern seaboard, spanning into parts of Canada and as far south as central America (USFWS, 2024). Tricolored bats can be found hibernating in caves and mines in the winter and roosting in forested habitats in the spring, summer, and fall. These bats prefer to roost in live or dead deciduous hardwood trees, primarily in leaf clusters. They are also being significantly impacted by white-nose syndrome, with areas affected by the disease showing 90-100% declines in winter colony abundance. Although tricolored bats may transit through the project areas, the immediate habitat does not support persistent bat presence.

The piping plover (*Charadrius melodus*), Federally listed as threatened, has been identified by IPaC as potentially present in South Boston and Dorchester neighborhoods of the study area. The Atlantic coast population of piping plover breeds and nests on sandy beaches from Newfoundland to northern South Carolina. Massachusetts currently has the largest population with nearly 700 breeding pairs (MA NHESP, 2015a). Piping plovers return to breeding sites in Massachusetts around late March and April. After laying eggs, plover parents take turns incubating the eggs for 26-28 days when they hatch. Chicks can feed themselves almost immediately, but it can take four to five weeks before they fledge. In late July to early September, piping plovers begin their southward migration to wintering grounds along the Atlantic and Gulf Coast from North Carolina to Mexico and into the Caribbean. Piping plovers forage invertebrates from substrate by gleaning or running and pecking in areas such as beaches, intertidal areas, lagoons, salt marshes, and other similar coastal habitats that are found on the Atlantic Coast. Piping plovers have been found to nest along beaches in South Boston and Dorchester.

The northeastern population of the roseate tern (*Sterna dougallii dougallii*) was designated as Federally endangered on 2 November 1987. Roseate terns were once abundant, but a variety of threats have resulted in reduced populations. According to the 1998 U.S. Fish and Wildlife Service (USFWS) Roseate Tern Recovery Plan – Northeastern Population, the numbers of roseate terns were severely reduced in the 1870's and 1880's by commercial hunting for the millinery trade. The total number of roseate terns was estimated to be roughly 2,000 pairs at the lowest point in about 1890, but by 1930 the population had grown to roughly 8,500 pairs with the majority based in Massachusetts (USFWS, 1998). Roseate tern populations increased following protection efforts but declined again to a low of 2,500 pairs in 1977 due to habitat loss and gull encroachment.

Roseate terns generally nest on sandy, gravelly, or rocky islands. Per the U.S. Fish and Wildlife Service Caribbean Roseate Tern and North Atlantic Roseate Tern (*Sterna*

dougallii dougallii) 5-Year Review: Summary and Evaluation, in 2009, approximately 94% of the population of roseate tern pairs were concentrated at just 3 colonies: Great Gull Island, NY; Bird Island, Marion, MA; and Ram Island, Mattapoisett, MA (USFWS, 2020). Roseate terns feed almost exclusively on small and/or juvenile fish, occasionally including crustaceans and insects in its diet. Its feeding habits are specialized, consuming primarily sand lance. Roseate terns capture food mainly by plunge-diving (diving from heights of 1-12 m and often submerging to ≥ 50 cm), but also by surface-dipping and contact-dipping (MA NHESP, 2015b). Roseate terns are unlikely to occur in the study area. Although there have been a few recent sightings in nearby Quincy, the last reported sighting within the study area occurred in South Boston over a century ago (Cornell Lab of Ornithology, n.d.).

The monarch butterfly (*Danaus plexippus*) was listed as proposed threatened in December 2024. Monarch butterfly populations found in the northeastern U.S. breed and lay eggs in their overwintering sites along the southern U.S. and northern Mexico (MA Audubon, n.d.). After breeding, they embark on a northward migration arriving in Massachusetts around May. Many of the local spring/summertime populations only live for two to five weeks while their overwintering counterparts can survive for six to nine months (MA Audubon, n.d.). The overwintering generation initiates a southward migration from Massachusetts around September. Monarch caterpillars have a highly specialized diet that only includes species of milkweed (*Asclepias* spp.). Of the *Asclepias* spp. within the study area that monarch caterpillars may rely on, whorled milkweed (*Asclepias verticillata*) is listed as threatened under the Massachusetts endangered species act (MA NHESP, 2019b).

2.2 American Bald and Golden Eagle Act of 1972

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer federally listed it is protected under the American Bald and Golden Eagle Act of 1972. The USFWS National Bald Eagle Management Guidelines (2007) provide general recommendations for land management practices that will benefit bald eagles, describe the potential for various human activities that disturb bald eagles, and encourage land management practices that benefit bald eagles. Over the past decade, there have been only sporadic sightings of bald eagles in most of Boston, with exception to the Neponset River Estuary and Belle Isle Marsh Areas of Critical Environmental Concern within the study area where sightings have been more common (Cornell Lab of Ornithology, n.d.).

To avoid disturbing bald eagles, a nest buffer is recommended between the human activity and the nest where applicable. Human impacts are considered detrimental to nesting success within the primary buffer (330 feet from nest) and within the secondary buffer (660 feet from nest) human impacts are thought to impact the quality of the primary buffer. Human activities that are considered detrimental to breeding activities (e.g. development, logging, use of toxic chemicals, etc.) are to be limited within the primary buffer and those that could impact the integrity of the primary buffer are restricted within a secondary buffer (e.g. developments, roadways, etc.). Per the

Management Guidelines, a nest buffer of 2,640 feet is recommended from the nest for loud, disturbing noises such as those caused by blasting and other loud, intermittent noises.

Bald eagles typically breed and winter in forested areas adjacent to large bodies of water. However, such areas must have an adequate food base, perching areas, and nesting sites. Throughout its range, it selects large, super-canopy roost trees that are open and accessible. Nests are constructed from an array of sticks placed in an interwoven pattern. Other materials added as fillers may include grasses, mosses, even corn stalks.

2.3 Marine Mammals

The harbor seal (*Phoca vitulina concolor*), also known as the common seal, is found throughout coastal waters of the Atlantic Ocean from Canada to southern New England, New York, and adjoining seas (Waring *et al*., 2004) above 30° N latitude. Harbor seals spend the late spring, summer, and early fall between New Hampshire and the Arctic, where they breed and care for newly born pups. A general southward movement from the Bay of Fundy to southern New England waters occurs in fall and early winter, mostly consisting of juveniles and subadults. Whitman and Payne (1990) have suggested that this age-related dispersal may reflect the higher energy requirements of younger individuals. After overwintering in southern New England and New York coastal waters, the vast majority of the population migrates to the northern waters of New Hampshire, Maine, and Canada in the spring for the pupping season (mid-May through June). No pupping areas have been identified in the project areas. The harbor seal is not listed as threatened or endangered under the Endangered Species Act (ESA), and it is not considered a strategic stock (i.e., a stock whose mortality is at a level that will destroy the population) by NMFS.

The white-sided dolphin (*Lagenorhynchus acutus*) occurs in temperate and polar waters in the North Atlantic Ocean, typically over the continental shelf to the 330-foot depth contour. White-sided dolphins are potential, but rare visitors to the outer project areas in Massachusetts Bay. The white-sided dolphin is not listed as threatened or endangered under the ESA and is not considered a strategic stock by NMFS. The habitat range of the white-sided dolphin is generally in deeper waters of the continental shelf and therefore would rarely be found in the inner Boston Harbor but have been sighted around the Boston Harbor Islands.

The harbor porpoise (*Phocoena phocoena*) is primarily an inshore species. During the summer, harbor porpoises are concentrated in the northern Gulf of Maine and the southern Bay of Fundy region, generally in waters less than 490 feet deep. This stock of harbor porpoises migrates south into the mid-Atlantic region during the fall and spring months; they are widely distributed from New Jersey to Maine. Low densities of harbor porpoises are found in waters off New York and north to Canada in the winter. No specific migratory routes to the Gulf of Maine/Bay of Fundy region have been identified. The best estimate for the abundance of the Gulf of Maine/Bay of Fundy population is 89,700 animals, with a minimum population estimate of 74,695 (Waring *et al*., 2004).

During the period of 1994 to 2001, 831 harbor porpoise strandings were reported from Maine to North Carolina, with only 27 strandings in 2000. Massachusetts alone had 219 strandings during this period. No specific information on locations in Massachusetts was available. NMFS considers the Gulf of Maine/Bay of Fundy harbor porpoise stock as a strategic stock, though the stock has preliminarily been removed from the ESA candidate species list by the NMFS (Waring *et al*., 2004). The preferred nearshore habitat of the harbor porpoise makes it a potential species to be found in the Boston Harbor area.

The gray seal (*Halichoerus grypus*) is found on both sides of the North Atlantic. The western North Atlantic population occurs from New England to Labrador (Waring *et al*., 2004). Gray seals inhabit temperate and sub-arctic waters and are found from Maine to Long Island Sound in the United States. There are two breeding concentrations in eastern Canada, one at Sable Island and a second that breeds on the pack ice in the Gulf of St. Lawrence. A small number of animals and pupping have been observed on several isolated islands along the Maine coast and in Nantucket-Vineyard Sound, Massachusetts. Gray seals are the second most common pinniped along the Atlantic coast of the US, living on remote, exposed islands, shoals, and unstable sandbars. Pupping occurs from late December through mid-February. There are no regular seasonal migrations, but young individuals wander extensively during their first two years of life. Gray seals feed on a wide variety of fish (Lesage and Hammil, 2001) as well as squid, octopus, crustaceans and even a seabird or two. The majority of dives are to depths of 230 to 328 feet, but gray seals can dive to depths greater than 1,312 feet.

Minke whales (*Balaenoptera acutorostrata*) occur throughout polar, temperate, and tropical waters. The minke whale is the third most abundant great whale in the Atlantic Ocean within 200 nmi of the U.S. coastline (Winn, 1982). Minke whales off the east coast of the United States are part of the Canadian east coast population, one of four minke populations recognized in the North Atlantic. The range of this population extends south from Canada to the Gulf of Mexico, but distribution is primarily concentrated in New England waters, with most sightings occurring in the spring and summer months. Based on surveys conducted in 1995 and 1999, the best available current abundance estimate for minke whales in the western North Atlantic is 4,018 animals, with a minimum estimate of 3,515 animals (Waring *et al*., 2004). This species is found in open seas primarily over continental shelf waters, but it occasionally enters bays, inlets, and estuaries. Minke whales may occasionally visit Boston Harbor and Massachusetts Bay, as is made evident by a recent minke whale mortality report. In 2001, a minke whale was found dead in Massachusetts Bay (42º 21'N 70º 43'W) with fairly fresh entanglement marks on the tail stock and across the tail flukes (Waring *et al*., 2004). The minke whale is not listed as threatened or endangered under the ESA, as depleted under the MMPA, or as a strategic stock by NMFS.

2.4 State Listed Species

The following table provides the Massachusetts state-listed protected species counts by taxonomic group (MA NHESP, 2020b). These counts include all state listed species that may occur in all neighborhoods of Boston (Tables D2-2, D2-3).

Table D2-2. Taxonomic breakdown of state listed species that may occur throughout the City of Boston, including in neighborhoods that are not part of this study.

	Amphibian	Insect	Bird	Fish	Mussel	Reptile	Vascular Plant	Total
Endangered		2	4				6	12
Threatened	1	2	5	1			14	23
Special Concern	1	5	7		1	1	3	18
Total	2	9	16	1	1	1	23	53

Table D2-3. Full species list of state listed species that may occur throughout the City of Boston, including in neighborhoods that are not part of this study.

TAXONOMIC GROUP	COMMON NAME	SCIENTIFIC NAME	STATUS	LAST OBSV
Amphibian	Blue-spotted Salamander (complex)	*Ambystoma laterale pop. 1*	Special Concern	2015
Amphibian	Eastern Spadefoot	*Scaphiopus holbrookii*	Threatened	1932
Beetle	Hentz's Red-bellied Tiger Beetle	*Cicindela rufiventris hentzii*	Threatened	1927
Beetle	Purple Tiger Beetle	*Cicindela purpurea*	Special Concern	1928
Beetle	Twelve-spotted Tiger Beetle	*Cicindela duodecimguttata*	Special Concern	1910
Bird	Barn Owl	*Tyto alba*	Special Concern	1989
Bird	Common Loon	*Gavia immer*	Special Concern	1824
Bird	Common Tern	*Sterna hirundo*	Special Concern	2017
Bird	Eastern Meadowlark	*Sturnella magna*	Special Concern	2015
Bird	Golden-winged Warbler	*Vermivora chrysoptera*	Endangered	Historic
Bird	Grasshopper Sparrow	*Ammodramus savannarum*	Threatened	1993
Bird	King Rail	*Rallus elegans*	Threatened	2019
Bird	Least Bittern	*Ixobrychus exilis*	Endangered	2019
Bird	Least Tern	*Sternula antillarum*	Special Concern	2017
Bird	Long-eared Owl	*Asio otus*	Special Concern	2018
Bird	Peregrine Falcon	*Falco peregrinus*	Threatened	2019
Bird	Piping Plover	*Charadrius melodus*	Threatened	2019
Bird	Saltmarsh Sparrow	*Ammospiza caudacuta*	Special Concern	2019

Bird	Short-eared Owl	*Asio flammeus*	Endangered	2019
Bird	Upland Sandpiper	*Bartramia longicauda*	Endangered	2015
Bird	Vesper Sparrow	*Pooecetes gramineus*	Threatened	1985
Butterfly/Moth	Barrens Metarranthis	*Metarranthis apiciaria*	Endangered	1934
Butterfly/Moth	Coastal Heathland Cutworm	*Abagrotis benjamini*	Special Concern	2001
Butterfly/Moth	New Jersey Tea Inchworm	*Apodrepanulatrix liberaria*	Endangered	Historic
Butterfly/Moth	Orange Sallow Moth	*Pyrrhia aurantiago*	Special Concern	1988
Dragonfly/Damselfly	Mocha Emerald	*Somatochlora linearis*	Special Concern	2009
Dragonfly/Damselfly	Ringed Boghaunter	*Williamsonia lintneri*	Threatened	1994
Fish	Threespine Stickleback	*Gasterosteus aculeatus*	Threatened	2019
Mussel	Eastern Pondmussel	*Ligumia nasuta*	Special Concern	1841
Reptile	Eastern Box Turtle	*Terrapene carolina*	Special Concern	1939
Vascular Plant	Adder's Tongue Fern	*Ophioglossum pusillum*	Threatened	1884
Vascular Plant	American Sea-blite	*Suaeda calceoliformis*	Special Concern	1909
Vascular Plant	Bristly Foxtail	*Setaria parviflora*	Special Concern	2001
Vascular Plant	Britton's Violet	*Viola brittoniana*	Threatened	1909
Vascular Plant	Clustered Sanicle	*Sanicula odorata*	Threatened	Historic
Vascular Plant	Green Adder’s-mouth	*Malaxis unifolia*	Threatened	1883
Vascular Plant	Green Rock-cress	*Boechera missouriensis*	Threatened	1930
Vascular Plant	Large-bracted Tick-trefoil	*Desmodium cuspidatum*	Threatened	1896
Vascular Plant	Lesser Snakeroot	*Ageratina aromatica*	Endangered	1896
Vascular Plant	Long's Bulrush	*Scirpus longii*	Threatened	1907
Vascular Plant	Long-leaved Bluet	*Houstonia longifolia*	Endangered	1918
Vascular Plant	New England Blazing Star	*Liatris novae-angliae*	Special Concern	1933
Vascular Plant	Pale Green Orchid	*Platanthera flava var. herbiola*	Threatened	1908
Vascular Plant	Purple Needlegrass	*Aristida purpurascens*	Threatened	1800s
Vascular Plant	Seabeach Dock	*Rumex pallidus*	Threatened	1984
Vascular Plant	Seabeach Needlegrass	*Aristida tuberculosa*	Threatened	1877
Vascular Plant	Slender Cottongrass	*Eriophorum gracile*	Threatened	1885
Vascular Plant	Slender Water-milfoil	*Myriophyllum alterniflorum*	Endangered	Historic
Vascular Plant	Small-flowered Buttercup	*Ranunculus micranthus*	Endangered	1891
Vascular Plant	Stiff Yellow Flax	*Linum medium var. texanum*	Threatened	1909
Vascular Plant	Taperleaf Water-horehound	*Lycopus rubellus*	Endangered	1896
Vascular Plant	Walter's Sedge	*Carex striata*	Endangered	Historic
Vascular Plant	Whorled Milkweed	*Asclepias verticillata*	Threatened	1878

2.5 Migratory Birds

Table D2-4 provides a comprehensive list of migratory birds that may be found in the study area. Not Applicable (N/A) indicates that species does not breed in the study area. Birds of conservation concern are identified (denoted with an asterisk) pursuant to the 1988 amendment to the Fish and Wildlife Conservation Act. Multiple species (n=26) are designated Birds of Conservation Concern (BCC), which describes all nongame birds that are in danger of becoming candidates for listing under the endangered species act if additional conservation measures are not taken. C=Charlestown; D=Dorchester; DT=Downtown and North end; EB=East Boston; SB=South Boston

Table D2-4. Full list of migratory bird species that may occur in the study area. The breeding seasons is provided for each species and which study neighborhoods the species may occur in.

Common Name	Scientific Name	Breeding Season	Study Areas
American Oyster Catcher*	*Haematopus palliatus*	Apr 15 - Aug 31	ALL
Bald Eagle	*Haliaeetus leucocephalus*	Oct 15 - Aug 31	ALL
Black Guillemot	*Cepphus grylle*	May 15 - Sep 10	D, EB
Black Scoter	*Melanitta nigra*	N/A	D, EB, SB
Black Skimmer*	*Rynchops niger*	May 20 - Sep 15	ALL
Black-billed Cuckoo*	*Coccyzus erythropthalmus*	May 15 - Oct 10	ALL
Black-legged Kittiwake	*Rissa tridactyla*	N/A	D, EB, SB
Blue-winged Warbler*	*Vermivora pinus*	May 1 - Jun 30	ALL
Bobolink*	*Dolichonyx oryzivorus*	May 20 - Jul 31	ALL
Brown Pelican	*Pelecanus occidentalis*	Jan 15 - Sep 30	D, EB, SB
Canada Warbler*	*Cardellina canadensis*	May 20 - Aug 10	ALL
Cerulean Warbler*	*Dendroica cerulea*	Apr 29 - Jul 20	ALL
Chimney Swift*	*Chaetura pelagica*	Mar 15 - Aug 25	ALL
Common Eider	*Somateria mollissima*	Jun 1 - Sep 30	D, EB, SB
Common Loon	*Gavia immer*	Apr 15 - Oct 31	D, EB, SB
Cory's Shearwater*	*Calonectris diomedea*	N/A	EB, SB
Dovekie	*Alle alle*	N/A	EB, SB
Eastern Whip-poor-will*	*Astrostomus vociferus*	May 1 - Aug 20	C, DT, EB, SB
Great Shearwater	*Puffinus gravis*	N/A	D, EB, SB
Hudsonian Godwit*	*Limosa haemastica*	N/A	ALL
Kentucky Warbler*	*Oporornis formosus*	Apr 20 - Aug 20	C, D, DT, SB
King Rail*	*Rallus elegans*	May 1 - Sep 5	C, DT, EB, SB
Lesser Yellowlegs*	*Tringa flavipes*	N/A	ALL
Long-eared Owl*	*Asio otus*	Mar 1 - Jul 15	C, D, DT, SB
Long-tailed Duck	*Clangula hyemalis*	N/A	EB, SB
Magnificent Frigatebird*	*Fregata magnificens*	N/A	D, SB
Manx Shearwater*	*Puffinus puffinus*	Apr 15 - Oct 31	D, EB, SB
Prairie Warbler*	*Dendroica discolor*	May 1 - Jul 31	ALL

Common Name	Scientific Name	Breeding Season	Study Areas
Prothonotary Warbler*	*Protonotaria citrea*	Apr 1 - Jul 31	C, D, DT, SB
Purple Sandpiper*	*Calidris maritima*	N/A	ALL
Razorbill	*Alca torda*	Jun 15 - Sep 10	D, EB, SB
Red-breasted Merganser	*Mergus serrator*	N/A	D, EB, SB
Red-headed Woodpecker*	*Melanerpes erythrocephalus*	May 10 - Sep 10	C, D, DT, SB
Red-necked Phalarope	*Phalaropus lobatus*	N/A	D, EB, SB
Red-throated Loon	*Gavia stellata*	N/A	D, EB, SB
Ring-billed Gull	*Larus delawarensis*	N/A	D, EB, SB
Roseate Tern	*Sterna dougallii*	May 10 - Aug 31	D, SB
Royal Tern	*Thalasseus maximus*	Apr 15 - Aug 31	D, EB, SB
Ruddy Turnstone*	*Arenaria interpres morinella*	N/A	ALL
Rusty Blackbird*	*Euphagus carolinus*	N/A	ALL
Short-billed Dowitcher*	*Limnodromus griseus*	N/A	ALL
Surf Scoter	*Melanitta perspicillata*	N/A	D, EB, SB
Thick-billed Murre	*Uria lomvia*	Apr 15 - Aug 15	D, EB, SB
White-winged Scoter	*Melanitta fusca*	N/A	D, EB, SB
Willet*	*Tringa semipalmata*	Apr 20 - Aug 5	ALL
Wilson's Storm-petrel	*Oceanites oceanicus*	N/A	D, EB, SB
Wood Thrush*	*Hylocichla mustelina*	May 10 - Aug 31	ALL

Information sourced from the USFWS Information for Planning and Consultation (IPaC) tool in conjunction with ebird.org.

3.0 Shellfish

Benthic sampling was conducted within the harbor for the Boston Harbor Deep Draft Project (Massport, 2003). Although designed to collect benthic infaunal community data, the sampling effort also generated data pertaining to shellfish presence in the area. Absence of a species from samples collected does not necessarily mean that the species does not occur in the project area.

Mystic River - Habitat for softshell clams has been identified by the Massachusetts Division of Marine Fisheries (MA DMF) along the northern bank of the Mystic River. The bottom type within these areas is mostly mud, which is consistent with the preferred substrate of softshell clams (fine sediments). Grab samples collected within the deepening area did not contain harvestable shellfish species (Pellegrino, 2003).

Chelsea River - The bottom type within the Chelsea River is a heterogeneous mix of gravel and sand, with areas of finer sediments (silt, mud, clay). Softshell clam habitat is present along the banks of the Chelsea River, with smaller areas of razor clam and blue mussel habitat in the upper reaches of the river. The presence of softshell clam was

confirmed by one grab sample collected in the general area of this identified habitat (Massport, 2003).

Inner Harbor – This area is defined as water from the confluence of the Mystic and Chelsea Rivers to tip of Governor's and Castle Islands. Mud and clay are the predominant sediment types within the Inner Harbor. No suitable shellfish habitat is identified by MA DMF within the Inner Harbor with exception to a small patch of softshell clam habitat within the inlet between Jeffries Point and Logan Airport in East Boston's. Blue mussel and Jonah crab were present in grab samples collected at North Jetty, just to the north of the Reserved Channel, in an area of mud and sand (Massport, 2003). Blue mussels were also present in samples from Conley Terminal within the Reserved Channel. Environmental Protection Agency (EPA) staff have previously noted European oysters (*Ostrea edulis)* along the East Boston shoreline.

Lower Harbor – This area is defined as waters extending from the outer edge of the inner harbor to the tip of Deer Island, bounded on the southern edge by Long and Spectacle Islands. Suitable habitat for several shellfish species is present along the coastline of the Lower Harbor. Softshell clam habitat exists along almost the entire coastline of the harbor north of the channel and along the coastline and shores of the islands (*i.e.*, Long Island, Spectacle Island, Thompson Island) to the south of the channel. This habitat is interspersed with large areas of blue mussel habitat and smaller, localized razor clam habitat. Blue mussel habitat is also located just outside the Presidents Roads Anchorage and Channel at the tip of Deer Island. These habitats coincide with areas of mixed coarse and fine-grained sediment or rock. Rock crabs were present in the grab samples collected within the Presidents Roads Anchorage and Main Ship Channel (Pellegrino, 2003). EPA staff have also previously noted European oysters along the Winthrop shoreline.

Recent data describing the distribution of shellfish in Boston Harbor are very limited. Potential habitat for several commercially and recreationally important species of shellfish (softshell clam, blue mussels, razor clams, and sea scallops) occurs along the banks of the Chelsea and Mystic Rivers and along the coastlines of the Lower and Harbor (Pellegrino, 2003; Massport, 2003). Of these species, softshell clam is the most common commercially harvested shellfish within Massachusetts and Boston Harbor. Most of the productive softshell clam beds are closed for harvesting, except for conditionally restricted areas near Logan Airport in North Boston Harbor and areas near the Neponset River and Dorchester Bay.

Dorchester Bay – This area includes waters south of the Inner Harbor that are adjacent to the study area, bounded by South Boston and Dorchester in the west and Quincy and Thompson Island to the east. This area was not included in the sampling effort done for the Boston Harbor Deep Draft Navigation project. However, MA DMF shellfish suitability maps indicate the shorelines of South Boston from Castle Island south along

Dorchester into the Neponset River estuary are nearly entirely lined with a mixture of softshell clam and blue mussel habitat.

4.0 Lobsters

Published scientific literature and results from larger scale lobster studies conducted by the MA DMF may be used to predict the distribution of lobster and their various life stages within the project area based on the substrate present. In general, lobster habitats are highly variable, dependent on life stage and time of year (Cooper and Uzmann, 1980). Inshore habitats used by populations of early benthic phase (EBP) juveniles, adolescents, and adults include mud, cobble, bedrock, peat reefs, eelgrass beds, sand, and for smaller individuals, the intertidal zone (Thomas, 1968; Cobb, 1971; Able *et al.*, 1988; Wahle and Steneck, 1991; Lawton and Robichaud, 1992; Cowan *et al*., 2002). Young-of-the-year (YOY), which have a carapace length (CL) <15 mm, are typically restricted to shelter-providing habitats that protect them from predators (Lavalli and Barshaw, 1986; Barshaw and Lavalli, 1988; Able *et al*., 1988; Wahle and Steneck, 1991; Wahle and Steneck, 1992). Larger juveniles may be less susceptible to inshore predators and, thus, are able to exploit a wider range of habitats, including those less likely to provide ready-made shelter and habitat that allows them to build shelters (e.g., mud) (Cobb, 1971; Berrill and Stewart, 1973; and Botero and Atema, 1982). Adolescents (sub-legal lobsters) and adults (mostly legal-sized lobsters), particularly those that remain in shallow coastal waters, have fewer predators, and are found in featureless substrates, such as sand and fine-grained mud (Cooper and Uzmann, 1980). While shelters are necessary for the purposes of molting and mating (Karnofsky, *et al.*, 1989), these larger lobsters show little shelter fidelity within a home range over a period of several days, except during over-wintering months (Goldstein and Watson, 2015). Thus, there is a trend of increased ability to exploit all available habitats, both featureless and that which provides shelter, as the size of a lobster increases.

5.0 Benthic Resources

The Massachusetts Water Resource Authority's continuing benthic studies in Boston Harbor provide valuable data on how the harbor has changed since discharge modification began in the early 2000s. As summarized by Maciolek *et al*. (2005, 2008), the major changes in discharge regimes that have occurred since 1995 were the stoppage of effluent discharge from Nut Island; the complete conversion to secondary treatment in 1998; and the diversion of all treatment discharges from the harbor to the new outfall in September 2000. Maciolek *et al*. (2008) compiled a concise summary of conditions in the Harbor since the mid-1970s. Maciolek *et al*. (2008, 2011) also documented the changes that have occurred in the harbor since the cessation of sludge discharge in 1991. The primary changes have involved stations in the northern part of the harbor, which were once considered to be heavily polluted. Changes in the northern

harbor have been dramatic; fluctuations in infaunal abundance and an increase in species numbers and diversity have been observed through 2003. Stations in the southern part of the harbor, which were less influenced by the former treatment discharges, have not shown changes in the benthos like those experienced at the northern stations. Since 1992 the improvements in benthic habitat quality led to increases in deeper, bioturbating species, which likely increased trophic complexity (Maciolek *et al*., 2011).

Infaunal communities within Boston Harbor are clearly separable into two geographic regions. The first region overlaps the study area and is described in the main report. The second region, which is largely outside the study area, extends from east of Reserved Channel to the mouth of the harbor and includes the Lower Harbor, Main Ship Channel, and Presidents Roads Anchorage area. Infaunal abundances here (based on USACE 2003 and Massport 2003 data only) range from medium (5,000–25,000/m^2) to large (25,000–80,000/m^2) and species numbers range from medium (15–25/sample) to large (25–40/sample). Predominant taxa in this region include several polychaete and amphipod species. Between 1993 through 2003 amphipod tube mats occurred in all regions of Boston Harbor, declined to zero in 2004 to 2005, and have been on the rebound since, with most increases occurring from the Lower Harbor out to the Presidents Roads Anchorage area (Maciolek *et al*., 2011).

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