4.15 THREATENED AND ENDANGERED SPECIES

4.15.1 Introduction

This chapter describes existing conditions, regulatory jurisdiction and evaluates impacts (both direct and indirect) of the alternatives on state and federally listed rare species.

4.15.1.1 Resource Definition

State-listed (rare) species are protected under the Massachusetts Endangered Species Act (MESA) of 1990,[1] and are classified as Endangered, Threatened, or Species of Special Concern. An "Endangered" species is one that is in danger of extinction throughout all or a significant portion of its range within Massachusetts. A "Threatened" species is one that is likely to become endangered in Massachusetts in the foreseeable future. Species of Special Concern are those species that biological research has documented to have suffered a decline that could threaten the species if the decline continues unchecked, or those species that occur in such small numbers or with such a restricted distribution that they could easily become threatened within the Commonwealth.

The Federal Endangered Species Act (ESA) of 1973[2] defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range." The ESA also defines a threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The ESA[3] protects species that are listed as endangered or threatened on a national basis.

4.15.1.2 Regulatory Context

Federal and state laws protect rare plants and animals and their critical habitats. The following describes the federal and state regulations that protect rare species and, in some instances, their habitats.

Federal Endangered Species Act

The ESA of 1973, (16 USC 1531 *et seq.,* as amended),[4] authorizes the determination and listing of species as Endangered and Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species. Section 7 of the Act[5] requires federal agencies to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. The U.S. Fish and Wildlife Service (USFWS) administers the Act. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), a division of the U.S. Department of Commerce, is the lead federal agency responsible for the stewardship of the nation's offshore living marine resources and their habitat. NOAA Fisheries manages, conserves, and protects fish, whales, dolphins, sea turtles and other living creatures in the ocean, and administers the Endangered Species Act for species within its purview.

[1] Massachusetts Endangered Species Act of 1990 (321 CMR 10.00: M.G.L. c. 131A.), Natural Heritage Endangered Species Program.
[2] Endangered Species Act of 1973, (16 U.S.C. 1531 et seq., as amended) United States Fish and Wildlife Service.
[3] Endangered Species Act of 1973, (16 U.S.C. 1531 et seq., as amended) United States Fish and Wildlife Service.

[4] Endangered Species Act of 1973, Section 7(16 USC 1531 et seq., as amended), United States Fish and Wildlife Service.
[5] Ibid.

Massachusetts Endangered Species Act

Massachusetts enacted MESA in 1990. The Act (M.G.L. Chapter 131A) and its regulations (321 CMR 10.00) prohibit the "taking" of any state-listed rare plants and animals unless specifically permitted for scientific, educational, or propagation purposes, or where a Conservation Permit is issued. "Take" includes protection of rare species habitat, and is defined as, "*in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat*."

The regulations (321 CMR 10.05) state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats… and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the project design. The Massachusetts Department of Fish and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP) is the agency responsible for ensuring compliance with MESA. A proposed project that would result in a "take," requires a Conservation and Management Permit from the NHESP.

State-listed (rare) species are protected under the MESA of 1990,[6] and are classified as Endangered, Threatened, or Species of Special Concern. An "Endangered" species is one that is in danger of extinction throughout all or a significant portion of its range within Massachusetts. A "Threatened" species is one that is likely to become endangered in Massachusetts in the foreseeable future. Species of Special Concern are those species that biological research has documented to have suffered a decline that could threaten the species if the decline continues unchecked, or those species that occur in such small numbers or with such a restricted distribution that they could easily become threatened within the Commonwealth.

Massachusetts Wetlands Protection Act

The Massachusetts Wetlands Protection Act Regulations (WPA [310 CMR 10.00 et seq.]) state that proposed projects that alter estimated rare wildlife habitat shall not be permitted to have any short-term or long-term adverse effects on the habitat of the local population of that species. The regulations only apply to proposed projects that would alter the habitat of a rare animal species occurring in a wetland resource area for which an occurrence has been entered into the official NHESP database. Rare plants are not regulated under the WPA. The NHESP maintains an atlas of Estimated Habitat for state-listed rare species, which was last updated in 2008.

4.15.1.3 Regulatory Coordination

On December 4, 2008, a letter was submitted by the applicant to the NHESP requesting site-specific rare species information. The list of species was provided by NHESP on January 8, 2009.[7] On December 4, 2008 a letter was submitted to the NMFS requesting information on any threatened and endangered fisheries resources located within the project area. NMFS response was received on January 12, 2009 with the determination that there are no federally endangered fisheries resources within the study area.

[6] Massachusetts Endangered Species Act of 1990 (321 CMR 10.00: M.G.L. c. 131A.), Natural Heritage Endangered Species Program.
[7] NHESP letter dated January 8, 2009.

Subsequent to the publication of the DEIS, the New York Bight Distinct Population Segment of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed as an endangered species under the ESA by the NMFS on April 6, 2012.[8] However, the NMFS stated in its May 13, 2013 response letter it is unlikely that any species listed under their jurisdiction will be exposed to any direct or indirect effects of the proposed South Coast Rail project, including the Atlantic sturgeon. The above correspondence is included in Appendix 4.15-A.

The Certificate of the Secretary of Environmental Affairs on the ENF dated April 3, 2009,[9] also requested the applicant to consult with NHESP to discuss additional endangered species habitat assessments and surveys required in order to adequately quantify relative impacts of the alternatives. MassDOT has consulted with the NHESP subsequent to the DEIS/DEIR concerning the methodology for evaluating existing conditions and species impacts to state-listed threatened and endangered species.

The South Coast Rail project would result in a "take" of state-listed animals if the reconstruction of the rail system would directly harm state-listed animals, or if the project would disrupt breeding or migratory activity through the loss of habitat or loss of migratory pathways. The reconstruction of the rail system would result in a "take" of plant species where the project would result in the loss of habitat occupied by these species

The NHESP has determined that constructing the South Coast Rail project could have an adverse effect (a "take") on three state-listed species: Blanding's turtle (*Emydoidea blandingii*), eastern box turtle (*Terrapene carolina carolina*), and blue-spotted salamander (*Ambystoma laterale*). NHESP has determined, based on the preliminary design, that reconstruction of the track in the Southern Triangle would not constitute a "take" under MESA.

4.15.2 Existing Conditions

4.15.2.1 Regional Overview of Existing Conditions

This chapter includes a general description of the study area for threatened and endangered species and lists the rare species found within the polygons of Estimated and Priority Habitats that intersect or are adjacent to it.

Study Area

The study area for the assessment of threatened and endangered species is the portion of the South Coast region that is adjacent to or crossed by the Stoughton and/or Whittenton Alternatives south of Canton Junction. Within the study area, the alignment of each alternative intersects areas that contain wetlands and ecosystems that have been mapped as Priority and/or Estimated Habitat for rare species. Maps of the alternatives were examined for areas of mapped habitat that were intersected by or adjacent to a 100-foot buffer, measured from the centerline of the proposed railroad tracks of the Build Alternatives. Areas of important biodiversity value include the Hockomock Swamp, Pine Swamp, Assonet Cedar Swamp, Acushnet Cedar Swamp, and Forge Pond (Figure 4.15-1 through 4.15-2). In some cases, these ecosystems are within ACECs such as the Hockomock Swamp ACEC, (Figure 4.14-2). ACECs are described in Chapter 4.10, *Protected Public Open Space and Areas of Critical Environmental Concern*.

[8] Federal Register: February 6, 2012 (Volume 77, Number 24, page 5880-5912), Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region.

[9] Executive Office of Transportation and Public Works, South Coast Rail Environmental Notification Form, November 2008.

Rare species represent one of the most sensitive elements of biodiversity. Other elements of biodiversity are addressed in Chapter 4.14, *Biodiversity, Wildlife, and Vegetation.*

The Stoughton and Whittenton Alternatives would utilize the Northeast Corridor between Canton Junction and South Station in Boston. However, the Northeast Corridor was not included in the study area because no construction/habitat disturbance would be required along the Northeast Corridor. Northeast Corridor is already electrified, thus catenary construction would not be needed in this area under the electric variants of the Stoughton and Whittenton Alternatives. In addition, there is no potential for indirect effects (noise disturbance, water quality impacts) on habitat along the Northeast Corridor because the South Coast Rail project trains would be a small incremental change relative to the heavy existing Northeast Corridor passenger and freight train traffic.

Priority and Estimated Habitats

A review of the 2008 Edition of the Massachusetts NHESP Natural Heritage Atlas was performed to identify areas where the South Coast Rail alternatives cross Priority Habitats of Rare Wildlife and Estimated Habitats of Rare Species. Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and pertains to MESA. Maps are used for determining whether or not a proposed project must be reviewed by the NHESP for MESA compliance.[10] Estimated Habitats are a sub-set of the Priority Habitats that are based on the geographical extent of habitat of state-listed rare wetlands wildlife. Each mapped Priority and Estimated Habitat is assigned a unique identification number that the Natural Heritage Program uses to track information related to each Priority Habitat and Estimated Habitat polygon.

Table 4.15-1 lists the Priority and Estimated Habitat polygon identification numbers that intersect or are adjacent to the project corridors. Table 4.15-2 lists the state-listed species that may be found within and/or adjacent to the South Coast Rail alternatives. This list is based on information provided by the NHESP on January 8, 2009,[11] in response to a formal request for a detailed list of species found within these Estimated and Priority Habitats (Figures 4.15-3). The above correspondence is included in Appendix 4.15-A.

The NHESP letter listed two Priority Habitat polygons (PH924/EH753 and PH926/EH755) that provide habitat for the state and federally endangered roseate tern (*Sterna dougalli*) and the state-special concern common tern (*Sterna hirundo*). These species and their Priority Habitat were excluded from both tables because these polygons are not adjacent to the 100-foot buffer of the project corridor and are separated from the New Bedford Main Line by major developed areas (Figure 4.15-8).

[10] Natural Heritage and Endangered Species Program Information: Priority Habitat and Estimated Habitat for Rare Species. Available online at: (http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm).

[11] NHESP letter dated January 8, 2009.

Table 4.15-1 Priority and Estimated Habitats Within or Adjacent to the Study Area

Project Alternative (segments)	Priority Habitat (PH) (Identification #)	Estimated Habitat (EH) (Identification #)	Location
Southern Triangle (New Bedford Main Line) (see Figures 4.15-4-8)	1093	951	Assonet Cedar Swamp, Mass Audubon Great Cedar Swamp, Assonet River, Cedar Swamp River, Cotley River
Southern Triangle (New Bedford Main Line) (see Figure 4.15-4-8)	1158	372	Apponquet Regional High School, Cedar Swamp River
Southern Triangle (New Bedford Main Line) (see Figures 4.15-4-8)	1349	1	Acushnet Cedar Swamp
Southern Triangle (Fall River Secondary) (see Figure 4.15-9-11)	1093	951	Assonet River
Stoughton Alternative (Stoughton Line) (see Figures 4.15-12-15)	1392	59	Hockomock Swamp ACEC, Hockomock Swamp WMA
Stoughton Alternative (Stoughton Line) (see Figure 4.15-12-15)	1297	1077	Pine Swamp
Whittenton Alternative (Whittenton Branch) (see Figure 4.15-16-17)	261	153	Tributary to Mill River

Table 4.15-2 Potential State-Listed Species Documented Within PH and EH Polygons Adjacent to the Project Alternatives

Species	Status[1]	Priority (PH) and Estimated (EH) Habitat[2]
Amphibians		
Blue-Spotted Salamander (*Ambystoma laterale*)	SC	PH1392/EH59
Reptiles		
Blanding's Turtle (*Emydoidea blandingii*)	T	PH1392/EH59;
Eastern Box Turtle (*Terrapene carolina carolina*)	SC	PH1392/EH59; PH1349/EH1; PH261/EH153
Crustacean		
Coastal Swamp Amphipod (*Synurella chamberlaini*)	SC	PH1349/EH1
Dragonflies		
Mocha Emerald (*Somatochlora linearis*)	SC	PH1093/EH951
Butterflies and Moths		
Hessel's Hairstreak *(Callophrys hesseli)*	SC	PH1349/EH1
Pale Green Pinion Moth (*Lithophane viridipalle*)	SC	PH1349/EH1
Water-Willow Stem Borer Moth (*Papaipema sulphurata*)	T	
Plants		
Gypsywort (*Lycopus rubellus*)	E	PH1392
Long-Leaved Panic-Grass (*Panicum rigidulum ssp. pubescens*)	T	PH1158

E = State Endangered, T =State Threatened, SC = State Special Concern. Fed E = Federal Endangered
Priority and Estimated Habitats (PH1158/EH372) have data sensitive species that were not released by NHESP.

Other State-Listed Species

The list of state-listed species (Table 4.15-2) provided by the NHESP includes only those species likely to be found adjacent to the alignment corridors of the alternatives. Other species may occur in the larger polygons, or within the contiguous ACECs, that are not listed in this table. Habitat for these additional

species may occur in areas adjacent to the alignment corridors. Based on information on the Massachusetts Department of Conservation and Recreation (DCR) ACEC Program website and the NHESP's lists of rare species by town, these could include freshwater mussels (tidewater mucket [*Leptodea ochracea*], triangle floater [*Alasmidonta undulata*], and eastern pondmussel [*Ligumia nasuta*]); damselflies (New England bluet [*Enallagma laterale*]); birds (American bittern [*Botaurus lentiginosus]*); amphibians (eastern spadefoot [*Scaphiopus holbrookii*]); and plants (Eaton's beggar-ticks [*Bidens eatonii*]; Long's bitter cress [*Cardamine longii*], cat-tail sedge [*Carex typhina*], round-fruited false-loosestrife [*Ludwigia sphaerocarpa*], climbing fern [*Lygodium palmatum*]*,* Philadelphia panic-grass [*Panicum philadelphicum*], pale green orchids [*Platanthera flava* var*. herbiola*], and grass-leaved ladies tresses [S*piranthes vernalis*]).

4.15.2.2 Rare Species Description and Habitat Requirements

This section includes a description of the range, habitat requirements, and areas where rare species are found within the polygons of Estimated and Priority Habitats that intersect or are adjacent to the study area. It also includes a summary of their breeding and nesting behavior. Unless otherwise indicated, the information below is based on the NHESP fact sheets for each species (www.mass.gov/dfwele/nhesp/species-info/nhfacts), accessed April 13, 2012.

Blue-Spotted Salamander (*Ambystoma laterale;* State Special Concern)

The NHESP database indicates that this species is present within the Hockomock Swamp polygon (PH1392/EH59). Populations of pure blue-spotted salamanders occur north of the hybridization zone with Jefferson salamanders (*A. jeffersonianum*). The area of populations of pure blue-spotted salamanders and hybrids extends from the Canadian Maritime Provinces, south along the Atlantic coast to northern New Jersey. The range extends westward through to northern Indiana and northeastern Illinois, through most of Wisconsin, eastern Minnesota and the southern half of Ontario. In Massachusetts, they occur predominantly within Middlesex and Essex Counties and in the adjacent eastern towns of Worcester County. Some occurrences are also noted within Bristol and Plymouth Counties. In general, Jefferson-blue-spotted complex salamanders found east of the Connecticut River are more likely to be blue-spotted salamanders. There are 102 towns in Massachusetts where blue-spotted salamanders have been observed. Over 172 occurrences have been documented since 1981, as well as 27 historic occurrences that were documented prior to 1981.

Blue-spotted salamanders require moist, moderately shaded environments; they favor northern hardwood/hemlock forests in glaciated areas with depressions available for seasonal flooding. Vernal pools, or temporary ponds, are necessary for reproduction and need to be full of dead and decaying leaves for cover and have overhanging bushes or grass for egg deposition. Roadside drainage ditches, small kettle holes, and temporary pasture ponds also provide habitat when flooded in the spring. Adults reside most of the year beneath leaf litter or underground to a depth of one meter, usually within 500 meters of their breeding pond. The brief breeding season lasts from mid-March to late April. Eggs are often laid singly or in a small egg mass, which cling lightly to overhanging vegetation or fall to the bottom of the pond.

Intensive rare species surveys conducted in 2001 identified a large population of blue-spotted salamanders in Hockomock Swamp, primarily south of Foundry Street, and confirmed that blue-spotted salamanders breed in vernal pools adjacent to the railroad berm in this area. A single blue-spotted salamander was trapped in the area immediately north of Foundry Street. The habitat of blue-spotted salamander was found to extend from approximately 650 feet north of Foundry Street to approximately

3,500 feet south of the power line. The adjacent forested uplands and wetlands provide suitable non-breeding habitat for this species.

Wood Turtle (*Clemmys insculpta*; State Special Concern)

The NHESP recently determined that habitat of the wood turtle occurs near the Southern Triangle. Due to its location in relation to the proposed railway alignment an analysis of impacts to this state-listed species was not included in this section.

Ringed Boghaunter (*Williamsonia lintneri*; State Threatened)

The NHESP has recently determined that habitat of ringed boghaunter dragonfly occurs near the Southern Triangle. However, due to its location in relation to the proposed railway alignment an analysis of impacts to this state-listed species was not included in this section.

Blanding's Turtle (*Emydoidea blandingii*; State Threatened)

The NHESP database indicates that this species is present within the polygons that include the Hockomock Swamp (PH1392/EH59). Blanding's turtles are found primarily in the Great Lakes region, extending to Kansas. Several smaller, disjunct populations occur in the East: in southern Nova Scotia, in an arc from eastern Massachusetts through southeastern New Hampshire to southern Maine, and in the New York's lower Hudson Valley. These populations (except those in New Hampshire) are all listed as threatened or endangered at the state or provincial level.

In Massachusetts, Blanding's turtles use a variety of wetland and terrestrial habitats. Blanding's turtles have been observed in seasonal pools, marshes, scrub-shrub wetlands, and open uplands.[12] Habitat use appears to vary according to the individual and the amount of precipitation, with more upland use during dry years.[13] Wetlands are used for overwintering during their inactive season (November to March).

Courtship and mating takes place during the spring and early summer and typically occurs in water. Females will remain in wetland or vernal pool habitat until they begin nesting. The majority of nesting occurs in June in open areas with well-drained loamy or sandy soils, such as dirt roads, powerline corridors, residential lawns, gravel pits, and early successional fields.

Field studies undertaken in 2009 confirmed Blanding's turtle use of the power line right-of-way east of Route 138. Habitat potentially used by this species along the Stoughton Alternative, as reported by NHESP, extends from Purchase Street in Easton to the Hockomock Swamp south of the power line right-of-way.

Eastern Box Turtle (*Terrapene carolina Carolina*; State Special Concern)

The NHESP database indicates that this species is present within the polygons that include the Assonet Cedar Swamp (PH1093/EH951), Acushnet Cedar Swamp (PH1349/EH1), wetlands and along the Whittenton Branch corridor (PH261/EH153). The Eastern box turtle's range is from southeastern Maine to northern Florida to Michigan, Illinois, and Tennessee. They occur throughout Massachusetts, but are more heavily concentrated in the southeastern section of the state.

[12] Sievert, P.R., Compton B.W., and M. Grgurovic. 2003. Blanding's Turtle (*Emydoidea blandingii*) conservation plan for Massachusetts. Pages 161. Report for Natural Heritage and Endangered Species Program. Westborough, MA.

[13] Joyal, L.A., McCollough, M. and J.M.L. Hunter. 2000. Population structure and reproductive ecology of Blanding's Turtle (Emydoidea blandingii) in Maine, near the Northeastern edge of its range. Chelonian Conservation and Biology 3:580-588.

In Massachusetts, Eastern box turtles inhabit many types of terrestrial habitats: both dry and moist woodlands, brushy fields, thickets, marsh edges, bogs, swales, fens, stream banks, and well-drained bottomland. Mating is opportunistic and may take place anytime between April and October. Females nest in June or early July and can travel great distances to find appropriate nesting habitat. Field studies in 2001 confirmed the presence of eastern box turtles in the Hockomock Swamp, south of the former Raynham Greyhound Park.

Coastal Swamp Amphipod (*Synurella chamberlaini*; State Special Concern)

The NHESP database indicates that this species is present within the Acushnet Cedar Swamp polygon (PH1349/EH1). In Massachusetts, the coastal swamp amphipod is known to be present in Dartmouth and New Bedford. Elsewhere in New England, records exist in southeastern Maine, Rhode Island, and eastern Connecticut. Its range also extends south from Maryland to South Carolina along the Middle Atlantic Coastal Plain.

In Massachusetts, coastal swamp amphipod is found in heavily vegetated, low-gradient, coastal wetland outlet streams of red maple and white cedar swamps in the Buzzards Bay moraine deposits.[14] This species can also be found in emergent marshes adjacent to these outlet streams. Elsewhere, the coastal swamp amphipod is known to inhabit small streams, bogs, ponds, and ditches.[15]

This species has an annual life cycle. In winter and spring, reproductive females brood up to 65 eggs per clutch.[16] In general, amphipods aggregate in large numbers and remain hidden in organic debris or among beds of aquatic vegetation.

Mocha Emerald (*Somatochlora linearis*; State Special Concern)

The NHESP database indicates that this dragonfly is present within the Assonet Cedar Swamp polygon (PH1093/EH951). The mocha emerald is distributed throughout the eastern United States from Massachusetts south to Florida and west to Michigan, Iowa, and Texas. In New England, the mocha emerald is recorded from Connecticut and Rhode Island, north only to Massachusetts. The species is known to inhabit about nine locations, all confined to eastern Massachusetts.

In Massachusetts, the mocha emerald has been found most often away from breeding habitats in fields and forest clearings. However, many of these areas are adjacent to habitats that, based on observations elsewhere in this species range, are appropriate breeding sites for the mocha emerald. Breeding sites for this species are small to medium-sized streams that flow through woods or swamps. A sand or gravel bottom may be an important habitat characteristic, since females prefer to oviposit (place their eggs) in this type of substrate. In addition to Assonet Cedar Swamp, Pierce Brook and the Cedar Swamp River (Assonet River) may provide suitable habitat for this species.

The mocha emerald has been recorded in Massachusetts from early July through mid-August. Information from nearby areas for this species extends the flight season from late June through early September. As in other regions where this species occurs, breeding in Massachusetts probably occurs from early July through August.

[14] Smith, D.G. 1987. The genus Synurella in New England (*Amphipoda, Crangonyctidae*). Crustaceana 53 (3): 304-306.

[15] Holsinger, J.R. 1972. The freshwater amphipod crustaceans (Gammaridae) of North America. United States Environmental Protection Agency. Biota of Freshwater Ecosystems. Identification Manual 5: 1-89.

[16] Holsinger, J.R. 1972. The freshwater amphipod crustaceans (Gammaridae) of North America. United States Environmental Protection Agency. Biota of Freshwater Ecosystems. Identification Manual 5: 1-89.

Hessel's Hairstreak (*Callophrys hesseli*; State Special Concern)

The NHESP database indicates that this butterfly is present within the Assonet Cedar Swamp polygon (PH1093/EH951) as well as the Pine Swamp polygon (PH129/EH1077). Hessel's hairstreak is distributed in scattered colonies along the Atlantic coastal plain from southern Maine to the Florida panhandle and southeastern Alabama. The greatest density of colonies is found in southern New Jersey, southeastern Massachusetts, and Rhode Island. In Massachusetts, most colonies are concentrated in southern Worcester, Norfolk, Bristol, and Plymouth Counties.

Hessel's hairstreak exclusively inhabits Atlantic white cedar swamps and bogs. This hairstreak has also been recorded in the Hockomock Swamp. Adults feed on nectar from swamp milkweed (*Asclepias incarnata*), shadbush (*Amelanchier alnifolia*), sand myrtle (*Leiophyllum buxifolium*), sweet pepperbush *(Clethra alnifolia)*, highbush blueberry *(Vaccinium corymbosum)*, buttonbush (C*ephalanthus occidentalis*), and dogbane (*Apocynum androsaemifolium*). It occurs only in or adjacent to Atlantic white cedar swamps and associated barrens. Males perch at the tops of white cedars in spring to seek receptive females, and females lay single eggs on the terminal shoots of white cedars. Larvae feed and develop into the pupal stage on the leaves of the host trees. Potential habitat along the project corridor for Hessel's hairstreak includes Atlantic white cedars established on the sideslopes of the embankment within Assonet Cedar Swamp, Pine Swamp, and Hockomock Swamp, and the extensive areas of Atlantic white cedar swamp within these wetlands.

Pale Green Pinion Moth (*Lithophane viridipallens*; State Special Concern)

The NHESP database indicates that this species is present within the Acushnet Cedar Swamp polygon (PH1349/EH1). The pale green pinion moth is spottily distributed along the coastal plain from southern New England south to New Jersey, with a more continuous range along the coastal plain from southern New Jersey south to Florida and west to Texas. In Massachusetts, this species occurs on the coastal plain in the southeast part of the state. In Massachusetts, the pale green pinion moth inhabits acidic, shrubby wetlands on the coastal plain, including wooded swamps, shrub swamps, shrubby bogs, and on the shores of coastal plain ponds. Suitable habitat occurs along the rail line through the Acushnet Cedar Swamp.

Adult moths emerge in October and early November and overwinter, flying on warm nights in late winter and early spring. Eggs are laid in spring on the larval host plants, which have not been documented in Massachusetts, but probably include a variety of acidic wetland shrubs such as holly (*Ilex* spp.), chokeberry (*Aronia* spp.), sweet pepper-bush, swamp-fetterbush (*Leucothoe racemosa*), maleberry (*Lyonia ligustrina*), and highbush blueberry.

Water-Willow Stem Borer (*Papaipema cataphracta*; State Threatened)

The NHESP database indicates that this moth is present within the Acushnet Cedar Swamp polygon (PH1349/EH1). The water-willow stem borer is endemic to southeastern Massachusetts, occurring in Plymouth and Bristol Counties as well as on Cape Cod and the offshore islands.

The water-willow stem borer inhabits shallow portions of coastal plain wetlands, in the shallowest portions of vernal pools, seasonally flooded swamps, abandoned cranberry bogs, and along upland edges of streams and ponds, where its obligate host water-willow *(Decodon verticillatus)* occurs. No specific surveys have been undertaken for Decodon, but it is likely that suitable habitat occurs near the rail line through Acushnet Cedar Swamp.

The water-willow stem borer is a nocturnal moth (noctuid) with a wingspan of 1.3 to 1.5 inches. Females lay eggs in late fall at the base of water-willow clumps, and when larva emerge the following spring, they bore into a water-willow stem, where they spend the summer. The larva pupate inside the stem in early fall, and upon emergence, look for a mate, reproduce, and die.

Gypsywort (*Lycopus europaeus*; State Endangered)

The NHESP database indicates that this plant is present within the Hockomock Swamp polygon (PH1392). Gypsywort is distributed from eastern Massachusetts southward to Florida and eastern Texas on the Coastal Plain, and northwards through the Mississippi River basin to southern Michigan. It is only sporadically found in the area between the Mississippi and the Atlantic Coast. Gypsywort is a coastal plain pond species occurring in smaller ponds with mucky to peaty soils, and is often associated with Plymouth gentian *(Sabatia kennedyana)*. Historically, it also was known from borders of ponds in Fall River and Westport.

Plant surveys conducted in 2001 identified a small population of gypsywort in open wetlands associated with Black Brook in the Hockomock Swamp, south of the power line right-of-way, within 15 feet of the existing railroad berm.[17]

Long-Leaved Panic-Grass (*Panicum rigidulum ssp. pubescens*; State Threatened)

This species is known to occur within the polygon that includes a wooded swamp area and the Cedar Swamp River (PH1158). The long-leaved panic-grass is associated with coastal plain pond shore communities.[18] No suitable habitat for this species has been identified in proximity to the rail right-of-way.

4.15.2.3 Rare Species Studies

This section describes specific rare species studies conducted in 2001 and 2008 along the Stoughton Line. These studies were undertaken to determine rare species occurrence along areas of this alternative where there is currently no track because NHESP determined that these were areas of concern.

In support of the 2002 Fall River/New Bedford Commuter Rail Extension EIR, a study was conducted in the spring and summer of 2001 to determine rare species occurrences in the Hockomock and Pine Swamps. The study methodology was developed in consultation with, and approved by, the NHESP and conducted under a Scientific Collecting Permit issued by the DFW. The rare species study area was defined as the area within 600 feet of the right-of-way centerline, extending from a point approximately 1,500 feet north of Foundry Street in Easton to Bridge Street in Raynham (Hockomock Swamp), and from King Philip Street to East Brittania Street in Raynham (Pine Swamp). This study area was divided into five segments, generally separated by roads or other features and with distinct vegetation types. Markers, consisting of numbered yellow plastic flagging and "tuft" stakes, were installed at 100-foot intervals to enable the study team to precisely locate rare species. The survey methods used included visual observation during "big night" events, drift fencing and pit traps, turtle hoop traps, radiotelemetry of turtles, invertebrate surveys, and rare plant surveys. Turtles equipped with radio transmitters were tracked daily until June 30, 2001 and then tracked weekly until September 30, 2001.

[17] New Bedford/Fall River Commuter Rail Extension Rare Species Study – Final Report. Prepared by VHB for MBTA, January 31 2002.
[18] Grass Manual on the Web, Utah State University. http://herbarium.usu.edu/webmanual, accessed April 13, 2012.

The 2001 study also included surveys for state-listed plant species and potential state-listed invertebrate habitats, based on host plant distributions.

In the spring of 2008, a survey using hoop traps, visual nesting surveys, and radiotelemetry was also conducted in Easton to locate Blanding's turtles. The following is a summary of the survey results for the blue-spotted salamander, eastern box turtle, and Blanding's turtle. No additional site-specific studies for state-listed species were undertaken at the direction of NHESP as existing information on species distributions was deemed adequate to evaluate impacts and develop a Conservation Management Plan (CMP).

Blue-Spotted Salamander (*Ambystoma laterale*)

The rare species study conducted in the spring and summer of 2001 documented a substantial population of blue-spotted salamanders that crossed the right-of-way in both directions. Blue-spotted salamanders were captured in 31 of the drift fence arrays, including 85 percent (11) of the drift fence arrays in a segment north of the powerline and 76 percent (16) of the drift fence arrays in a segment south of the powerline. No blue-spotted salamanders were found in Pine Swamp or in the Hockomock ACEC, south of the former Greyhound Park. One was captured north of Foundry Street.

Animals were captured in approximately equal numbers on both sides of the right-of-way. There did not appear to be any significant directional component to the population movement.

During the "big night" event (April 6, 2001), blue-spotted salamanders were observed in almost equal numbers north and south of the powerlines (27 and 31, respectively). The majority of animals to which a movement direction could be determined were moving across the right-of-way from west to east.

A total of 549 blue-spotted salamanders from a large population were captured in pit traps. An additional 58 animals were observed during visual night surveys. The majority of these animals were captured during the first two weeks of the study, with elevated numbers also observed in mid-May (Table 4.15-3).

Table 4.15-3 Blue-Spotted Salamander (*Ambystoma laterale*) Capture–by Date (2001)

Date	Total Number
March 31-31	64
April 1-15	293
April 16-30	41
May 1-15	8
May 16-31	134
June 1-15	9
June 16-30	0

Eastern Box Turtle (*Terrapene carolina carolina*)

One eastern box turtle was captured in 2001 and fitted with a radio transmitter. This turtle (designated B1) was captured in the upland forest west of the right-of-way, north of Bridge Street in Raynham. Turtle B1 was captured initially on May 11, 2001. It was tracked in the uplands west and north of the initial capture location until May 21, then relocated four weeks later (June 20) in the same area. The turtle was apparently west of the right-of-way, out of receiver range, during this period.

On June 30, 2001, the turtle research team documented the locations of turtle nests within the study area that had been excavated by predators. It was not possible to accurately determine the species of turtle; therefore, these data indicate the locations where all turtle species (spotted, snapping, and painted) nest within the study area. Turtle nests were found in six locations within the Hockomock Swamp. Generally, nests were found in the softer substrate at the edges of the right-of-way. More specific locations of turtle nests have been submitted to the NHESP.

The 2001 rare species study determined that eastern box turtles are infrequently found within the Hockomock Swamp ACEC, and that this species was found to occur only within upland forested areas south of the former Greyhound Park. The 2008 Blanding's turtle study conducted in the Hockomock Swamp (south of Foundry Street) found no eastern box turtles during the nest surveys.

Blanding's Turtle (*Emydoidea blandingii*)

The extensive studies conducted in 2001 found no evidence of Blanding's turtles in the surveyed areas. However, NHESP records show several individuals north and east of the right-of-way in Easton.

In June 2008, habitat evaluations and surveys along the Stoughton Alternative were conducted for the state-Threatened Blanding's turtle. This survey was performed because the NHESP database indicated the presence of Blanding's turtles in the vicinity of the existing railroad bed. Surveys and habitat evaluations were conducted along an approximately 1.3-mile section of an existing railroad bed and a 1.2-mile section of an existing powerline easement within the Hockomock Swamp in Easton. The area surveyed extends from approximately 0.16 mile north of Foundry Street to 1.14 miles south of Foundry Street along the railroad bed. The purpose of this study was to verify the presence of Blanding's turtles, evaluate their use of aquatic habitats and upland nesting habitats, and to start establishing a subpopulation of Blanding's turtles outfitted with radio transmitters.

The Blanding's turtle study area is almost entirely within land managed by the DFW's Hockomock Swamp Wildlife Management Area. Wetland and upland areas adjacent to the proposed project are mapped by the NHESP (2008) as Priority Habitat (PH1392) and Estimated Habitat (EH59) for the Blanding's turtle. Mapped habitat areas extend from the northern extent of the study area (southern boundary of the Easton Country Club), south approximately 3.7 miles to I-495 and from Prospect Street and Howard Street west of the railroad bed to beyond Route 24 east of the railroad bed.

The survey methodology included:

- Trapping in specially designed sardine-baited hoop traps, (3- and 4-foot diameter, 1-inch mesh)
- Repeated transect and/or meander surveys of suitable habitat on foot
- Basking surveys from shore with binoculars
- Meander surveys through suitable nesting habitats

One female Blanding's turtle (designated EB-1) was observed east of Route 138 and outfitted with a radio transmitter. One nest was found approximately 2 meters from the location where EB-1 was observed. Other recent observations documented by NHESP have been east of the rail corridor as well.

Deep aquatic habitats typically associated with this species were limited within the survey area and were primarily associated with Black Brook and a few isolated pockets within the greater Hockomock Swamp area. Areas of suitable foraging habitat (e.g., vernal pools), large expanses of unfragmented open space for migration, and suitable nesting habitats were observed during the nesting surveys. Potential Blanding's turtle habitats were also investigated from a broader landscape perspective; this investigation was primarily based on interpretation of 2005 MassGIS color aerial photographs with field verification of some areas.

A variety of landscape features are present within the vicinity of the railroad bed including commercial and residential development, paved roads, a school, a landfill, golf courses, cranberry bogs, a power line easement, and forested uplands. Wetland habitat types in the study area consist of a variety of deciduous and coniferous palustrine forested (PFO) wetland systems, scrub-shrub (PSS) and emergent (PEM) wetland systems, certified vernal pools, and a perennial, unconsolidated bottom riverine system (Black Brook). The majority of suitable aquatic habitat occurs east of the rail corridor, in the vicinity of the cranberry bog complex north of Foundry Street and in the Hockomock Brook and Hockomock Swamp east of Route 138. No suitable aquatic habitat occurs west of the rail corridor north of Foundry Street. NHESP has indicated that they believe that Blanding's turtles use habitats east and west of the rail corridor from the powerlines north through the golf course area.

In 2009 radio-telemetry was conducted in several site visits down to the Hockomock Swamp in Easton, MA with the primary goal of re-capturing the female Blanding's turtle that was outfitted with a transmitter in June 2008, and removing that transmitter. The female Blanding's turtle covered significant distances (approximately 3 miles over the 6 point observations collected between June 2008 and July 2009) and was hand captured on July 5, 2009 within 100 feet of her June 2008 nesting location. The survey was submitted to NHESP.

Rare Plant Survey

Rare plant species recorded for the Hockomock Swamp ACEC, according to NHESP, include:

- *Ludwigia sphaerocarpa* (coastal plain pondshores)
- *Lycopus rubellus* (coastal plain pondshores)
- *Scirpus longii* (coastal plain pondshores, fens)
- *Sabatia kennedyana* (coastal plain pondshores)
- *Utricularia biflora* (coastal plain pondshores)

The entire alignment within the Hockomock Swamp segment of the right-of-way (including all areas within 100 feet of the right-of-way) was investigated by a qualified plant taxonomist in 2000-2001 to determine if potential habitats for state-listed plant species occur within or adjacent to the corridor. Three wetland areas within 100 feet of the railroad right-of-way were investigated to determine if these provide coastal plain pondshore or fen habitats, and if any of these or other state-listed species were present. Detailed location information has been provided to the NHESP.

None of the wetlands adjacent to the right-of-way are coastal plain ponds or fens. The Black Brook wetland, located adjacent to the right-of-way and south of the powerline, contains a small population of

gypsywort, a state-listed plant. This species was found within 15 feet of the right-of-way. No other state-listed species were found in areas adjacent to the right-of-way.

Habitat of State-Listed Invertebrates

Areas along the Stoughton Line, particularly within the Hockomock Swamp and Pine Swamp, were surveyed in the spring and summer of 2000 and 2001 to determine if suitable habitat for state-listed invertebrates is present, based on the presence of host plant species. This survey found that suitable habitat (Atlantic white cedars (*Chamaecyparis thyoides*) and water-willow) for two state-listed insects is present.

Potential habitat along the project corridor for Hessel's hairstreak includes Atlantic white cedars that have become established on the sideslopes of the embankment within Hockomock Swamp and Pine Swamp as well as the extensive areas of Atlantic white cedar swamp within these wetlands.

Two areas of water-willow have been identified along the right-of-way in the Hockomock Swamp. The first is in the southern portion of the ponding area associated with Certified Vernal Pool 1711 (within Wetland EA37). The second is in a pond in Wetland EA37, west of the railroad embankment, approximately 900 feet north of the former Greyhound Park.

4.15.2.4 Existing Conditions within the Study Corridor

This section lists and describes the Priority and Estimated Habitats that are crossed by the alternatives and the state-listed species associated with each.

Southern Triangle (Common to All Rail Alternatives)

The Southern Triangle section of the project area includes the existing active Fall River Secondary and the New Bedford Main Line. Portions of these rail lines are within mapped Priority and Estimated Habitats. Based on the 2008 NHESP Atlas, the New Bedford Main Line crosses three NHESP Priority and Estimated Habitats (PH1093/EH951, PH1158/EH372, and PH1349/EH1), including the Cotley River, Cedar Swamp River, Assonet Cedar Swamp/Great Cedar Swamp, and the Acushnet Cedar Swamp (Figures 4.15-4-8).

The Fall River Secondary crosses one NHESP Priority and Estimated Habitat (PH1093/EH951). This section of the right-of-way includes several smaller wetlands along the Assonet River (Figures 4.15-9). Table 4.15-4 lists the species found within these Priority and Estimated Habitats. These sections include a description of the Priority Habitats polygons crossed by the New Bedford Main Line and Fall River Secondary and the suitable habitat for rare species within these areas. Because the Southern Triangle covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments along New Bedford Mainline and Fall River Secondary.

Table 4.15-4 Southern Triangle Priority and Estimated Habitats

Species	Priority Habitat (PH) (Identification #)	Estimated Habitat (EH) (Identification #)	Project Alternative (Areas of High Biodiversity)
Eastern Box Turtle (Terrapene carolina carolina) Mocha Emerald (Somatochlora linearis) Hessel's Hairstreak *(Callophrys hesseli)*	1093	951	New Bedford Main Line and Fall River Secondary (Assonet Cedar Swamp/Mass Audubon Great Cedar Swamp/Assonet River/Cedar Swamp River/ Cotley River)
Long-Leaved Panic-Grass (Panicum rigidulum ssp. pubescens) Data-sensitive species	1158	372	New Bedford Main Line (Apponquet Regional High School/Cedar Swamp River/ wooded swamp)
Eastern Box Turtle (Terrapene carolina carolina) Coastal Swamp Amphipod (*Synurella chamberlaini*) Pale Green Pinion Moth (*Lithophane viridipalle*) Water-Willow Stem Borer Moth (*Papaipema sulphurata*)	1349	1	New Bedford Main Line (Acushnet Cedar Swamp)

* Mapped habitat is within 100 feet of but does not intersect the right-of-way.

New Bedford Mainline

Assonet Cedar Swamp (PH 1093/EA 951) (New Bedford Main Line)—The polygon with Priority Habitat (PH1093) includes the Assonet Cedar Swamp which is located in Lakeville and is sometimes referred to as the Great Cedar Swamp. The Great Cedar Swamp borders the Cedar Swamp River and Assonet River south of Myricks Junction (Figure 4.15-5). The Assonet Cedar Swamp includes the Assonet Cedar Swamp Wildlife Sanctuary, a 1,000-acre parcel of conservation land in Lakeville owned by the Massachusetts Audubon Society (Figure 4.15-5). The existing New Bedford Main Line, currently used for freight rail service, crosses the Assonet Cedar Swamp for approximately 1 mile and forms its western boundary for approximately 1 mile in Lakeville. The extensive wetland contains one of the largest Atlantic white cedar swamps in the state.

This polygon extends for approximately 3.5 miles through Berkley and Lakeville. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon.

Northern Limit to Padelford Street—This section extends for 0.9 mile (Figure 4.15-4-5), and is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The railbed passes through forested uplands and two large wetlands associated with the Cotley River (BKCM 4, BKCM 11, BKCM 18). Portions of these wetlands are dominated by shrub swamp. The Cotley River passes under the railbed.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles.

Padelford Street to Myricks Street—This section extends for 0.65 mile (Figure 4.15-5), and is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The railbed primarily passes through a large wetland which is forested on the west side of the right-of-way (BKCM 14) and a shrub swamp on the east side (BKCM 20).

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road may be used for nesting although they do not provide optimal habitat due to the dense and stony substrate. The existing tracks are a barrier to the movement of eastern box turtles.

Myricks Street to Malbone Street—This section extends for 0.4 mile (Figure 4.15-5), and is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The railbed primarily passes through upland areas which are disturbed, and passes between two small forested wetlands (BK 1, BKN 1).

This segment is bordered by areas of marginally suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles.

Malbone Street to Southern Limit Assonet Cedar Swamp—This section extends for 1.7 miles (Figures 4.15-5), and is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The railbed is an elevated berm above wetlands for much of its length, passing through a complex of deciduous forested wetlands, Atlantic white cedar swamp, and more open shrub-dominated swamp. Two perennial streams (Pierce Brook and the Cedar Swamp River) cross under the railbed and may provide habitat for the mocha emerald (*Somatochlora*).

This segment is bordered by some areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. The adjacent wetlands also provide habitat for Hessel's hairstreak (in Atlantic white cedar trees) and the mocha emerald dragonfly may breed in adjacent streams.

Howland Road Area (PH 1158/EA 372)—This 0.5 mile polygon is an active freight railroad (Figure 4.15-5-6) located in Lakeville and Freetown. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The northern section is bordered primarily by forested upland, with a complex of smaller interconnected wetlands in the central portion (LK 12 to LK 19) includes open space areas such as the Apponquet Regional High School, wooded swamps, and other wetlands associated with the Cedar Swamp River. These are forested wetlands, although portions of LK 18 are mapped as Atlantic white cedar swamp (coniferous wetland). Several small culverts convey streams beneath the railbed.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. There are no open coastal plain pond or sandy wetland habitats adjacent to the railbed that provide suitable habitat for long-leaved panic-grass. Within the portion of the polygon (PH1158) crossed by the New Bedford Main Line, one data-sensitive species is also known to be present.[19]

[19] NHESP letter dated January 8, 2009.

Acushnet Cedar Swamp (PH 1349/EH 1)—The polygon with Priority Habitat (PH1349) includes the Acushnet Cedar Swamp State Reservation, which is an approximately 1,000-acre property located in New Bedford and Dartmouth, north of the New Bedford Airport (Figure4.15-7). This is one of eight cedar swamps in public ownership in Massachusetts, and has been designated by the U.S. Department of the Interior – National Park Service as a National Natural Landmark.[20] The existing New Bedford Main Line, currently used for freight rail service, forms the eastern boundary of the State Reservation for approximately 1.5 miles in New Bedford and crosses it for approximately 800 feet. It is an outstanding example of an Atlantic white cedar swamp and provides habitat for several state-listed species. Within the part of the Acushnet Cedar Swamp and adjacent areas crossed by the New Bedford Main Line, four state-listed species (eastern box turtle, coastal swamp amphipod, pale green pinion moth, and water-willow stem borer moth) are known to be present.[21]

This polygon extends for approximately 3 miles through Freetown and New Bedford. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon.

Northern Limit Acushnet Cedar Swamp to Chipaway Road—This 1,600-foot section (Figure 4.15-6) is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. It is bordered by two narrow forested wetlands (FRN-25, FRN 26) and upland forest.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

Chipaway Road to Samuel Barnett Boulevard—This 1.2 mile section (Figure 4.15-7) is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The land to the east, in the northern portion of this section, is a commercial cranberry bog operation consisting of managed bogs and a large pond. The remaining section is bordered by upland forest and forested wetlands containing one certified vernal pool.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

Samuel Barnett Boulevard to Route 140—This 1.5 mile section (Figure 4.15-7-8) is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The land west of the right-of-way is the Acushnet Cedar Swamp State Reservation, and is predominantly forested wetland (NB 22). This wetland is primarily deciduous or

[20] Sorrie, Bruce A. and Henry L. Woolsey, 1987. The Status and Distribution of Atlantic White Cedar in Massachusetts. In A. Laderman, Atlantic White Cedar Wetlands, Westview Press. Pp. 135-142.

[21] NHESP letter dated January 8, 2009.

mixed wetland, with some areas dominated by Atlantic white cedar swamp. Although there is a narrow wetland along the east side of the right-of-way (NB 20), industrial and residential development are close to the railroad right-of-way along this entire segment.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles (although it is unlikely that box turtles occur east of the right-of-way due to extensive development). Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

A transfer power substation is proposed in this segment, immediately south of the powerline right-of-way that parallels Samuel Barnet Boulevard. This would result in the loss of 1.25 acres of potential eastern box turtle habitat.

Fall River Secondary

Within the part of the Assonet Cedar Swamp and adjacent areas crossed by the New Bedford Main Line and Fall River Secondary, three state-listed species (eastern box turtle, mocha emerald, and Hessel's hairstreak) are known to be present.[22] The Fall River Secondary passes through this Priority Habitat (PH1093) from Myricks Junction to Beechwood Road (1.1 miles) (Figures 4.15-9-11). This active freight railroad was constructed as a single track. In the northern section, the railbed is bordered by disturbed uplands or lawns. The remaining section is bordered by forested uplands or forested wetlands (deciduous). The railroad crosses the Cedar Swamp River on a bridge. The Cedar Swamp River may provide suitable habitat for the mocha emerald. There are no Atlantic white cedar swamp habitats along this section.

One culvert in this segment that would be reconstructed to meet Commonwealth of Massachusetts Stream Crossing Standards,[23] and the Cedar Swamp River bridge would be reconstructed with wildlife shelves. None of the filled wetland provides suitable habitat for the mocha emerald. Improving culverts and bridges within this segment could have temporary construction-period impacts to mocha emerald habitat, but would result in an overall improvement by replacing culverts with open-bottom structures.

Potential Rare Species Habitat

This section summarizes the potential rare species habitat adjacent to the right-of-way. Both the New Bedford Main Line and Fall River Secondary are active freight lines with ballasted right-of-way, tracks and ties. There are culverts that convey streams underneath the embankment. The right-of-way itself does not provide suitable habitat for any of the rare species and the tracks and ties prevent turtles and amphibians from moving across the right-of-way, except through the culverts.

- Suitable forested upland habitat for the eastern box turtle is found boarding the New Bedford Main (Acushnet Cedar Swamp and Assonet Cedar Swamp).

[22] NHESP letter dated January 8, 2009.

[23] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

- Coastal swamp amphipods may find suitable habitat within slow-moving streams and inundated hollows in the forested swamps of Acushnet Cedar Swamp.

- Mocha emerald may find suitable habitat along streams that flow through woods or swamps of the Assonet Cedar Swamp.

- Pale green pinion moth may find suitable habitat within wooded swamps of the Acushnet Cedar Swamp.

- Water-willow stem borer moth is a globally restricted species, occurring only in southeastern Massachusetts along upland edges of streams and ponds where its obligate host, water-willow, occurs. It may find suitable habitat in seasonally flooded swamps and along edges of streams and ponds.

- Hessel's hairstreak may find suitable habitat in the Atlantic white cedars that have become established on the sideslopes of the embankment within the Assonet Cedar Swamp and the extensive areas of Atlantic white cedar swamp within these wetlands.

- Long-leaved panic-grass likely does not find suitable habitat within portions of the Priority Habitat (PH1158) adjacent to the New Bedford Main Line because there are no coastal plain ponds located adjacent to the railroad embankment. NHESP has recently determined that habitat of two additional species, wood turtle and ringed boghaunter dragonfly occurs near the Southern Triangle. Due to its location in relation to the proposed railway alignment an analysis of impacts to these two state-listed species was not included in this chapter.

Eastern box turtles may find some suitable habitat within the forested, shrub or meadow portions of the mapped Priority Habitats (PH261 and PH1439) associated with the Three Mile River.

Stoughton Alternative

The study area for the Stoughton Alternative, north of Weir Junction, includes improvements to existing active freight or rail lines (from north of Stoughton Station, and Dean Street to Cotley Junction) and track construction on out-of-service or abandoned rights-of-way (between Stoughton Station and Dean. This Alternative would include constructing a trestle through part of the Hockomock Swamp to reduce impacts to wetlands and rare species.

Based on the 2008 NHESP Atlas, the Stoughton Alternative crosses two Priority and Estimated Habitats (PH1392/EH59, and PH1297/EH1077). These Priority habitats include land within the Hockomock Swamp ACEC, and Pine Swamp (Figures 4.15-12-15).

Table 4.15-5 lists the species found adjacent to the Stoughton Alternative corridor within these Priority and Estimated Habitats, based on information provided by NHESP.

Table 4.15-5 Stoughton Alternative Study Area—Priority and Estimated Habitats

Species	Priority Habitat (PH) (Identification #)	Estimated Habitat (EH) (Identification #)	Project Alternative (Areas of High Biodiversity)
Blue-Spotted Salamander (*Ambystoma laterale*) Blanding's Turtle (*Emydoidea blandingii*) Eastern Box Turtle (*Terrapene carolina carolina*) Gypsywort (*Lycopus rubellus*)	1392[1]	59	Stoughton Alternative (Hockomock Swamp ACEC/Hockomock Swamp WMA)
Hessel's Hairstreak *(Callophrys hesseli)*	1297	1077	Stoughton Alternative (Pine Swamp)

1 Priority Habitat (PH1392) includes an additional 11 state-listed species which do not occur adjacent to the rail corridor.

These sections include a description of the Priority Habitat polygons crossed by the Stoughton Alternative and the suitable habitat for rare species within these areas.

Hockomock Swamp ACEC (PH1392)—This polygon extends for a total of 5.5 miles from Purchase Street in Easton to I-495 in Raynham. The polygon with Priority Habitat (PH1392) includes the Hockomock Swamp ACEC, which is approximately 16,950 acres of land in Bridgewater, Easton, Norton, Raynham, Taunton, and West Bridgewater (Figures 4.15-14-15). The ACEC is fragmented by several major transportation corridors, including Routes 24, I-495, 138, 106, and other major roadways, and it includes substantial upland areas within the watershed of the Hockomock Swamp. These uplands include land developed in commercial and residential uses as well as undeveloped forested upland and farmland.

The DCR describes the ACEC as one of the most extensive inland wildlife habitats in southeastern Massachusetts. The Atlantic white cedar swamp and acidic fen wetland communities scattered throughout the Hockomock Swamp ACEC are considered to be outstanding examples of these unique natural communities. The ACEC provides habitat for at least 13 species listed as rare, endangered, or of special concern by the NHESP, and much of the ACEC is designated as BioMap Core Habitat. Within the part of the ACEC crossed by the Stoughton Alternative, four state-listed species (blue-spotted salamander, Blanding's turtle, eastern box turtle, and gypsywort) are known to be present.[24] The majority of the vernal pools that support blue spotted salamanders are located between Foundry Street and the existing power line, near the South Easton Vocational and Technical School. The Atlantic white cedar stands also provide potential habitat for Hessel's hairstreak. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon. However, Atlantic white cedar trees are confined to the west side of the existing railroad grade, evidencing the probability that the original establishment of the right-of-way in ca. 1866 eventually altered the delicate hydrogeology of the previously contiguous Atlantic white cedar swamp.

Purchase Street to Prospect Street—The railroad right-of-way within this 0.75 mile section (Figure 4.15-14) consists of a narrow (6 feet wide) gravel pathway on the former railbed. There are drainage ditches on either side of the railbed that have become partially blocked. Due to these blockages, drainage has been diverted onto the railbed, which functions as an intermittent stream. Residences are immediately

[24] NHESP letter dated January 8, 2009.

adjacent to the railbed on the west side, for approximately 0.4 mile. The adjacent land is primarily forested, and includes forested uplands and wetlands.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. Eastern box turtles, if present, may move across the right-of-way to access suitable habitat areas on either side. NHESP also considers this segment to be within the potential habitat of Blanding's turtle.

Prospect Street to Foundry Street—The railroad right-of-way within this 0.9 mile section (Figure 4.15-14) consists of a 10-foot wide gravel pathway on the former railbed (with evidence of use by ATVs). For the northern 0.3 mile, the right-of-way is bordered by forested upland and wetland on the west, associated with Black Brook, and by a golf course on the east. For the next 0.3 mile, the right-of-way passes between two golf courses. The southern third passes between two large wetlands (EA 82, EA 81). A certified vernal pool is east of the right-of-way just north of Foundry Street. During the 2001 field study, a single blue-spotted salamander was trapped in this area.

This segment is bordered by areas of suitable upland habitat for eastern box turtle and wetlands potentially used by Blanding's turtle. Sandy soils in the golf courses may provide nesting habitat for either turtle species, which, if present, may move across the right-of-way to access suitable habitat areas on either side.

Foundry Street to Power Line—The railroad right-of-way within this 0.6 mile section (Figure 4.15-14) consists of a wide gravel pathway on the former railbed (with evidence of use by ATVs). The Southeast Regional Vocational Technical High School is east of the right-of-way at Foundry Street. The baseball field is immediately adjacent to the railbed. The right-of-way passes through a white pine forested upland and deciduous forested upland and wetlands (EA 77, EA 78) in the northern half and deciduous forested wetland (EA 63, EA 64) in the southern half. An open former sand/gravel pit is west of the railbed at Wetland EA 65.1. Several certified vernal pools are within this section, on both sides of the railbed. At the southern end of this section, the railbed crosses a right-of-way for an overhead power line and the powerline maintenance road. The railbed consists of an open, wide sandy road adjacent to wetlands dominated by woody shrubs, including of highbush blueberry, sweet pepperbush, swamp azalea, and common winterberry (*Ilex verticillata*). Typical herbaceous vegetation include skunk cabbage (*Symplocarpus feotidus)*, cinnamon fern (*Osmunda cinnamomea*), and sensitive fern (*Onoclea sensibilis*) and in some disturbed areas giant reed grass (*Phragmites australis*).

This segment is bordered by areas of suitable upland habitat for eastern box turtle, wetlands potentially used by Blanding's turtle, and vernal pools used as breeding habitat by blue-spotted salamanders. Sandy soils in the gravel pit, or in the ballfield, may provide nesting habitat for either turtle species. All three species may move across the right-of-way to access suitable habitat areas on either side. Significant use of the ACEC by ATVs is evident along the right-of-way, within the abandoned gravel pit, and within side trails, many of which pass in serpentine or circuitous pathways across and through the vernal pools, causing significant disturbance to the soils and likely concomitant damage to egg masses and larval and juvenile stages of amphibians, particularly blue spotted salamander, American toad (*Bufo americanus*) and wood frogs (*Rana sylvatica*). These uses are neither sanctioned nor actively prohibited by MassDOT or Department of Fish and Game personnel.

The northernmost 1,200 feet of this segment would be the approach to the trestle. In this approach segment, the track would slope up, and retaining walls would be used to minimize fill. A traction power substation would be constructed east of the right-of-way, within an area of white pine forest or in the

ballfield. The track would be on the trestle for majority of this section, and the only impacts would result from vegetation removal.

Power Line to Former Raynham Greyhound Park—The railroad right-of-way within this 1.7 mile section (Figures 4.15-14-15) consists of a wide gravel pathway on the elevated former railbed (with evidence of use by ATVs). The railbed passes through primarily forested red maple-dominated wetlands, although there is an open emergent marsh and shrub swamp west of the railbed (south of the powerline), a large vernal pool east of the railbed, (probably a former borrow pit from which earthen materials were once extracted to construct the grade), and an Atlantic white cedar swamp located entirely west of the railbed and extending for approximately 0.6 mile north of the former Raynham Greyhound Park. Three certified and two potential vernal pools occur within this section.

This segment is bordered by wetlands potentially used by Blanding's turtle, wetlands and uplands potentially used by eastern box turtles, and vernal pools used as breeding habitat by blue-spotted salamanders. Based on prior studies, the railroad embankment through the Hockomock Swamp provides limited nesting habitat due to the dense gravel substrate and shaded light regime. Although turtles are occasionally observed to nest on the embankment, the open sandy soils under the power line and along the power line roadway are preferred nesting sites based on field observations by the Corps and others of nesting turtles and predated nests. Sandy soils under the powerline may provide nesting habitat for either turtle species. All three species may move across the right-of-way to access suitable habitat areas on either side. Gypsywort occurs in the open emergent wetland west of the railbed, south of the power line. There would be no impact to this population.

Former Raynham Greyhound Park to Bridge Street—The railroad right-of-way within this 1.1 mile section (Figure 4.15-15) consists of a wide gravel roadway on the former railbed, with evidence of extensive use by ATVs. The northernmost 1,400 feet of this section is bordered to the east by an industrial park, with a detention basin that drains onto the right-of-way. This drainage, combined with a stream flowing from the west, has been identified as a perennial stream flowing north within the railbed. The railbed passes through primarily upland forest, and passes through one small wetland system (R 61, R 59). A maintained powerline is located on the east side of the railbed. A complex of potential vernal pools occurs on both sides of the railbed approximately 1,500 feet north of Bridge Street.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. Eastern box turtles, if present, may move across the right-of-way to access suitable habitat areas on either side.

Bridge Street to I-495—The railroad right-of-way within this 0.25 mile section consists of a wide gravel path on the former railbed. The railbed is bordered by a small park and ballfield to the east, and by residential development on both sides. Elm Street crosses the right-of-way mid-way between Bridge Street and the highway.

Pine Swamp (PH1298)—The polygon with Priority Habitat (PH1297) includes the Pine Swamp, a 275-acre wetland system in western Raynham that includes several properties owned by the Town of Raynham Conservation Commission (Figures 4.15-15). This area consists of forested and marsh wetlands and is located within mapped estimated habitat of several rare wetlands species. It supports an Atlantic

white cedar swamp community. Within the part of the Pine Swamp crossed by the Stoughton Line, one state-listed species (Hessel's hairstreak) is known to be present.[25]

The railroad right-of-way through Pine Swamp, between King Phillip Street and East Britannia Street (Figure 4.15-15), is on an elevated berm for the northern 0.5-mile section and at-grade in the southern section. The railbed contains a narrow (3 to 4 feet wide) path and a powerline owned by the Taunton Municipal Light Company. The northernmost 500 feet is bordered by residential development on the west side. An auto junkyard is east of the right-of-way at the East Britannia Street crossing. The railbed and adjacent powerline are predominantly vegetated with shrubs and herbaceous species, including giant reed grass. Adjacent areas are forested or shrub-dominated wetlands (including a large stand of giant reed grass). The forested wetland east of the railbed is dominated by deciduous trees, while the forested wetland west of the railbed is dominated by Atlantic white cedar.

Atlantic white cedar trees, present in the wetland west of the railbed and on the railbed itself, provide breeding habitat for Hessel's hairstreak butterflies. Atlantic white cedars are present at low densities in Wetland RA12.2, west of the railbed, between the southern Pine Swamp Brook crossing and the northern Pine Swamp Brook crossing. The southernmost trees are located at wetland flag RA12.2-154 (STA 1729), and are approximately 6 feet west of the wetland flag. The northernmost trees are located at wetland flag RA12.2-138 (STA 1711). The Atlantic white cedar community spans a distance of approximately 1,800 linear feet. Trees are primarily growing on the west side of the perimeter ditch, 5 to 6 feet west of the wetland flags. There are occasional trees on the railbed side of the ditch. The Atlantic white cedars occur at low densities within a predominantly red maple (*Acer rubrum*) forested wetland, and co-occur with tupelo (*Nyssa sylvatica*), white pine (*Pinus strobus*), highbush blueberry, dangleberry (*Gaylussacia frondosa*), sweet pepperbush, and poison sumac (*Toxicodendron vernix*). A total of 35 trees were observed on, or within 10 feet of the railbed along this 1,800 foot distance.

Potential Rare Species Habitat

This section summarizes the potential rare species habitat adjacent to the right-of-way. The Stoughton Line is an inactive line without tracks and ties for most of its length. There are culverts that convey streams underneath the embankment. In addition to the culverts, the right-of-way itself provides suitable migratory habitat for rare species in locations where there are no tracks and ties to prevent turtles and amphibians from moving across the right-of-way. The right-of-way may provide suitable nesting, feeding, sheltering, or overwintering habitat for rare species where it has become overgrown. However, portions of the right-of-way show evidence of heavy although unauthorized use by all-terrain vehicles (ATVs), pedestrians and bicycles. Several existing vernal pools adjacent to or nearby the right-of-way also exhibit use by ATVs, with obvious pathways of tire-ruts leading from the railroad corridor into the adjacent habitats, and disturbed soil throughout. This has obvious negative consequences for habitat by crushing eggs or other sensitive life stages of rare species and/or their preferred prey. Nevertheless, successful migrations across the right-of-way by blue-spotted salamanders and certain other fauna are likely not jeopardized by these uses of the corridor, since such crossings generally occur at night and/or early spring when ATVs and other users of the track are likely to be less prevalent. More severe impacts from ATVs are likely within the vernal pools themselves.

As described in Section 4.15.2, a study was conducted in the spring and summer of 2001 to determine rare species occurrences in the Hockomock and Pine Swamps. The study documented a substantial population of blue-spotted salamanders that crossed the right-of-way in both directions. No blue-

[25] Ibid.

spotted salamanders were found in Pine Swamp or in the Hockomock ACEC south of the former Greyhound Park. The largest concentration (85 percent of all animals) was found between the powerline corridor and the Greyhound Park. The Stoughton Line provides migratory habitat for the blue-spotted salamanders.

Based on the Blanding's turtle survey conducted in 2008 within the Hockomock Swamp, Blanding's turtles may find suitable aquatic habitat primarily associated with Black Brook (where it crosses the right-of-way) as well as within vernal pools and other isolated pockets within the greater Hockomock Swamp area. The utility corridor that crosses the rail right-of-way provides suitable nesting habitat for the turtles. Nesting habitat provided within or adjacent to the rail right-of-way is of marginal quality in those areas where the canopy is open enough to allow sunlight to incubate the eggs for long enough periods of time for viable survival.

The eastern box turtle may find some suitable habitat within the forested portions of the right-of-way. However, due to its linear nature and lack of adjacent expanses of forested uplands, it is not ideal habitat for this species. Eastern box turtles are more likely to be found within the upland portions of the powerline corridor and the forested upland areas within the study area. During the 2001 rare species survey, one eastern box turtle was captured and fitted with a radio transmitter. This turtle (designated B1) was captured in the upland forest west of the right-of-way, north of Bridge Street in Raynham. The 2001 rare species study determined that eastern box turtles are infrequently found within the Hockomock Swamp ACEC, and that this species was found to occur only within upland forested areas south of the former Greyhound Park. The 2008 Blanding's turtle study conducted in the Hockomock Swamp (south of Foundry Street) found no eastern box turtles during the nest surveys.

The project corridor may provide marginal nesting habitat for eastern box turtles. However, these areas would be limited to portions of the right-of-way where the canopy is open enough to allow sunlight to incubate the eggs for long enough periods of time for viable survival. Turtles moving between patches of suitable habitat may also cross the right-of-way.

During the 2001 rare species studies, suitable habitat for Hessel's hairstreak was observed where Atlantic white cedars have become established on the sideslopes of the embankment within Hockomock Swamp and Pine Swamp as well as the extensive areas of Atlantic white cedar swamp within these wetlands. No Hessel's hairstreaks were observed during this study.

During the 2001 rare species study, suitable habitat for water-willow stem borer was observed within the Hockomock Swamp in two areas where water-willows were identified along the Stoughton Alternative. One small population of gypsywort was identified within 10 to 15 feet of the railroad berm south of the utility corridor. It is likely that additional areas of suitable habitat exist within the Hockomock Swamp.

Whittenton Alternative

The Whittenton Alternative runs predominantly along the same route as the Stoughton Alternative. The Whittenton Alternative is different from the Stoughton Alternative only along a portion of right-of-way between Raynham Junction and Weir Junction, a length of approximately 5.8 miles. A section of the Whittenton Alternative, known as the Whittenton Branch, diverges from the Stoughton Line at Raynham Junction and travels through Raynham and Taunton for approximately 3.4 miles to Whittenton Junction. This section of track is inactive. At Whittenton Junction, the track joins the Attleboro Secondary, an active rail line, for approximately 2.4 miles to Weir Junction at the beginning of the New Bedford Main

Line. The Whittenton and Stoughton Alternatives run the same route on the Stoughton Line from Canton to Raynham Junction. The New Bedford Main Line and the Fall River Secondary are also identical for both alternatives. Figure 4.15-16-17 shows the Whittenton Alternative.

Priority Habitat polygons (PH261 and PH1439) include portions of the recently-designated Three Mile River Watershed ACEC. This ACEC covers approximately 14,275 acres in Dighton, Norton, and Taunton (Figures 4.15-16-17). The ACEC is fragmented by Route 140, a major transportation corridor, and several other major roadways. It includes substantial upland areas that are developed with commercial and residential uses as well as undeveloped forested upland and farmland.

The ACEC provides habitat for several species listed by the NHESP as rare, endangered, or of special concern. Within the part of the ACEC crossed by Whittenton Alternative on the Attleboro Secondary, one state-listed species (eastern box turtle) is known to be present. The Three Mile Watershed contains many important habitats. A total of 13,486 acres (nearly 95 percent) of the ACEC are comprised of the habitats designated by the NHESP as BioMap Core Habitat and Supporting Natural Landscapes, and as Living Waters Core Habitat and Critical Supporting Watersheds. The certified vernal pools in the ACEC have been found to provide breeding habitat for wood frogs, spotted salamanders (*Ambystoma maculatum*), and fairy shrimp (*Eubranchipus* spp.). The inland wetlands provide food, cover, and shelter for waterfowl, muskrats (*Ondatra zibethica*), snakes, turtles, amphibians, and insects. The floodplain provides essential breeding habitat for reptile and amphibian species, including several NHESP listed species.

Potential Rare Species Habitat

A portion of the Whittenton Branch and a portion of the Attleboro Secondary are within an area listed by the NHESP as eastern box turtle habitat. This area extends from Warren Street on the Whittenton Branch to Whittenton Junction, and along the Attleboro Secondary to a point approximately 500 feet before Danforth Street. The right-of-way itself does not provide suitable habitat for any of the rare species, and the tracks and ties constrain the movement of turtles and amphibians across the right-of-way except through the culverts.

Impacts to rare species habitat are not expected along the Attleboro Secondary because it is an existing active rail line and already presents a barrier to wildlife movement.

Along the Whittenton Branch, while the existing access road does not constitute wildlife habitat, constructing the railroad would result in additional impacts on either side of this road. More substantial impacts would occur along the southernmost section of the right-of-way between the access road and Whittenton Junction, where the path is narrower. Area of impact was estimated by measuring the area inside the limit of work (limit of grading) and subtracting the area of the roadway and path, based on available survey information. A total of approximately 1.2 acres of rare species habitat (successional vegetation along the edge of the traveled path) would be permanently impacted from constructing the railroad. In addition, a total of approximately 0.6 additional acre of eastern box turtle habitat would be temporarily impacted, based on an estimated additional 4 feet outside the limit of grading on both sides of the right-of-way that would be necessary to construct the berm and grading for the railroad. All impacted habitat is upland area except for approximately 460 square feet of permanent impact and 820 square feet of temporary impact to Wetland RWB 04. Wildlife crossings are proposed to facilitate movement under the right-of-way, as described in the previous section

Stations

This section describes the Priority and Estimated Habitats within the proposed station sites associated for the Stoughton and Whittenton Alternatives.

None of the proposed station sites are within mapped Priority Habitat. All the proposed station sites are within partially or fully developed areas. Raynham Park is the only station where the platform would be within mapped Priority Habitat (PH1392); the rest of the Raynham Park station site and its parking lot would not be within the Priority Habitat polygon. This station would serve the Stoughton Alternative and is located at the former Greyhound Park in Raynham (Figure 4.15-15). The Raynham Park Station site is entirely developed and does not provide potential habitat. Based on the habitat requirements of the species known to occur in the study area, it is unlikely that any of the identified rare species would be found on any of the station sites, except for the Eastern Box Turtle, which is a habitat generalist.

Layover Facilities

Neither of the proposed overnight layover facilities (Wamsutta and Weaver's Cove East) are located within a Priority or Estimated Habitat polygon.

One midday rail layover facility is planned for the Boston area, This site is associated with the proposed expansion of South Station, which has independent utility of the South Coast Rail project and is not part of the South Coast Rail project. Any impacts associated with the expansion of South Station, including midday layover facilities, would be addressed through the environmental review process associated with the proposed expansion of South Station. The proposed expansion of South Station is discussed in Chapter 3 as part of the No-Build Alternative.

4.15.2.5 Summary of Existing Conditions

A total of 9 state-listed rare species, have been recorded in areas adjacent to the alternatives corridors. These include one salamander, two turtles, one crustacean, three moths and butterflies, one dragonfly, and one plant species.

The Southern Triangle, common to all Build Alternatives, includes two active freight lines with ballasted right-of-way, tracks and ties. The right-of-way does not provide suitable habitat for any of the rare species, and the tracks and ties prevent turtles and amphibians from moving across the right-of-way except through the culverts. Suitable foraging, breeding, and nesting habitat for rare species occurs adjacent to the rail rights-of-way, particularly in the Assonet Cedar Swamp and Acushnet Cedar Swamp.

The Stoughton Alternative is an inactive right-of-way corridor without tracks and ties from Easton (Short Street) to Longmeadow Street in Taunton . Along this corridor, the right-of-way itself may provide migratory habitat for rare species such as the blue-spotted salamander, Blanding's turtle, and eastern box turtle because there are no tracks and ties to prevent small animals from moving across the right-of-way. The right-of-way itself is unlikely to provide suitable nesting, breeding, or foraging habitat for rare species. Areas on and adjacent to the right-of-way provide habitat for state-listed plants and invertebrates.

The Whittenton Branch and a portion of the Attleboro Secondary are within an area listed by the NHESP as eastern box turtle habitat. The right-of-way itself does not provide suitable habitat for any of the rare species, and the tracks and ties constrain the movement of turtles and amphibians across the right-of-way except through the culverts.

None of the proposed station sites intersect mapped areas of Priority and Estimated Habitat. The only station site that is located adjacent to mapped areas of Priority Habitat is Raynham Park), which largely developed and does not contain significant habitat resources. Based on the habitat requirements of the species known to occur in the study area, it is unlikely that rare species would be found at the proposed station platform site. The eastern box turtle is a habitat generalist and could occur at undeveloped station sites such as the Taunton Depot Station sites, although none have been observed at that location. Table 4.15-6 provides a summary of existing conditions and compares the different alternatives.

Table 4.15-6 Summary of Project Alternatives near Suitable Rare Species Habitat

Alternative	Total # of PH and EH Intersected / Adjacent	Total # of Rare Species Recorded
Southern Triangle		
New Bedford Main Line	3	7
Fall River Secondary	3	7
Stoughton Alternative		
Stoughton Alignment	2	5
Whittenton Alternative		
Whittenton Alignment	3	5

4.15.3 Analysis of Impacts and Mitigation

4.15.3.1 Introduction

This section describes and evaluates impacts that the proposed South Coast Rail alternatives may have on threatened and endangered species within the project study area. Both direct and indirect effects are considered and discussed for each of the project elements. Measures incorporated in the alternatives' designs to avoid and minimize, and when necessary mitigate for unavoidable impacts are described for each of the project elements. Regulatory jurisdiction and compliance with state, and federal regulations are also discussed.

This section also addresses the requirements of the Certificate of the Secretary of Environmental Affairs on the ENF dated April 3, 2009,[26] as well as the Secretary's Certificate on the DEIS/DEIR (June 29, 2011[27]), which required the following.

- Include a detailed quantification and analysis of the relative impacts of the alternatives on state-listed species and their habitats; the analysis should include all components of the project alternatives, including the rail alignments (including the Southern Triangle), stations and layover facilities, and secondary growth impacts.
- Describe how potential impacts of the alternatives will be avoided and minimized.
- Include a detailed description of proposed mitigation measures for each alternative.

[26] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Certificate of the Secretary of Energy and Environmental Affairs on the DEIS/DEIR, South Coast Rail Project (EEA# 14346), April 3, 2009.

[27] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Certificate of the Secretary of Energy and Environmental Affairs on the DEIS/DEIR, South Coast Rail Project (EEA# 14346), June 29, 2011.

- Describe the endangered species permitting process for each alternative based on consultations with NHESP.

- Discuss how costs associated with permitting, including mitigation requirements, are incorporated in the alternatives analysis.

- Consult with NHESP about the methodology to be used prior to any additional habitat analysis and to discuss metrics to be used in the FEIR for assessing impacts to state-listed species and their habitat.

- Consult with NHESP regarding the assumptions related to vegetation cover that were used in the DEIS/DEIR. The analysis of impacts for the Stoughton route should be revised in the FEIR to reflect the full range of vegetation cover types that each state-listed species requires, as recommended by NHESP.

- Quantify impacts to state-listed species, vernal pool habitat, general wildlife, and state-owned open space, and a detailed plan for minimization and mitigation of impacts.

- Provide comprehensive description of how the applicant proposes to meet MESA regulatory requirements, including the standards for authorizing a take of a state-listed species through a Conservation and Management Permit.

- Provide detailed descriptions and discussion of rare species and wildlife crossings and barrier design (for example, culverts and bridges) as well as other minimization measures such as construction management to minimize turtle and salamander mortality.

- Explain in detail how the project will meet the long-term "net benefit" standard in 321 CMR 10.23 including detailed mitigation plans that should be developed in consultation with NHESP. These mitigation plans should be at a very specific level of detail to demonstrate clearly that appropriate and effective mitigation will be implemented.

- Evaluate any potential impacts to migration associated with widening the existing tracks and right-of-way.

Section 4.15.3.2 describes the methodology and definition of impact, Section 4.15.3.3 identifies individual elements impacts along each alternative, Section 4.15.3.4 identifies general temporary construction period impacts, Section 4.15.3.5 summarizes the impacts by alternative, Section 4.15.3.6 presents mitigation approaches, and Section 4.15.4 describes compliance with state and federal regulatory requirements.

4.15.3.2 Impact Assessment Methodology

The proposed South Coast Rail alternatives and associated stations are expected to have direct and indirect effects on rare species and their habitat. This section discusses direct and indirect effects in general, and describes the methodology used to calculate and evaluate impacts to rare species within the project study area.

The list of state-listed species found within Priority and Estimated Habitat polygons that intersect or are adjacent to the project corridors was provided by the NHESP on January, 8, 2009, in response to a

formal request for a detailed list of species found within these Estimated and Priority Habitats. This chapter also addresses the requirements of the Certificate of the Secretary of Environmental Affairs on the ENF and DEIR/DEIS dated April 3, 2009,[28] and June 29, 2011,[29] respectively.

Method for Assessing Direct Impacts

Temporary and permanent direct impacts to rare species and their habitat are anticipated along each of the Build Alternatives. Direct impacts include impacts from construction, grading, vegetation management, and mortality associated with potential collisions with rail traffic. These activities may result in degradation of ecological function and, loss of habitat, as well as loss of rare plant and animal species. Potential temporary construction related impacts are described in Section 4.15.3.4. Permanent effects may include losses or changes in habitat and rare plant and wildlife species through clearing, grading, construction, and the potential introduction of undesirable, invasive species.

Potential habitat loss is a direct effect of transportation projects. Habitat loss occurs if an area that previously provided food, cover, water, and/or breeding resources to a rare species is cleared, paved, filled or altered in such a way that it no longer provides one or more of these resources.

The majority of the work associated with the Build Alternatives falls within existing railroad rights-of-way, therefore, minor temporary and permanent impacts to rare species habitat may occur within narrow strips immediately adjacent to the right-of-way as necessary for track reconstruction and minor re-alignment of track in certain areas.

Direct impacts were calculated through the use of a Geographic Information Systems (GIS) model. This model quantified impacts by intersecting proposed work areas with NHESP Priority and Estimated Habitat polygons for rare species. The model quantified all loss of habitat along the project corridors and at the proposed station sites based on the limit of permanent alteration. Areas within permanent alteration limits that are already disturbed, such as ballasted railbed and roads, were not counted as habitat loss. In addition, impact areas less than 10 feet wide were not counted as habitat loss, because impacts in those areas are expected to be avoided as the final design is developed. Impacts to wetland habitats were calculated based on the updated wetland delineations conducted for the project (and reviewed by each Conservation Commission pursuant to an Order of Resource Area Delineation) and the updated track designs. Temporary wetland impacts during construction were calculated based on an average 4-foot construction offset from the toe of slope. The cover type data were produced based on field observations and review of aerial photographs and MassGIS mapping, as well as field studies undertaken in 2001 and 2009. Additional field observations were made in 2011 during field review of the Abbreviated Notices of Resource Area Delineation filed with each of the corridor conservation commissions, and supplemented by additional field investigations to map specific habitat types in 2012.

Method for Assessing Indirect Impacts

The CEQ defines indirect effects (or impacts) as effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems,

[28] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Certificate of the Secretary of Energy and Environmental Affairs on the DEIS/DEIR, South Coast Rail Project (EEA# 14346), April 3, 2009.

[29] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Certificate of the Secretary of Energy and Environmental Affairs on the DEIS/DEIR, South Coast Rail Project (EEA# 14346), June 29, 2011.

including ecosystems. Indirect effects change the quality or functions of a resource, are measured qualitatively and, therefore, are more difficult to accurately assess than direct effects. Indirect effects include habitat fragmentation and associated edge effects; the loss of genetic diversity of rare plant and animal populations, increased competition for resources, and physical or psychological restrictions on movements caused by some feature within a corridor that wildlife are unwilling or unable to cross. Indirect effects can be caused by the increased noise and visual disturbance from land-clearing, earth-moving, and construction machinery during construction. Following construction, noise associated with the active rail line may cause indirect effects if wildlife avoid habitat near the embankment.

Fragmentation is defined as the subdivision of once large and continuous tracts of habitat into smaller patches. It results from agriculture, urbanization, and transportation or other rights-of-way.[30] Fragmentation clearly has consequences on wildlife communities, especially on rare species. Habitat fragmentation is associated with edge effects when there is a disturbed or developed area created adjacent to a natural and/or forested area. Edge effects may include the spread of invasive species, increase in the canopy gap, and a decrease in species dependent on core and/or undisturbed habitat. In general, fragmentation of habitat is viewed as detrimental when considering original native, climax species composition and abundance, natural history, and relative ecological stability of unmanaged plant and animal populations.

A railroad corridor may act as a barrier that interferes with the movement of some mammals, amphibians, birds and reptiles from one habitat to another. The width of a railroad corridor can influence the frequency of wildlife crossings, as well as the mortality associated with potential collisions with rail traffic. The rail itself can create a barrier to smaller species such as amphibians, reptiles, and smaller mammals. Traffic density and traffic speed may also influence wildlife avoidance of transportation corridors.[31,32,33,34] The loss of migratory routes (barrier effect) was estimated by calculating the length of the new track through the polygons of Priority and Estimated Habitat. This is a conservative estimate of impact because it is unlikely that the entire length of the proposed new track would cross habitat suitable for migration.

For the purposes of calculating barrier effect impacts, it was assumed that impacts to migration would only occur on proposed new tracks. For the Stoughton Alternative and Whittenton Alternatives it would include new track construction on abandoned/out-of-service right-of-way segments of the former Stoughton Line and Whittenton Branch. Existing abandoned tracks such as those on portions of the abandoned Stoughton line provide a semi-porous access for wildlife due to missing cross-ties, missing lengths of rail, and other track degradation. Construction of new tracks in abandoned rail right-of-way would reduce the porosity typical of abandoned tracks and as such could impact migration. It was assumed that there would be no new impacts to migration in areas with existing active tracks.

[30] Rosenfield, R.N., C.M. Morasky. J. Bielefeldt, and W.L. Loope. 1992. *Forest fragmentation and island biogeography: a summary and bibliography*. U.S. Department of the Interior Technical Report NPS/NRUW/NRTR 92/08.

[31] Reijnen, R., R. Foppen, C. ter Braak, and J. Thissen. 1995. *The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads*. Journal of Applied Ecology. 32: 187-202.

[32] Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. T*he effects of traffic on the density of breeding birds in Dutch agricultural grasslands.* Biological Conservation. 75: 255-260.

[33] Reijnen, R. 1995. *Disturbance by car traffic as a threat to breeding birds in The Netherlands*. PhD thesis, DLO Institute of Forestry and Natural Resources. Wageningen, Netherlands.

[34] Formann, R.T.T. and L.E. Alexander. 1998. *Roads and their major ecological effects.* Annual Review of Ecological Systematics. 29:207-31.

Chapter 4.14, *Biodiversity*, *Wildlife, and Vegetation*, provides a broader analysis of the indirect impacts to natural habitats and communities. Chapter 5 evaluates potential indirect effects and cumulative impacts.

4.15.3.3 Impacts of Alternatives by Element

This section describes specific potential impacts that the proposed South Coast Rail alternatives, stations, layover facilities, and traction power stations (specific to the electric alternatives) may have on rare species. These alternatives include the No-Build Alternative (Enhanced Bus), Stoughton Alternative (Electric and Diesel), and Whittenton Alternative (Electric and Diesel) (Figure 4.15-4 through 4.15-17).

The majority of the Build Alternatives use existing segments of active freight and commuter rail lines with ballasted right-of-way, tracks, and ties. Existing culverts carry streams beneath the railroad embankment. These culverts maintain wetland hydrology and provide crossing points for migratory wildlife to access wetland areas on either side of the embankment. The right-of-way itself does not provide suitable habitat for any of the rare species and the tracks and ties prevent turtles and amphibians from moving across the right-of-way except through the culverts. Only the out-of-service portions of the Stoughton Line (Stoughton Alternative) where tracks and ties have been removed (generally, south of Prospect Street in Easton) and Whittenton Branch (Whittenton Alternative) provide suitable unrestricted migratory habitat for rare species.

No-Build (Enhanced Bus) Alternative

The No-Build Alternative would consist of enhancing current bus service along existing roads and highways. The following three existing park-and-ride facilities would be modified as part of the No-Build Alternative:

- The West Bridgewater Park-and-Ride, located near the southwest corner of the intersection of Routes 106 and 24
- The Mount Pleasant Street Park-and-Ride, located on the northwest corner of the intersection of King's Highway and Route 140 in New Bedford
- The Silver City Galleria Park-and-Ride, located adjacent to the Silver City Galleria shopping mall in Taunton

None of the proposed park-and-ride facilities are within Estimated and Priority Habitats. Therefore, none of the components of the No-Build Alternative are expected to impact rare species and/or their habitat.

Southern Triangle (Common to All Rail Alternatives)

Portions of the rail lines within the southern part of the South Coast Rail study area are common to all Build Alternatives. These rail lines form a roughly triangular shape running south from Weir Junction through Myricks Junction to New Bedford along the New Bedford Main Line, and from Myricks Junction to Fall River along the Fall River Secondary, and are therefore referred to as the Southern Triangle. The following sections describe the potential impacts to rare species that may result from new construction for these two components of the Build Alternatives. The southern part of the South Coast Rail study area is encompassed by the other Build Alternative described in subsequent sections.

New Bedford Main Line Rail Segment

The New Bedford Main Line rail segment would require upgrading and reconstructing the existing freight rail tracks (Figures 4.15-4-8). Two new train stations would be constructed in New Bedford (King's Highway and Whale's Tooth) and one in Taunton (Taunton Depot). Double-track sections would be constructed around King's Highway Station, and a combination of double and triple-track would be constructed from Weir Junction to Myricks Junction. Under the electrification alternatives, four traction power stations would be built along this track segment. Impacts to rare species potentially resulting from developing the new stations and layover facilities are discussed later in this section.

Based on the 2008 NHESP Atlas, the New Bedford Main Line crosses three NHESP Priority and Estimated Habitats (PH1093/EH951, PH1158/EH372, and PH1349/EH1). These habitats include the Cotley River, Cedar Swamp River, Assonet Cedar Swamp/Great Cedar Swamp, and the Acushnet Cedar Swamp (Figures 4.15-8). No ACECs are crossed by the New Bedford Main Line. Both direct and indirect impacts as they relate to this rail segment are described below.

Direct Impacts of the Rail Build Alternatives: New Bedford Main Line Rail Segment

The New Bedford Main Line is an active railroad, and the majority of the improvements would occur within the footprint of the existing track. Analysis by NHESP confirms that improvements to the New Bedford Main Line would result in relatively minor impacts to state-listed species. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent to the right-of-way as necessary for track reconstruction and minor re-alignment of track segments in certain areas. The only major change would be an increase in train speed and frequency from the existing use.

Proposed improvements to the New Bedford Main Line rail segment under all Build Alternatives would result in the loss of potential habitat of eight state-listed species that are known to be present within the Priority Habitats crossed by this segment.[35] These species are: eastern box turtle, mocha emerald, Hessel's hairstreak, long-leaved panic-grass, coastal swamp amphipod, pale green pinion moth, mocha emerald and water-willow stem borer moth. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon.

Northern Limit to Padelford Street—This segment (Figure 4.15-23) is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement. The bridge over the Cotley River would be reconstructed to enhance fish and wildlife passage.

Padelford Street to Myricks Street—This segment (Figure 4.15-23) is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road may be used for nesting although they do not provide optimal habitat due to the dense and stony substrate. The existing tracks are a barrier to the movement of eastern box turtles.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement. Box turtle movement may be enhanced, as there is one

[35] NHESP letter dated January 8, 2009.

culvert in this segment that would be reconstructed to meet Commonwealth of Massachusetts Stream Crossing Standards.[36]

Myricks Street to Malbone Street—This segment (Figure 4.15-23) is bordered by areas of marginally suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement.

Malbone Street to Southern Limit Assonet Cedar Swamp—This section extends for 1.7 miles (Figure 4.15-24), and is an active freight railroad. The railbed was constructed for a double track, and currently contains a single track and a maintenance roadway. The railbed is an elevated berm above wetlands for much of its length, passing through a complex of deciduous forested wetlands, Atlantic white cedar swamp, and more open shrub-dominated swamp. Two perennial streams (Pierce Brook and the Cedar Swamp River) cross under the railbed and may provide habitat for the mocha emerald (*Somatochlora linearis*).

This segment is bordered by some areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. The adjacent wetlands also provide habitat for Hessel's hairstreak (in Atlantic white cedar trees) and the mocha emerald dragonfly may breed in adjacent streams.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement. Box turtle movement may be enhanced, as there are culverts in this segment that would be reconstructed to meet Commonwealth of Massachusetts Stream Crossing Standards,[37] between-the-ties crossings would be added, and the Cedar Swamp River bridge would be reconstructed with wildlife shelves.

Reconstructing the railbed would result in some wetland impact in this section, affecting the habitat of Hessel's hairstreak. Atlantic white cedars are present at low to medium densities in Wetland LK-6, east of the railbed, between the Pierce Brook and the Cedar Swamp River. The northernmost trees are located at wetland flag LK6 219 (STA 2184+50), and are approximately 6 feet east of the wetland flag. The southernmost trees are located at the Cedar Swamp River, LK6-101 (STA 2225). The Atlantic white cedar community spans a distance of approximately 4,000 linear feet. Trees are primarily growing on the east side of the perimeter ditch, 5 to 6 feet west of the wetland flags. There are occasional trees on the railbed side of the ditch. The Atlantic white cedars occur at low densities within a predominantly red maple forested wetland, and co-occur with tupelo, white pine, highbush blueberry, dangleberry , sweet pepperbush, and greenbriar (*Smilax rotundifolia*). The number of trees observed on, or within 10 feet of the railbed along this 4,000 foot distance were not counted. Trees were generally single, or in groups of three to five, and spaced 50 to 100 feet apart.

[36] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

[37] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

None of the proposed filled wetland within this segment provides suitable habitat for the mocha emerald. Improving culverts and bridges within this segment could have temporary construction-period impacts to mocha emerald habitat, but would result in an overall improvement by replacing culverts with open-bottom structures.

Howland Road Area (PH 1158/EA 372)—This segment (Figure 4.15-24) is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. There are no open coastal plain pond or sandy wetland habitats adjacent to the railbed that provide suitable habitat for long-leaved panic-grass. Within the portion of the polygon (PH1158) crossed by the New Bedford Main Line, one data-sensitive species is also known to be present.[38]

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement.

Acushnet Cedar Swamp (PH 1349/EH 1)—The polygon with Priority Habitat (PH1349) includes the Acushnet Cedar Swamp State Reservation, which is an approximately 1,000-acre property located in New Bedford and Dartmouth, north of the New Bedford Airport (Figures 4.15-25-26). Within the part of the Acushnet Cedar Swamp and adjacent areas crossed by the New Bedford Main Line, four state-listed species (eastern box turtle, coastal swamp amphipod, pale green pinion moth, and water-willow stem borer moth) are known to be present.[39]

This polygon extends for approximately 3 miles through Freetown and New Bedford. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon.

Northern Limit Acushnet Cedar Swamp to Chipaway Road—This 1,600-foot section (Figure 4.15-25) is an active freight railroad segment is bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement.

Reconstructing the railbed would result in some wetland impact in this section, potentially affecting the habitat of the three invertebrate species. Approximately 100 square feet of suitable wetland habitat would be temporarily altered for construction.

The impact to water-willow stem borer moth and pale green pinion moth habitat would be mitigated by restoring the altered wetlands within the Acushnet Cedar Swamp segment with the appropriate host plant species (water-willow, highbush blueberry, winterberry, sweet pepperbush).

[38] NHESP letter dated January 8, 2009.
[39] NHESP letter dated January 8, 2009.

Chipaway Road to Samuel Barnett Boulevard—This 1.2 mile section (Figure 4.15-25) is an active freight railroad segment bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles. Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement.

Reconstructing the railbed would result in some wetland impact in this section, potentially affecting the habitat of the three invertebrate species. Approximately 11,691 square feet of forested and shrub-dominated wetland in four wetlands would be lost due to filling, and an additional 6,899 square feet of wetland habitat would be temporarily altered for construction.

The impact to water-willow stem borer moth and pale green pinion moth habitat would be mitigated by restoring the altered wetlands within the Acushnet Cedar Swamp segment (6,899 square feet) with the appropriate host plant species (water-willow, highbush blueberry, winterberry, sweet pepperbush).

Samuel Barnett Boulevard to Route 140—This 1.5 mile section (Figure 4.15-25-26) is an active freight railroad segment bordered by areas of suitable upland habitat for eastern box turtle. The open soils of the maintenance road, although dense and stony, may be used for nesting although they do not provide optimal habitat. The existing tracks are a barrier to the movement of eastern box turtles (although it is unlikely that box turtles occur east of the right-of-way due to extensive development). Ditches and wetlands adjacent to the right-of-way may provide suitable habitat for the coastal swamp amphipod. Adjacent wetlands may also provide suitable habitat for the pale pinon moth and the water-willow stem borer moth.

A transfer power substation is proposed in this segment, immediately south of the powerline right-of-way that parallels Samuel Barnet Boulevard. This would result in the loss of 1.25 acres of potential eastern box turtle habitat.

Reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement. Reconstructing the railbed would result in some wetland impact in this section, potentially affecting the habitat of the three invertebrate species. Approximately 1,043 square feet of forested and shrub-dominated wetland in one wetland would be lost due to filling, and an additional 2,859 square feet of suitable wetland habitat would be temporarily altered for construction. Improving culverts within this segment could have temporary construction-period impacts to coastal swamp amphipod habitat, but would result in an overall improvement by replacing culverts with open-bottom structures.

The impact to water-willow stem borer moth and pale green pinion moth habitat would be mitigated by restoring the altered wetlands within the Acushnet Cedar Swamp segment (2,859 square feet) with the appropriate host plant species (water-willow, highbush blueberry, winterberry, sweet pepperbush).

Indirect Impacts of the Rail Build Alternatives: New Bedford Main Line Rail Segment

Upgrading New Bedford Main Line Rail Segment would result in marginal loss of nesting, foraging, and wintering habitat for rare species. There would be no habitat fragmentation because losses would be limited to narrow strips at the edge of the existing railroad ballast. The loss of a small percentage of habitat is not anticipated to affect the long-term persistence of these species populations given the large area of suitable habitat for these species in, and in the vicinity of, the project areas. This is especially the case for eastern box turtles which are habitat generalists and can use other adjacent areas, such as cleared land and scrub-shrub, as basking and foraging habitat.

This alternative would require modification and reconstruction of freight rail bridges across the Taunton River, potentially with temporary impacts to Atlantic sturgeon (*Acipenser oxyrhinchus*) habitat. On December 4, 2008, a letter was submitted to the National Marine Fisheries Service (NMFS) requesting information on any threatened and endangered fisheries resources located within the project area. The response from NMFS received on January 12, 2009, stated that there are no federally endangered fisheries resources present in the Taunton River. Although Atlantic sturgeons are known to be present in the Taunton River during the summer months, they are typically found at the mouth of the river with occasional reports of sturgeon venturing further upstream. NMFS noted that it is unlikely that this species occurs in the vicinity of the proposed project (see correspondence in Appendix 4.15-A).

Since the publication of the DEIS, the New York Bight Distinct Population Segment of Atlantic sturgeon was listed as endangered species under the ESA by the NMFS on April 6, 2012.[40] Therefore, the Corps coordinated with NMFS to determine whether the Build Alternatives would affect this species. However, the NMFS stated in their May 13, 2013 response letter it is unlikely that any species listed under their jurisdiction will be exposed to any direct or indirect effects of the proposed South Coast Rail project, including the Atlantic sturgeon (see correspondence in Appendix 4.15-A). Therefore, further Section 7 consultation with NMFS is not necessary.

In addition, NHESP, in their comment letter on the ENF[41] and in subsequent consultations, has not identified adverse impacts to the Atlantic sturgeon.

Indirect impacts to rare species associated with improvements to the New Bedford Main Line Rail Segment under the Build Alternatives include:

- Improvements to migration for terrestrial wildlife, because reconstructing these tracks presents opportunities to reconstruct existing culverts or bridges to improve wildlife passage (e.g., eastern box turtle) and reduce fragmentation.

- Increase in turtle mortality from being struck by trains if they are able to climb the rail, although this is unlikely because the steel rails represent physical barriers not easily climbed by turtles.

- At grade crossings, when moving between habitats, turtles could die of dehydration if they are trapped between the rails.

[40] Federal Register: February 6, 2012 (Volume 77, Number 24, page 5880-5912), Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region.

[41] Executive Office of Transportation and Public Works, *South Coast Rail Environmental Notification Form*, November 2008.

- Potential increase in mortality of rare species near streams or wetland habitat (mocha emerald, Hessel's hairstreak, coastal swamp amphipod, pale green pinion moth) caused by the use of herbicides. Adherence to the approved Vegetation Management Plan (VMP), as implemented with its YOPs, restricts the use of herbicides in areas adjacent to wetlands or sensitive resources, which would thus reduce such impacts

The habitat requirements of the data-sensitive species found within Priority and Estimated Habitat (PH1158/EH372) have been evaluated, and none occur within or adjacent to the right-of-way. As there are no proposed impacts to habitat of this species, no short- or long-term impacts to such species are anticipated.

Fall River Secondary Rail Segment

The Fall River Secondary rail segment would require upgrading and reconstruction of the existing freight rail tracks (Figures 4.15-27-29). Two new stations would be constructed in Fall River (Battleship Cove and Fall River Depot) and one in Freetown (Freetown). Double-track segments would be constructed in the vicinity of these two stations, while the remainder of the corridor would be maintained as a single-track. Under the electrification alternatives, two traction power stations would be built along this track segment. Traction power stations are small facilities (each approximately one acre or less) that are required at periodic intervals along an electrified rail corridor in order to provide connections to the electricity grid. On the Fall River Secondary, Weaver's Cove East is the favorable location to site a Fall River layover facility.

Based on the 2008 NHESP Atlas, the Fall River Secondary crosses one NHESP Priority and Estimated Habitat (PH1093/EH951). This section of the right-of-way includes several small wetlands along the Assonet River (Figure 4.15-27-29). There are no ACECs crossed by the Fall River Secondary rail segment. The following sections describe both direct and indirect impacts as they relate to the Fall River Secondary rail segment.

Direct Impacts of Rail Build Alternatives: Fall River Secondary Rail Segment

The Fall River Secondary rail segment proposed for use under all Build Alternatives is an active rail road and the majority of the improvements for the Build Alternatives would occur within the footprint of the existing track. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent to the right-of-way as necessary for track reconstruction and minor re-alignment of track segments in certain areas. The only major change would be an increase in train speed and frequency.

Within the part of the Assonet Cedar Swamp (PH1093) and adjacent areas crossed by the Fall River Secondary rail segment, the following three state-listed species are known to be present:[42] eastern box turtle, mocha emerald, and Hessel's hairstreak.

Mitigation for the barrier effect would likely be provided by:

- Reconstructing culverts to meet Commonwealth of Massachusetts Stream Crossing Standards[43]

[42] NHESP letter dated January 8, 2009.

[43] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

- Reconstructing the Cedar Swamp River bridge with wildlife shelves (see Figure 4.14-21a in Chapter 4.14, *Biodiversity, Wildlife, and Vegetation*)

None of the wetlands to be filled provide suitable habitat for the mocha emerald. Improving culverts and bridges within this segment could have temporary construction-period impacts to mocha emerald habitat, but would result in an overall improvement by replacing restricted culverts with open-bottom structures. Reconstructed culverts and other crossings would be designed so as to prevent secondary drainage or other negative alterations to the delicate hydrology of the sensitive wetlands on either side of the right-of-way.

Indirect Impacts of Rail Build Alternatives: Fall River Secondary Rail Segment

Upgrading this track would result in marginal loss of nesting, foraging, and wintering habitat for rare species. Analysis by NHESP confirms that improvements to the Fall Secondary rail segment would result in relatively minor impacts to state-listed species. There would be no habitat fragmentation because all habitat losses would be narrow strips at the edge of the existing railroad ballast. The loss of a small percentage of habitat is not anticipated to affect the long-term persistence of these species populations given the large area of suitable habitat for these species in, and in the vicinity of, the project areas. This is especially the case for eastern box turtles which are habitat generalists and can use other adjacent cleared and scrub-shrub areas as basking and foraging habitat

Indirect impacts to rare species associated with this alternative include:

- Improvements to migration for terrestrial wildlife, because reconstructing these tracks presents opportunities to reconstruct existing culverts or bridges to improve wildlife passage (e.g., eastern box turtle) and reduce fragmentation. During final design, each culvert or bridge that would be removed or replaced would be analyzed in order to avoid causing hydrologic changes.

- Increase in turtle mortality resulting from being struck by trains if they are able to climb the rail, but this is not expected to occur frequently because the steel rails are not easily climbed by turtles.

- At grade crossings, when moving between habitats, turtles could die of dehydration if they are trapped between the rails and are not able to get out.

- Potential increase in mortality of rare species near streams or wetland habitat (e.g., mocha emerald and Hessel's hairstreak) caused by the use of herbicides. Adherence to an approved Vegetation Management Plan (VMP), as implemented in conjunction with Yearly Operating Plans (YOP), restricts the use of herbicides in areas adjacent to wetlands or sensitive resources and would thus reduce such impacts.

Summary of Southern Triangle Impacts

As shown in Table 4.15-7, improvements to the existing railbed would result in the permanent loss of 1.3 acres of wetland and require the temporary alteration of 0.9 acre of wetland, in 16 wetlands. In three locations (Wetland LK-7 on the New Bedford Main Line; Wetland LKF-1, and Wetland FRF-1B on the Fall River Secondary) culverts conveying perennial or intermittent streams under the berm would be extended. Bridges over the Cedar Swamp River would be reconstructed, with no work in the water. While portions of Southern Triangle are bordered by areas of suitable upland habitat for eastern box

turtle, the existing tracks are a barrier to the movement of eastern box turtles. Accordingly, reconstructing the existing railbed and tracks would not result in the loss of eastern box turtle habitat nor create a barrier to box turtle movement.

Table 4.15-7 Southern Triangle Impacts within Estimated and Priority Habitat

Location/Species	Upland Habitat Loss (ac)	Wetland	Wetland Loss (sf)	Temporary Construction Impact (sf)	Comments
New Bedford Main Line - Assonet Cedar Swamp (PH1093)					
Mocha emerald (*Somatochlora linearis*)	NA[1]	BK-1	9,903	4,178	No impact to habitat
Hessel's hairstreak *(Callophrys hesseli)*	NA	LK-4	2,499	1,503	No impact to habitat
		LK-7	23,608	17,267	No impact to habitat
Total[1]	NA		36,010	22,948	
Fall River Secondary - Assonet Cedar Swamp (PH1093)					
Mocha emerald (*Somatochlora linearis*)	NA	BK-2B	5,963	1,721	Forested wetland
	NA	BK-7	414	1,336	Forested wetland
	NA	LKF-1	0	0	Intermittent stream, bank impact only
	NA	LKF-2	2,043	2,500	Forested wetland
	NA	LKF-3	109	193	Forested wetland
	NA	LKF-4	307	514	Forested wetland
	NA	LKF-1A	638	335	Shrub swamp
	NA	FRF-1B	0	0	Intermittent stream, bank impact only
Total	NA		9,474	6,406	
New Bedford Main Line and Fall River Secondary - Acushnet Cedar Swamp (PH1349)					
Coastal swamp amphipod (*Synurella chamberlaini*)	NA	NB-2	1,045	928	Forested wetland
Water-willow stem borer moth (*Papaipema sulphurata*)	NA	NB-6	2,012	1,010	Forested wetland
Pale green pinion moth (*Lithophane viridipalle*)	NA	NB-8	1,567	1,139	Forested wetland
	NA	NB-10	7,067	3,822	Forested wetland
	NA	NB-22	1,043	2,859	Forested wetland
Eastern box turtle (*Terrapene carolina carolina*)	1.25	NA	0	0	Successional upland vegetation
Total[2]	NA		11,691	9,758	

1 Not applicable, no loss of suitable habitat.
2 Inclusive of all species listed under each location.

Long-leaved panic-grass is known to occur within the polygon that includes a wooded swamp area and the Cedar Swamp River (PH1158). Long leaved panic grass is associated with coastal plain pond shore communities, and occurs in moist open sandy habitats on the coastal plain. No suitable habitat has been identified in proximity to the rail right-of-way.

Stoughton Electric Alternative

The Stoughton Electric Alternative north of the Southern Triangle would be comprised of a portion of the Northeast Corridor and the Stoughton Line (Figures 4.15-12-15). This alternative would use the Northeast Corridor from South Station to Canton Junction. At Canton Junction, trains would continue on the existing, active Stoughton Line as far south as the relocated Stoughton Station. Commuter rail service would be extended south from Stoughton Station, using an out-of-service railroad bed, through Raynham Junction to Weir Junction in Taunton. This alignment joins the New Bedford Main Line at Weir Junction, the northern end of the Southern Triangle. This evaluation focuses on the existing and the extended Stoughton Line segment. The Priority and Estimated Habitats crossed by the Northeast Corridor north of Canton Junction would not be impacted under the Stoughton Alternative.

The existing Stoughton Line commuter rail track from Canton Junction to Stoughton would be upgraded for the Stoughton Electric Alternative. This includes improvements to existing active freight or rail lines from Canton Junction to Stoughton Station, and from Dean Street to Weir Junction. This alternative also requires track construction on out-of-service or abandoned rights-of-way between Stoughton Station and Dean Street.

One existing train station along the Stoughton Line would be reconstructed (Canton Center) and six new train stations would be constructed (Stoughton, Easton Village, North Easton, Raynham Park, Taunton, and Taunton Depot). Three traction power stations would be built along this track segment. No new layover facilities would be constructed along this segment. Potential impacts to rare species from reconstructing the existing and developing the new stations are discussed later in this section.

Based on the 2008 NHESP Atlas, the Stoughton Line crosses two Priority and Estimated Habitats (PH1392/EH59 and PH1297/EH1077). These Priority habitats include land within the Hockomock Swamp ACEC and Pine Swamp respectively. The following sections describe both direct and indirect impacts as they relate to this alternative; the two Southern Triangle components were previously discussed.

Direct Impacts of the Stoughton Electric Alternative: Stoughton Rail Segment

The alignment of the proposed Stoughton Alternative follows a previously developed railroad corridor. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent the right-of-way during track reconstruction and re-alignment. Most of the impacts are expected along the track construction on out-of-service or abandoned rights-of-way between Stoughton Station and Dean Street.

The Stoughton Alternative would result in the loss of potential habitat of five state-listed species (Blanding's turtle; eastern box turtle; blue-spotted salamander, gypsywort and Hessel's hairstreak) and would interrupt a migratory corridor used by turtles and blue-spotted salamanders (Table 4.15-8). These species are known to be present within the Priority Habitats crossed by this segment.[44]

[44] NHESP letter dated January 8, 2009.

Table 4.15-8 Stoughton Alternative Impacts within Estimated and Priority Habitat

Location/Species	Upland Habitat Loss (ac)	Wetland (ID)	Wetland Loss (sf)	Temporary Construction Impact (sf)	Comments
Stoughton Alternative-Hockomock Swamp Area (PH1392)					
Blanding's turtle (*Emydoidea blandingii*)	12.5	EA-77	0	217	Forested and shrub wetland bordering intermittent stream CVP 1665
Blue-spotted salamander (*Ambystoma laterale*)	7.5	EA-77	0	217	Forested and shrub wetland bordering intermittent stream CVP 1665
Eastern box turtle (*Terrapene carolina carolina*)	11.4	NA[1]	NA	NA	Successional upland vegetation, unvegetated gravel railroad berm, impede movement
Stoughton Alternative-Pine Swamp Area (PH1297)					
Hessel's hairstreak *(Callophrys hesseli)*	NA	R-12.2	18,578	14,537	Forested wetland containing Atlantic White Cedar – estimated loss of 35 trees

1 Not applicable, no loss of suitable habitat.

Hockomock Swamp ACEC (PH1392)—This polygon extends for a total of 5.5 miles from Purchase Street in Easton to I 495 in Raynham. The polygon with Priority Habitat (PH1392) includes the Hockomock Swamp ACEC, which is approximately 16,950 acres of land in Bridgewater, Easton, Norton, Raynham, Taunton, and West Bridgewater (Figures 4.15-21-22). The ACEC is fragmented by several major transportation corridors, including Route 24, I-495, Route 138, Route 106, and other major roadways, and the railroad right-of-way itself, and it includes substantial upland areas within the watershed of the Hockomock Swamp. These uplands include land developed in commercial and residential uses as well as undeveloped forested upland and farmland.

The DCR describes the ACEC as one of the most extensive inland wildlife habitats in southeastern Massachusetts. The Atlantic white cedar swamp and acidic fen wetland communities scattered throughout the Hockomock Swamp ACEC are considered to be outstanding examples of these unique natural communities. Within the part of the ACEC crossed by the Stoughton Alternative, four state-listed species (blue-spotted salamander, Blanding's turtle, eastern box turtle, and gypsywort) are known to be present.[45] The Atlantic white cedar stands also provide potential habitat for Hessel's hairstreak. Because the polygon covers an extensive area and crosses several diverse habitats, existing conditions are described for individual segments within the polygon.

Purchase Street to Prospect Street—The railroad right-of-way within this 0.75 mile section (Figure 4.15-21) consists of a narrow (6 feet wide) gravel pathway on the former railbed. This segment is bordered by

[45] NHESP letter dated January 8, 2009.

areas of suitable upland habitat for eastern box turtle. Eastern box turtles, if present, may move across the right-of-way to access suitable habitat areas on either side. NHESP also considers this segment to be within the potential habitat of Blanding's turtles.

Reconstructing the railbed would result in the loss of vegetation along the edges of the path that may provide cover for turtles (3.1 acres) and would create a barrier to the movement of turtles between potential habitats east and west of the railbed.

Prospect Street to Foundry Street—The railroad right-of-way within this 0.9 mile section (Figure 4.15-21) consists of a 10-foot wide gravel pathway on the former railbed (with evidence of use by ATVs). For the northern 0.3 mile, the right-of-way is bordered by forested upland and wetland on the west, associated with Black Brook, and by a golf course on the east. For the next 0.3 mile, the right-of-way passes between two golf courses. The southern third passes between two large wetlands (EA 82, EA 81). A certified vernal pool is east of the right-of-way just north of Foundry Street. During the 2001 field study, a single blue-spotted salamander was trapped in this area.

This segment is bordered by areas of suitable upland habitat for eastern box turtles and wetlands potentially used by Blanding's turtles. Sandy soils in the golf courses may provide nesting habitat for either turtle species, which, if present, may move across the right-of-way to access suitable habitat areas on either side.

Reconstructing the railbed and track within this section would create a barrier to the movement of Blanding's turtles between the two golf courses and potentially suitable habitat on either side of the right-of-way. This would also create a barrier to the movement of blue-spotted salamanders in the southernmost 800 feet of this section.

Reconstructing the railbed would also result in the loss of vegetation, where the right-of-way is not occupied by a dirt path. The path in this section averages 10 feet wide. The loss of natural vegetation providing cover to turtles would be approximately 2.8 acres; the loss of natural vegetation providing cover or upland habitat for blue-spotted salamanders would be 0.7 acre.

Mitigation for the barrier effect would likely be provided by:

- Reconstructing the Black Brook bridge with wildlife shelves
- Reconstructing culverts to meet Commonwealth of Massachusetts Stream Crossing Standards[46]
- Installing between-the-ties crossing structures
- Installing wildlife crossing culverts

Foundry Street to Power Line—The railroad right-of-way within this 0.6 mile section (Figure 4.15-21) consists of a wide gravel pathway on the former railbed (with evidence of use by ATVs. The right-of-way passes through a white pine forested upland and deciduous forested upland and wetlands (EA 77, EA 78) in the northern half and deciduous forested wetland (EA 63, EA 64) in the southern half. Several certified

[46] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

vernal pools are within this section, on both sides of the railbed. At the southern end of this section, the railbed crosses a right-of-way for an overhead power line and the powerline maintenance road. The railbed consists of an open, wide sandy road adjacent to wetlands dominated by woody shrubs and Phragmites.

This segment is bordered by areas of suitable upland habitat for eastern box turtle, wetlands potentially used by Blanding's turtle, and vernal pools used as breeding habitat by blue-spotted salamanders. Sandy soils in the gravel pit, or in the ballfield, may provide nesting habitat for either turtle species. All three species may move across the right-of-way to access suitable habitat areas on either side.

The northernmost 1,200 feet of this segment would be the approach to the trestle. In this approach segment, the track would slope up, and retaining walls would be used to minimize fill. A traction power substation would be constructed east of the right-of-way, within an area of white pine forest or in the ballfield. The track would be on the trestle for the majority of this section, and the only impacts would result from vegetation removal. Reconstructing the railbed and track within the northernmost 1,200 feet of this section would create a barrier to the movement of Blanding's turtles and blue spotted salamanders. However, these species could cross through the enhanced culvert or could walk south and pass under the trestle, guided by the retaining walls.

Reconstructing the railbed and constructing the trestle would also result in the loss of vegetation, where the right-of-way is not occupied by a dirt path. The path in this section averages 15 feet wide (the width ranges from 10 to 30 feet). The loss of natural vegetation providing cover to turtles or salamanders would be approximately 1.6 acres. There would be no wetland impacts in this section, except as needed to reconstruct the culvert connecting wetlands EA-77 and EA-78 (both of which contain vernal pools).

Mitigation for the barrier effect would likely be provided by:

- Reconstructing the culvert to meet Commonwealth of Massachusetts Stream Crossing Standards[47]
- Retaining walls would guide animals around the at-grade section north of the trestle
- Daylighting culverts in this segment (beneath the proposed trestle)

Power Line to Former Raynham Greyhound Park—The railroad right-of-way within this 1.7 mile section (Figures 4.15-21-22) consists of a wide gravel pathway on the elevated former railbed (with evidence of use by ATVs). The railbed passes through primarily forested red maple-dominated wetlands, although there is an open emergent marsh and shrub swamp west of the railbed (south of the powerline), a large vernal pool east of the railbed, and an Atlantic white cedar swamp located entirely west of the railbed and extending for approximately 0.6 mile north of the Raynham Greyhound Park. Several vernal pools occur within this section.

This segment is bordered by wetlands potentially used by Blanding's turtles, wetlands and uplands potentially used by eastern box turtles, and vernal pools used as breeding habitat by blue-spotted salamanders. Sandy soils under the powerline may provide nesting habitat for either turtle species. All three species may move across the right-of-way to access suitable habitat areas on either side.

[47] Ibid.

Gypsywort occurs in the open emergent wetland west of the railbed, south of the power line. There would be no impact to this population.

Reconstructing the railbed would result in the loss of upland forest vegetation, where the right-of-way is not occupied by a dirt path. The path in this section averages 10 feet wide. The loss of natural vegetation providing cover to turtles or salamanders would be approximately 5 acres.

The southernmost section of this segment would be the approach to the trestle. In this approach segment, the track would be at-grade, sloped up to the trestle. Although there would be impacts to wetlands north of the Raynham Greyhound Park road crossing, these wetlands do not provide habitat for Blanding's turtle, eastern box turtle, or blue-spotted salamander. One culvert in this section would be reconstructed to meet Commonwealth of Massachusetts Stream Crossing Standards.[48]

Although the trestle does not affect wildlife movement, the six culverts within the trestle section would be "daylighted" to improve their function as wildlife crossings.

Former Raynham Greyhound Park to Bridge Street—The railroad right-of-way within this 1.1 mile section (Figure 4.15-22) is within a cut through the landscape, making the right-of-way a topographic low point. It consists of a wide gravel roadway on the former railbed, with evidence of extensive use by ATVs. The northernmost 1,400 feet of this section is bordered to the east by an industrial park, with a detention basin that drains onto the right-of-way. An existing stream (formerly an agriculture drainage ditch) flowing from the west drains into a ditch on the west side of, and parallel to, the track. This drainageway has become blocked, and thus the combined flow from the ditch and the detention basin on the east, has been identified as a perennial stream flowing north within the railbed. The railbed passes through primarily upland forest, and passes through one small wetland system (R 61, R 59). A maintained powerline is located on the east side of the railbed. A complex of potential vernal pools occurs on both sides of the railbed approximately 1,500 feet north of Bridge Street.

This segment is bordered by areas of suitable upland habitat for eastern box turtle. Eastern box turtles, if present, may move across the right-of-way to access suitable habitat areas on either side.

Reconstructing the railbed and track within this section would create a barrier to the movement of eastern box turtles between potentially suitable habitat on either side of the right-of-way. Reconstructing the railbed would also result in the loss of vegetation, where the right-of-way is not occupied by a dirt path. The path in this section averages 10 feet wide. The loss of natural vegetation providing cover to turtles would be approximately 11.4 acres as calculated by NHESP, including the gravel pathway.

Mitigation for the barrier effect would likely be provided by installing between ties crossing structures.

Bridge Street to I-495—The railroad right-of-way within this 0.25 mile section consists of a wide gravel path on the former railbed. The railbed is bordered by a small park and ballfield to the east, and by residential development on both sides. Elm Street crosses the right-of-way mid-way between Bridge Street and the highway.

[48] Ibid.

Although included in the priority habitat polygon, this segment is not bordered by areas of suitable upland habitat for eastern box turtle. Accordingly, there are no impacts to eastern box turtle in this section.

Pine Swamp (PH1298)—The railroad right-of-way through Pine Swamp, between King Phillip Street and East Britannia Street (Figure 4.15-22), is on an elevated berm for the northern 0.5-mile section and at-grade in the southern section. The railbed contains a narrow (3 to 4 feet wide) path and a powerline owned by the Taunton Municipal Light Company. The northernmost 500 feet is bordered by residential development on the west side. An auto junkyard is east of the right-of-way at the East Britannia Street crossing. The railbed and adjacent powerline are predominantly vegetated with shrubs and herbaceous species, including giant reed grass. Adjacent areas are forested or shrub-dominated wetlands (including a large stand of giant reed grass). The forested wetland east of the railbed is dominated by deciduous trees, while the forested wetland west of the railbed is dominated by Atlantic white cedar.

Atlantic white cedar trees, present in the wetland west of the railbed and on the railbed itself, provide breeding habitat for the Hessel's hairstreak butterfly. Atlantic white cedars are present at low densities in Wetland RA12.2, west of the railbed, between the southern Pine Swamp Brook crossing and the northern Pine Swamp Brook crossing. The southernmost trees are located at wetland flag RA12.2-154 (STA 1729), and are approximately 6 feet west of the wetland flag. The northernmost trees are located at wetland flag RA12.2-138 (STA 1711). The Atlantic white cedar community spans a distance of approximately 1,800 linear feet. Trees are primarily growing on the west side of the perimeter ditch, 5 to 6 feet west of the wetland flags. There are occasional trees on the railbed side of the ditch. The Atlantic white cedars occur at low densities within a predominantly red maple forested wetland, and co-occur with tupelo, white pine, highbush blueberry, dangleberry), sweet pepperbush, and poison sumac . A total of 35 trees were observed on, or within 10 feet of the railbed along this 1,800 foot distance.

Reconstructing the railbed would result in the loss of vegetation, where the right-of-way is not occupied by a dirt path. The path in this section averages 3 to 4 feet wide. The loss of natural vegetation containing Atlantic white cedars would be approximately 18,578 square feet, and approximately 14,537 square feet of wetland would be temporarily altered for construction. This work would result in the loss of approximately 35 Atlantic white cedar trees (the habitat of Hessel's hairstreak).

This impact would be mitigated by restoring the altered wetlands within the Pine Swamp segment (14,537 square feet) with Atlantic white cedars.

The Stoughton Line would potentially impact rare species habitat within the Hockomock Swamp ACEC, which encompasses most of Priority and Estimated Habitat polygon (PH1392/EH59). Habitat potentially used by Blanding's turtle, eastern box turtle, blue-spotted salamander, gypsywort and Hessel's hairstreak would be impacted within the Hockomock Swamp ACEC. An additional 11 state-listed species occur within the Hockomock Swamp polygon (PH1392/EH59). Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Gypsywort (*Lycopus rubellus*)—The proposed Stoughton Alternative is not anticipated to have any adverse effect on the existing population or habitat of gypsywort, and not likely to result in a "take." The known population is within a wetland adjacent to the railroad berm through the Hockomock Swamp, where the restored tracks would be on an elevated trestle. No work would occur in the wetland where this species occurs.

Hessel's Hairstreak Butterfly (*Callophrys hesseli*)—The proposed Stoughton Alternative would not result in a "take" of Hessel's hairstreak as a result of the loss of breeding habitat (Atlantic white cedar trees) in Pine Swamp. The proposed project would require that the tracks be reconstructed through Pine Swamp. This would require that the existing berm be reconstructed with placement of sub-ballast, ballast, ties and track. As shown in Figure 4.15-22, impacts have been minimized through the use of reinforced earth slopes. However, there would be unavoidable impacts to wetlands containing Atlantic white cedar trees, as well as Atlantic white cedar trees growing on the existing upland berm. However, no Atlantic white cedar swamp would be affected in the Assonet Cedar Swamp. The total estimated loss of habitat for Hessel's hairstreak (wetland [R 12.2] and upland) is approximately 35 Atlantic white cedar trees, assuming the impacted areas are utilized by the Hessel's hairstreak.

Mocha Emerald Dragonfly (*Somatochlora linearis*)—The proposed Stoughton Alternative would result in minor impacts to potential mocha emerald dragonfly habitat within the Assonet Cedar Swamp polygon but would not result in a "take" as determined by NHESP. Improvement to the existing railbed would result in the permanent loss of 1.04 acres of wetland and could require the temporary alteration of an additional 0.7 acre of wetland. These losses of wetlands would be in narrow strips at the existing edge of the railroad berm.

Pale Green Pinion Moth (*Lithophane viridipalle*)—The proposed Stoughton Alternative would result in minor impacts to potential pale green pinion moth habitat within the Acushnet Cedar Swamp polygon but would not result in a "take" as determined by NHESP. Proposed improvements to the existing railbed would result in the permanent loss of 0.26 acre of wetland and could require the temporary alteration of an additional 0.22 acre of wetland, in five wetlands. This loss of wetlands would be in a narrow strip at the existing edge of the railroad berm.

Water-willow Stem Borer Moth (*Papaipema sulphurata*)—The proposed Stoughton Alternative would result in minor impacts to potential water-willow stem borer moth habitat within the Acushnet Cedar Swamp polygon but would not result in a "take" as determined by NHESP. Improvements to the existing railbed would result in the permanent loss of 0.26 acre of wetland and could require the temporary alteration of an additional 0.22 acre of wetland, in five wetlands. This loss of wetlands would be in a narrow strip at the existing edge of the railroad berm.

Coastal Swamp Amphipod (*Synurella chamberlaini*)—The proposed Stoughton Alternative would result in minor impacts to potential coastal swamp amphipod habitat within the Acushnet Cedar Swamp polygon but would not result in a "take" as determined by NHESP. The proposed improvements to the existing railbed would result in the permanent loss 0.26 acre of wetland and could require the temporary alteration of an additional 0.22 acre of wetland, in five wetlands. This loss of wetlands would be in a narrow strip at the existing edge of the railroad berm.

Blue-spotted Salamander (*Ambystoma laterale*)—The proposed Stoughton Alternative would result in a "take" of blue-spotted salamander as a result of reconstructing the railbed between Foundry Street and the powerline. Although the reconstruction would not result in the loss of vernal pool habitat used for reproduction, there would be a loss of 7.5 acres of forested upland habitat potentially used as non-breeding and overwintering habitat for construction of the transfer power substation south of Foundry Street. Constructing the tracks at grade and on the approach to the trestle would create a barrier to the movement of salamanders between breeding and non-breeding habitat along approximately 1,500 feet of this section, and an additional 800 feet north of Foundry Street. The remaining length of the railbed would continue to allow unimpeded movement across the berm.

Considering blue-spotted salamanders are rarely encountered above ground, except as adults during their early spring breeding season, or as metamorphosed juveniles in the late summer, limiting proposed work in know areas where this species is present during these periods may minimize impacts to this species. Furthermore, the installation of between-the-ties crossing structures and other mitigation measures would aid in minimizing impacts to this species.

Construction of the approach to the trestle at the northern end would require temporarily impacting approximately 217 square feet of Wetland EA-77, a forested and shrub-dominated wetland bordering an intermittent stream. This wetland contains a vernal pool and provides breeding habitat for vernal pool amphibians.

Construction of the trestle would result in the loss of natural vegetation adjacent to vernal pools, which has the potential to affect water temperature and detrital influxes. However, the loss of canopy would be restricted to one side of each vernal pool and would not affect the capacity of the pool to continue to provide breeding habitat. In addition, the approximately north-south orientation of the right-of-way would limit means that remnant trees would provide adequate shade except during the few hours before and after noon.

Blanding's Turtle (*Emydoidea blandingii*)—The principal effect of the Stoughton Alternative to Blanding's turtles would be to impede the movement of turtles from east to west, particularly in the area where golf courses abut the rail right-of-way on both sides. This could potentially affect access between adult habitat and nesting habitats. There would be no fill in wetlands that provide potential Blanding's turtle habitat (deep marshes or pools with shrub cover). The proposed Stoughton Alternative would require that the out-of-service tracks be reconstructed through the area identified as potential Blanding's turtle habitat. The track would be reconstructed at-grade from Depot Street to approximately 0.28 mile south of Foundry Street. The reconstructed track would interfere with the movements of Blanding's turtles between wetland and upland (potential breeding) habitats on either side of the right-of-way for a total distance of 0.72 mile from Purchase to Prospect Street, 0.87 mile from Prospect to Foundry Street, and 0.28 mile from Foundry Street to the start of the trestle, for a total of 1.9 miles of barrier effect. South of this point, the track would be on an elevated trestle and would not impede turtle movements. The installation of between-the-ties crossing structures and other mitigation measures in concert with potential time of year construction limitations would aid in minimizing impacts to this species.

Construction of the trestle would result in the loss of natural vegetation adjacent to vernal pools, which has the potential to affect water temperature and detrital influxes. However, the loss of canopy would be restricted to one side of each vernal pool and would not affect the capacity of the pool to continue to provide habitat for Blanding's turtles. There would be a total loss of upland vegetation of 12.5 acres consisting of successional vegetation within the right-of-way.

Eastern Box Turtle (*Terrapene carolina carolina*)—The principal effect of the Stoughton Alternative to eastern box turtles would be to impede the movement of turtles from east to west, particularly in the area where undeveloped forested land abuts the right-of-way on both sides. The reconstruction of existing freight rail tracks is not anticipated to affect turtle movement. There would be a loss of 11.4 acres of successional upland vegetation potentially utilized by eastern box turtles as well as the unvegetated gravel railroad berm. The Stoughton Alternative would require that the tracks be reconstructed in the section of the Hockomock Swamp (south of the former Raynham Greyhound Track) that provides eastern box turtle habitat. This work would result in a "take" as the tracks would preclude

the movement of eastern box turtles across the right-of-way, between suitable habitat areas, for a distance of 0.9 mile.

Indirect Impacts of the Stoughton Electric Alternative: Stoughton Rail Segment

The Stoughton Line is an inactive line without tracks and ties for most of its length. Existing culverts carry streams beneath the railroad embankment and provide migratory habitat to wildlife species. In addition to the culverts, the right-of-way itself provides suitable migratory habitat for rare species because there are no tracks and ties to prevent turtles and amphibians from moving across the right-of-way. The right-of-way does not likely provide significant nesting, breeding, and foraging habitat for rare species. However, as noted by the NHESP, much of the embankment has become reforested since the tracks were removed, and is likely to provide suitable feeding, sheltering, and overwintering habitat for the blue-spotted salamander and eastern box turtle. The GIS analysis did not show any loss of Atlantic white cedar swamp habitat; however, Atlantic white cedars were observed growing on the edges of the rail bed and may provide habitat for Hessel's hairstreak.

Documented nesting of spotted turtles within the right-of-way of the Stoughton segment indicates that portions of the right-of-way may also provide nesting habitat for the Blanding's turtle and eastern box turtle. However, nesting habitat available within or adjacent to the right-of-way is of marginal quality, except for the area beneath the overhead powerlines south of Foundry Street. These areas would be limited to portions of the right-of-way where the canopy is open enough to allow sunlight to incubate the eggs for long enough periods of time for viable survival, but higher-quality nesting habitat is present along the powerline right-of-way. Turtles moving between patches of suitable habitat may also cross the right-of-way. Table 4.15-9 lists the species reported to be found within Priority Habitat polygons and the potential habitat functions that could be impacted.

Table 4.15-9 Whittenton Alterntive Impacts within Estimated and Priority Habitat

Location/Species	Upland Habitat Loss (ac)	Wetland (ID)	Wetland Loss (sf)	Temporary Construction Impact (sf)	Comments
Whittenton Alternative- (PH261)					
Blanding's turtle (*Emydoidea blandingii*)	12.5	EA-77	0	217	Forested and shrub wetland bordering intermittent stream CVP 1665
Blue-spotted salamander (*Ambystoma laterale*)	7.5	EA-77	0	217	Forested and shrub wetland bordering intermittent stream CVP 1665
Eastern box turtle (*Terrapene carolina carolina*)	12.6	NA	NA	NA	Successional upland vegetation, unvegetated gravel railroad berm, impede movement

1 Not applicable, no loss of suitable habitat.

The reconstructed rail infrastructure, in locations where no tracks or ties currently exist, would prevent or impede the movement of Blanding's or eastern box turtles across the right-of-way. This habitat

fragmentation could lead to the loss of genetic diversity and decrease in population size, potentially resulting in the local extirpation of some small populations.[49] Fragmentation of habitat for blue-spotted salamanders could potentially have similar results, although the rail would constitute a barrier to salamander movement at the northern edge of the Hockomock Swamp population area and would not impede movement of salamanders for the remaining 7,000 linear feet of the trestle. No habitat fragmentation is anticipated for state-listed insect species which primarily occur along the active freight rail lines. The trestle would be constructed between south of Foundry Street and north of Raynham Park station site. Additional description of the trestle is included in Section 4.15.3.6.

Indirect impacts to rare species associated with the Stoughton segment of the Stoughton Electric Alternative include:

- Loss of migratory routes (barrier effect) and increase in habitat fragmentation, because construction of this track would occur within undeveloped forested area. Within the Hockomock Swamp (PH1392/EH59), in areas north and south of the trestle, the total barrier effect would be approximately 3.2 miles. The barrier effect would be approximately 1.9 miles potentially used by Blanding's turtle between Depot Street and Foundry Street, approximately 0.4 mile used by blue-spotted salamander between Foundry Street and the northern limit of the trestle, and approximately 0.9 mile used by eastern box turtle between the southern limit of the trestle and Bridge Street. The barrier effect was estimated by calculating the length of the new track through the polygons of Priority and Estimated Habitat. This is a conservative estimate of impact because it is unlikely that the entire length of the proposed new track would cross habitat suitable for migration. It does not account for the construction of culverts or bridges as part of the design that would improve the potential for wildlife passage and reduce fragmentation impacts.

- There is potentially some fragmentation to Hessel's hairstreak habitat caused by widening the canopy gap within the Hockomock Swamp. Maintenance of the powerline corridor along the right-of-way has created an existing canopy gap within the Pine Swamp.

- Increase in turtle mortality from being struck by trains if they are able to climb the rail, but this is unlikely to occur frequently because the steel rails represent a physical barrier not easily climbed by turtles.

- At grade crossings, when moving between habitats, turtles could also die of dehydration if they are trapped between the rails and are not able to get out.

- Clearing within 100 feet of vernal pools could lead to the loss of shade within vernal pool habitat that could be used by the blue-spotted salamander. The vernal pool impacts are evaluated in Chapter 4.14, *Biodiversity, Wildlife, and Vegetation*.

Stoughton Diesel Alternative

No traction power facilities are proposed under the diesel alternative. Therefore, the Stoughton Diesel Alternative, north of Weir Junction, would have approximately 1.9 acres less impact than the Stoughton Electric Alternative. All other rare species impacts are the same as those associated with the Stoughton Electric Alternative.

[49] Steen, D.A. and J.P. Gibbs. 2004. Effects of roads on the structure of freshwater turtle populations. Cons. Biol. 18:1143-1148.

Whittenton Electric Alternative

The Whittenton Electric Alternative is an alignment variant of the Stoughton Electric Alternative. Specifically, at Raynham Junction near the southern end of the right-of-way of the former Stoughton Line, the alignment would divert to the southwest, following the right-of-way of the former Whittenton Branch. This alignment would connect with the existing Attleboro Secondary tracks at Whittenton Junction in Taunton, and then continue toward the southeast to connect with the tracks of the New Bedford Main Line at Weir Junction. The portion of the former Stoughton Line between Raynham Junction and Weir Junction would not be used under the Whittenton Alternative which would avoid crossing the Priority and Estimated Habitat (PH1297/EH11077) associated with Pine Swamp.

One existing train stations along the Stoughton Line would be reconstructed (Canton Center) and six new train stations would be constructed (Stoughton, Easton Village, North Easton, Raynham Park, Taunton Depot, and Dana Street). Four traction power stations would be built along this track segment. No new layover facilities would be constructed along this segment. Potential impacts to rare species from reconstructing the existing and developing the new stations are discussed later in this chapter.

Based on the 2008 NHESP Atlas, the Whittenton Electric Alternative crosses two Priority and Estimated Habitats (PH1392/EH59, and PH261/EH153). These Priority Habitats include land within the Hockomock Swamp ACEC and the Three Mile River ACEC (Figure 4.15-16-17). The following sections describe both direct and indirect impacts as they relate to the Whittenton Alternative; inclusive of the Southern Triangle components.

Direct Impacts of the Whittenton Electric Alternative: Stoughton/Whittenton Rail Segment

The alignment of the proposed Whittenton Alternative follows previously developed railroad corridors along the Attleboro Secondary, Whittenton Branch, and Stoughton Line. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent to the right-of-way during track reconstruction and re-alignment. Most of the impacts are expected along the track construction on out-of-service or abandoned rights-of-way between Stoughton Station and Raynham Junction (Stoughton Line) discussed above, and from to Raynham Junction to Whittenton Junction (Whittenton Branch). Impacts to rare species habitat are not expected along the Attleboro Secondary because it is an existing active rail line and already presents a barrier to wildlife movement.

Along the Whittenton Branch, while the right-of-way road does not constitute wildlife habitat, constructing the railroad would result in additional impacts on either side of the right-of-way. More substantial impacts would occur along the southernmost section of the right-of-way between the access road and Whittenton Junction, where the path is narrower. Area of impact was estimated by measuring the area inside the limit of work (limit of grading) and subtracting the area of the roadway and path, based on available survey information. A total of approximately 1.2 acres of rare species habitat (successional vegetation along the edge of the traveled path) would be permanently impacted as a result of constructing the railroad. All impacted habitat is upland area except for approximately 460 square feet of permanent impact and 820 square feet of temporary impact to Wetland RWB-04.

Portions of the Whittenton Electric Alternative along the Stoughton Line, would potentially impact rare species habitat within the Hockomock Swamp ACEC, which encompasses most of Priority and Estimated Habitat polygon (PH1392/EH59). Habitat potentially used by Blanding's turtle, eastern box turtle, blue spotted salamander, gypsywort and Hessel's hairstreak would be impacted within the Hockomock Swamp ACEC. An additional 11 state-listed species occur within the Hockomock Swamp polygon

(PH1392/EH59). Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Mitigation for the barrier effect would likely be provided by:

- Reconstructing culverts to meet Commonwealth of Massachusetts Stream Crossing Standards[50]
- Installing between-the-ties crossing structures
- Installing wildlife crossing culvert

Indirect Impacts of the Whittenton Electric Alternative: Stoughton/Whittenton Rail Segment

The Whittenton Branch and the section of the Stoughton Line from Stoughton Station to Raynham Junction are inactive lines without tracks and ties for most of their lengths. Existing culverts carry streams beneath the abandoned railroad embankment and provide migratory habitat to wildlife species. In addition to the culverts, the right-of-way of the abandoned rail line itself provides suitable migratory habitat for rare species because there are no tracks and ties to prevent turtles and amphibians from moving across the right-of-way.

The right-of-way does not likely provide suitable nesting, breeding, and foraging habitat for rare species. However, as noted by the NHESP, much of the embankment has become reforested since the tracks were removed, and is likely to provide suitable feeding, sheltering, and overwintering habitat for blue-spotted salamanders and eastern box turtles. The GIS analysis did not show the loss of Atlantic white cedar swamp habitat; however, Atlantic white cedars were observed growing on the edges of the rail bed and may provide habitat for Hessel's hairstreak.

Documented nesting of spotted turtles within the abandoned rail line right-of-way indicates that portions of the right-of-way may also provide nesting habitat for Blanding's turtles and eastern box turtles, except for the area beneath the overhead powerlines south of Foundry Street. Nesting habitat of marginal quality is available within or adjacent to the rail right-of-way where the tree canopy is open enough for sunlight to incubate turtle eggs long enough for viable survival. Higher quality nesting habitat is present along the powerline right-of-way.

The reconstructed rail infrastructure, in locations where no tracks or ties currently exist, would prevent or impede the movement of Blanding's or eastern box turtles across the right-of-way. This habitat fragmentation could lead to the loss of genetic diversity and decrease in population size, potentially resulting in the local extirpation of some small populations.[51] Fragmentation of habitat for blue-spotted salamanders could potentially have similar results, although the rail would constitute a barrier to salamander movement for only 1,500 linear feet at the northern edge of the Hockomock Swamp population area and would not impede movement of salamanders for the remaining 7,000 linear feet of the trestle. No habitat fragmentation is anticipated for state-listed insect species which primarily occur along the active freight rail lines. Unlike the Stoughton Alternative, which crosses Pine Swamp between Raynham Junction and Weir Junction, the Whittenton Alternative would not utilize this segment and

[50] River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration- Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

[51] Steen, D.A. and J.P. Gibbs. 2004. Effects of roads on the structure of freshwater turtle populations. Cons. Biol. 18:1143-1148.

thus would avoid potential impacts to Hessel's hairstreak found within the Pine Swamp (PH1297/EH1077).

The indirect impacts to rare species associated with this alternative are the same as the ones described for the Stoughton Alternative, except that:

Loss of migratory routes (barrier effect) and increase in habitat fragmentation, because constructing of this track would be within undeveloped forested area. Within the Hockomock Swamp (PH1392/EH59), in areas north and south of the trestle, the total barrier effect would be approximately 3.6 miles. The barrier effect would be approximately 1.9 miles for Blanding's turtle between Depot Street and Foundry Street, approximately 0.4 mile for blue-spotted salamander between Foundry Street and the northern limit of the trestle, and approximately 0.9 mile for eastern box turtle between the southern limit of the trestle and Bridge Street. Within the Whittenton Branch (PH261/EH153) there is approximately 0.4 mile of additional barrier effect for the eastern box turtle. The barrier effect was estimated by calculating the length of the new track through the Priority and Estimated Habitat polygon. This is a conservative estimate of impact because it is unlikely that the entire length of the proposed new track would cross habitat suitable for migration. It does not account for the construction of culverts bridges or between-the-tie-crossings as part of the design that would improve the potential for wildlife passage and reduce fragmentation impacts.

Whittenton Diesel Alternative

No traction power facilities are proposed under the Whittenton Diesel Alternative. Therefore, the Whittenton Diesel Alternative, north of Weir Junction, involves approximately 1.9 acres less impact than the Whittenton Electric Alternative, which includes 0.8 acre of upland forest and 0.3 acre of upland shrub scrub within traction power station TPSS-1. All other rare species impacts are the same for the Whittenton Diesel Alternative as those associated with the Whittenton Electric Alternative.

Stations

This section describes the Priority and Estimated Habitats within the proposed station sites. None of the proposed station sites for any of the Build Alternatives are within mapped Priority Habitat. All the station sites are within partially or fully developed areas. Raynham Park is the only station where the platform would be within mapped Priority Habitat (PH1392); the rest of the station site and its parking lot would not be within the Priority Habitat polygon. The Raynham Park station would serve the Stoughton Alternatives (electric and diesel) and the Whittenton Alternatives (electric and diesel) (Figure 4.15-4-17). The Raynham Park station site does not provide potential habitat because it is mostly developed. Based on the habitat requirements of the species known to occur in the study area, it is unlikely that any of the identified rare species would be found on any of the station sites, except for the eastern box turtle.

Layover Facilities

Two preferred overnight layover facilities have been selected on the New Bedford Main Line and Fall River Secondary. Neither of the proposed layover facilities are located within Priority or Estimated Habitat polygons.

One midday rail layover facility is planned for the Boston area. This site is associated with the proposed expansion of South Station, which has independent utility of the South Coast Rail project and is not part of the South Coast Rail project. Any impacts associated with the expansion of South Station, including

midday layover facilities, would be addressed through the environmental review process associated with the proposed expansion of South Station. The proposed expansion of South Station is discussed in Chapter 3 as part of the No-Build Alternative.

4.15.3.4 Temporary Construction-Period Impacts

This section describes the range of potential temporary construction impacts to rare species caused by the construction of the South Coast Rail alternatives. It also describes a range of potential mitigation measures.

Temporary Impacts

Temporary impacts include short-term disturbances to rare species during construction that would cease once construction activities are complete. This may include, but is not limited to, the installation of erosion controls, the establishment of a work area, or the installation of a temporary structure at a stream crossing.

Potential short-term construction related impacts may include impairment of ground and surface water due to sedimentation in stormwater runoff or accidental spills; temporary loss of habitat, displacement of rare species due to physical disturbance and noise; and plant and animal injury or death from construction equipment and activities. In areas where the project would require construction in a wetland (resulting in the loss of wetland), the impact calculations include an area of temporary wetland impact extending 8 feet from the slope or retaining wall limit, to allow construction of footings or slope supports. These areas would be restored and revegetated following construction, with appropriate hydrology and plant species. This would result in a short-term loss of habitat available for state-listed species such as water-willow stem borer moth, pale green pinion moth, or coastal swamp amphipod.

Potential short-term construction related impacts may include impairment of ground and surface water due to sedimentation in stormwater runoff or accidental spills; temporary loss of habitat, displacement of rare species due to physical disturbance and noise; and plant and animal injury or death from construction equipment and activities.

The Stoughton Alternative would require reconstructing freight rail bridges across the Taunton River (within the New Bedford Main Line), potentially with temporary impacts to Atlantic sturgeon habitat. The National Marine Fisheries Service has noted that it is unlikely that this species occurs in the vicinity of the proposed project (see correspondence in Appendix 4.15-A).

Both the Stoughton and Whittenton Alternatives propose constructing a trestle along the Hockomock Swamp to avoid impacts to rare species and other wildlife. Constructing the trestle would require placement of hay bales and installing erosion controls along the limit of work which would result in a temporary barrier to rare salamanders and turtle species which currently use the abandoned right-of-way for migration. However, this barrier would only be a short-term temporary condition.

Mitigation for Construction-Period Impacts

Timing of construction may affect the extent of impacts to rare species. Disturbance of habitat during the breeding season is likely to have greater short-term or individual effects on reproductive success; however short-term effects are not likely to have long-term repercussions unless the species population is already unstable. To avoid potential short-term effects to breeding wildlife and rare species (e.g., turtles and salamanders) construction in areas where movement of rare species is a concern, including

the Hockomock Swamp, and Pine Swamp sections may be phased to reduce disruption during breeding season. Daily monitoring of the work areas by a qualified biologist/technician, on both sides of the fencing, would be conducted from early Spring through late Fall. In all cases, construction would be limited to normal daylight hours.

Construction impacts to rare species using or living within aquatic resources (e.g., mocha emerald, coastal swamp amphipod, and pale green pinion moth) would be mitigated through the appropriate use of erosion and sedimentation controls to minimize and eliminate sedimentation of wetlands and waterways. Erosion and sedimentation controls would be installed before construction begins, properly maintained through the construction period, and removed after disturbed areas have stabilized. Construction of bridges and culverts at stream crossings would follow Best Management Practices to avoid impacts to streams and rare species using them.

Detailed site-specific, species-specific mitigation measures would be developed in the permit process in consultation with NHESP. Some of the mitigation measures would include:

- Staking, entrenching siltation fencing at all limits of work within identified rare species habitat areas
- One-way turtle gates
- Daily monitoring of the work area by a qualified biologist/technician, on both sides of the fencing, from early Spring through late Fall; more specifically monitoring would be conducted in areas of rare species habitat as required by NHESP in the Conservation Management Plan (CMP)
- Removing any animals found within the work area
- Relocating any animals found along the drift fence (outside of the work area) to the opposite side of the corridor

Timing and Methods of Construction

Timing of construction may affect the extent of impacts to rare species. Disturbance of habitat during the breeding season is likely to have greater short term or individual effects on reproductive success; however short term effects are not likely to have long term repercussions unless the species population is already unstable. To avoid potential short term effects to breeding wildlife and rare species (e.g., turtles and salamanders), construction in areas where movement of rare species is a concern, including the Hockomock Swamp and Pine Swamp sections, may be phased to reduce disruption during breeding season. In all cases, construction would be limited to normal daylight hours.

Construction impacts to aquatic resources and associated rare species would be avoided and minimized by the appropriate use of erosion and sedimentation controls. These would be installed before construction begins, properly maintained, and removed after disturbed areas have stabilized.

To protect animals (primarily Blanding's turtle and eastern box turtle) during the construction process, the applicant would provide construction period protection and monitoring in all areas where work is proposed within mapped estimated habitat. Construction period monitoring would include:

- Inspecting siltation fencing at all limits of work within identified rare species habitat areas
- Inspecting the one way turtle gates
- Daily monitoring of the work area between Depot Street in Easton and Bridge Street in Raynham by a qualified biologist/technician, on both sides of the fencing, from early Spring through late Fall
- Removal/Relocating any animals found within the work area
- Relocating any animals found along the drift fence (outside of the work area) to the opposite side of the corridor

Post-construction Maintenance

Right-of-way maintenance is critical to the protection of the tracks and ties and to maintaining railroad safety. Right-of-way maintenance is done in accordance with an approved Vegetation Management Plan (VMP) and Yearly Operating Plan (YOP). To protect state-listed species along the project corridors, the applicant adheres to the approved VMP, as implemented with its YOPs, which restrict the use of herbicides in areas adjacent to wetlands or sensitive resources. Sensitive areas include wetlands within 10 feet of surface waters or wetlands where there is no herbicide use application, and include the entire Hockomock Swamp and Pine Swamp sections. Water resources and proposed stormwater management are described separately in the FEIS in Chapter 4.17, *Water Resources*.

4.15.3.5 Summary of Impacts by Alternative

A total of eight state-listed rare species have been recorded in areas adjacent to the project corridors. These include one salamander, two turtles, one crustacean, three moths and butterflies, and one dragonfly. Potential impacts to these species include habitat loss (primarily associated with filling wetlands) and habitat fragmentation, primarily due to constructing new track in areas that do not currently have track, out-of-service portions of the Stoughton Line, and Whittenton Branch. A detailed table of impacts for each of the alternatives is presented below.

No-Build (Enhanced Bus) Alternative

None of the proposed park-and-ride facilities are within Estimated and Priority Habitats. Therefore, none of the components of the No-Build Alternative are expected to impact rare species and/or their habitat.

Southern Triangle

The Southern Triangle portion of the project area includes the existing active Fall River Secondary and the New Bedford Main Line and is common to both railway alternatives (Stoughton and Whittenton). A detailed table of impacts for each of the alternatives is presented below and includes the Southern Triangle.

Stoughton Electric Alternative

The Stoughton Electric Alternative would adversely affect habitat of eight state-listed species (blue-spotted salamander, Blanding's turtle, eastern box turtle, coastal swamp amphipod, mocha emerald dragonfly, Hessel's hairstreak, pale green pinion moth, and water-willow stem borer), and result in a loss

of upland and wetland habitat loss of eight state-listed species (Table 4.15-10). Most of the impacts are expected along the track construction on out-of-service and abandoned portions of the Stoughton Line right-of-way between Stoughton Station and Dean Street. It is anticipated that within the Hockomock Swamp (PH1392/EH59), in areas north and south of the trestle, the Stoughton Line would interrupt migratory corridors for rare species. North of the trestle, the barrier effect would be approximately 1.9 miles and 0.4 mile within areas used by Blanding's turtle and blue-spotted salamander respectively; south of the trestle, the barrier effect would be approximately 0.9 mile within areas used by eastern box turtle (Table 4.15-10).

Table 4.15-10 Impacts by Species–Stoughton Electric Alternative

Species	Upland Habitat Loss (ac)	Wetland Habitat Loss (sf)	Wetland Temporary (sf)	Barrier Effect (length in miles)
Blanding's turtle (*Emydoidea blandingii*)	12.5	0	217	1.9
Blue Spotted salamander (*Ambystoma laterale*)	7.5	0	217	0.4
Hessel's hairstreak[2] *(Callophrys hesseli)*	NA[1]	18,578[4]	14,537	NA
Mocha emerald (*Somatochlora linearis*)	NA	9,474	6,406	NA
Coastal swamp amphipod (*Synurella chamberlaini*)	NA	11,691	9,758	NA
Water-willow stem borer moth (*Papaipema sulphurata*)	NA	11,691	9,758	NA
Pale green pinion moth (*Lithophane viridipalle*)	NA	11,691	9,758	NA
Gypsywort (*Lycopus rubellus*)	NA	NA	NA	NA
Long-leaved panic-grass (*Panicum rigidulum* ssp. *pubes cens*)	NA	NA	NA	NA
Eastern box turtle (*Terrapene carolina carolina*)	12.6[3]	NA	NA	0.9

1 Not applicable, no loss of suitable habitat.
2 Loss of 35 Atlantic white cedar trees.
3 Calculated by NHESP, including vegetated and unvegetated area.
4 Assumes all altered wetland contains suitable host species.

Raynham Park is the only station where part of the station (the platform) would be within mapped Priority Habitat (PH1392); the remainder of the station and its parking lot are outside of the Priority Habitat polygon. The platform impacts are within the limits of work of the Stoughton Line and are accounted for in the impacts associated with reconstruction of the track. The Raynham Park station site does not provide potential habitat because it is currently developed. None of the other station sites are within mapped Priority and Estimated Habitat.

Stoughton Diesel Alternative

The Stoughton Diesel Alternative would result in approximately 1.9 acres less impact than the electric alternative because no traction power facilities are proposed under the diesel alternative. All other rare

species impacts would be the same as those associated with the Stoughton Electric Alternative. These impacts include habitat loss for eight state-species and associated habitat fragmentation/barrier effect for three of these species (blue-spotted salamander, Blanding's turtle, and eastern box turtle).

Whittenton Electric Alternative

The Whittenton Electric Alternative would adversely affect habitat of eight state-listed species (blue-spotted salamander, Blanding's turtle, eastern box turtle, coastal swamp amphipod, mocha emerald dragonfly, Hessel's hairstreak, pale green pinion moth, and water-willow stem borer), and result in a loss of upland and wetland habitat loss of eight state-listed species (Table 4.15-11). Most of the impacts are expected along the track construction on out-of-service and abandoned portions of the Stoughton Line right-of-way between Stoughton Station and Dean Street. It is anticipated that within the Hockomock Swamp (PH1392/EH59), in areas north and south of the trestle, the Stoughton Line would interrupt migratory corridors for rare species. North of the trestle, the barrier effect would be approximately 1.9 miles and 0.4 mile within areas used by Blanding's turtle and blue-spotted salamander respectively; south of the trestle, the barrier effect would be approximately 1.3 miles within areas used by eastern box turtle (Table 4.15-11).

Most of the impacts are expected along the track construction on out-of-service and abandoned rights-of-way between Whittenton Junction and Raynham Junction (Whittenton Branch), and between Dean Street and Stoughton Station from Raynham Junction (portion of the Stoughton Line). It is anticipated that within the Hockomock Swamp (PH1392/EH59) and Whittenton Branch (PH261/EH153) the right-of-way would interrupt migratory corridors (3.6 miles of barrier effect) for rare species. North of the trestle, the barrier effect would be approximately 1.9 miles within areas used by Blanding's turtle and 0.4 mile within areas used by blue-spotted salamander. South of the trestle, the barrier effect 1.3 miles of additional barrier effect within areas used by eastern box turtle within the Whittenton Branch (Table 4.15-11).

Raynham Park is the only station where part of the station (the platform) would be within mapped Priority Habitat (PH1392); the remainder of the station and its parking lot are outside of the Priority Habitat polygon. The platform impacts are within the limits of work of the Stoughton Line and are accounted for in the impacts associated with reconstruction of the track. The Raynham Park station site does not provide potential habitat because it is currently developed. None of the other station sites are within mapped Priority and Estimated Habitat.

Table 4.15-11 Impacts by Species–Whittenton Electric Alternative

Species	Upland Habitat Loss (ac)	Wetland Habitat Loss (sf)	Wetland Temporary (sf)	Barrier Effect (length in miles)
Blanding's turtle (*Emydoidea blandingii*)	12.5	0	217	1.9
Blue Spotted salamander (*Ambystoma laterale*)	7.5	0	217	0.4
Hessel's hairstreak *(Callophrys hesseli)*	NA[1]	18,578	14,537	NA
Mocha emerald (*Somatochlora linearis*)	NA	9,474	6,406	NA
Coastal swamp amphipod (*Synurella chamberlaini*)	NA	11,691	9,758	NA
Water-willow stem borer moth (*Papaipema sulphurata*)	NA	11,691	9,758	NA
Pale green pinion moth (*Lithophane viridipalle*)	NA	11,691	9,758	NA
Gypsywort (Lycopus rubellus)	NA	NA	NA	NA
Long-leaved panic-grass (*Panicum rigidulum* ssp. *pubescens*)	NA	NA	NA	NA
Eastern box turtle (*Terrapene carolina carolina*)	13.8[2]	NA	NA	1.3[3]

1 Not applicable, no loss of suitable aquatic habitat
2 Calculated by NHESP, including vegetated and unvegetated area
3 Barrier effect equals 0.9 mile along north of Raynham Junction and 0.4 mile along the southern portion of the Whittenton Branch.

Whittenton Diesel Alternative

The Whittenton Diesel Alternative would result in approximately 1.9 acres less impact than the electric alternative because no traction power facilities are proposed under the diesel alternative. All other rare species impacts would be the same as those associated with the Whittenton Electric Alternative. These impacts include habitat loss for eight state-species and associated habitat fragmentation/barrier effect for three of these species (blue-spotted salamander, Blanding's turtle, and eastern box turtle).

Summary of Impacts

Each of the Build Alternatives could impact eight state-listed species, and would result in the loss of migratory route habitat because all Build Alternatives require construction of new rail lines where currently there are none (Table 4.15-12).

The Stoughton and Whittenton Alternatives would have potential impacts on suitable rare species habitat as seen in Table 4.15-10 and 4.15-11 for the diesel alternatives, respectively. The Stoughton and Whittenton Diesel Alternatives would each result in approximately 1.9 acres less impact than the electric alternative because no traction power facilities are proposed under the diesel alternative.

Long-leaved panic-grass is known to occur within the polygon that includes a wooded swamp area and the Cedar Swamp River (PH1158). The long leaved panic grass is associated with coastal plain pond shore communities, and occurs in moist open sandy habitats on the coastal plain. No suitable habitat has been identified in proximity to the rail right-of-way.

Table 4.15-12 Direct and Indirect Effects to Rare Species from the South Coast Rail Alternatives

	# of Priority Habitat (PH)	# of Rare Species Impacted[2]	Migratory Route (Barrier effect)
Stoughton Electric	5	8	3.2 miles
Stoughton Diesel	5	8	3.2 miles
Whittenton Electric	6	8	3.6 miles
Whittenton Diesel	6	8	3.6 miles
Stations	0	--	--
Layovers	0	--	--

The Stoughton and Whittenton Alternatives would result in the loss of migratory route habitat (barrier effect) of approximately 3.2 miles, and 3.6 miles, respectively.

4.15.3.6 Mitigation

This section describes the measures to avoid and minimize impacts to rare species and their habitat. It includes specific description of mitigation measures for each of the proposed alternatives.

Introduction

Measures to be developed in coordination with applicable regulatory agencies to avoid and minimize and mitigate rare species impacts within the project study area could include the following.

- Construct tunnels or other passages to facilitate movement across the railbed, with drift fencing.
- Construct a trestle within a section of the Hockomock Swamp as part of the Stoughton and Whittenton Alternatives.
- Construct new nesting or reproduction sites (e.g., for eastern box turtles).
- Supplement vegetation, particularly Atlantic white cedar populations.
- Conduct pre-construction studies to determine population size, distribution, or usage of the railbed to finalize mitigation measures.
- Develop protocols for protection of rare species during the construction process.
- Develop, in consultation with NHESP, mitigation measures that would be acceptable to provide a "net benefit to the local population" of each affected species. These measures may include:
  - Establish new habitat areas based on the state of the science
  - Acquisition of land or conservation restrictions that protect identified critical habitats that are at risk of loss or degradation

- Contribute to the mitigation bank for land protection of species such as the eastern box turtle

Avoidance

Habitat used by state-listed species is present in wetlands and uplands within the study area. Due to the close proximity of state-listed species habitat to the right-of-way, there are no feasible or practicable alternatives that would entirely avoid the loss of habitat. Avoidance of all impacts to rare species habitat would only be possible by implementing the No-Build Alternative (Enhanced Bus). The Build Alternatives would avoid impacts to rare species by:

- Locating all station sites and layover facilities outside of Priority Habitat, and not constructing maintenance roads along the project corridors.

- Keeping, when possible, the track construction and improvements within the existing footprint.

- Constructing a 8,500 foot trestle elevated through the Hockomock Swamp, from approximately 1,400 feet south of Foundry Street in Easton (near the SE Regional Vocational High School ball field) to approximately 1,400 feet north of the proposed Raynham Park station site (Figure 4.15-18). The trestle would be constructed using precast concrete beams, supported on concrete piles with a concrete pile cap. The span between piles would be approximately 30 feet, and the distance between the existing ground and the bottom of the beams would be 5 feet. At each end, the height of the trestle above the ground would decrease to approximately 2 feet above existing grade. To complete the return to ground level, approximately 900 feet of elevated track would be built between retaining walls at each end.

- The Whittenton Alternative would avoid all impacts to rare species habitat (i.e., Hessel's hairstreak) within Pine Swamp by following the Whittenton Branch, rather than the Stoughton Line south of Raynham Junction. However, this would increase impacts to eastern box turtle habitat.

The two proposed traction power substations (Easton and New Bedford) cannot be sited to avoid impact to state-listed species habitat. The only avoidance alternative would be the Stoughton Diesel Alternative. Traction power substations must be located in proximity to major power lines:

- Major power lines cross the New Bedford Main Line south of Samuel Barnett Boulevard. The presence of the powerlines dictates the location of the power substation, and there are no upland locations proximate to the proposed power substation that are not within mapped eastern box turtle habitat. The substation has been designed to avoid impacts to wetland habitats which may provide habitat to listed invertebrate species.

- A major power line crosses the Stoughton Line in the Hockomock Swamp, approximately 1.3 miles south of Foundry Street. The entire area both south and north of the power line is within mapped habitat for blue-spotted salamander and Blanding's turtle. Several alternative locations for this substation were evaluated prior to the publication of the DEIS/DEIR. Upland locations on the west side of the right-of-way were eliminated from further consideration as this land is Town of Easton Conservation Land, protected under

Article 97. In addition, any power substation on the west side would require constructing an access road parallel to the right-of-way, which would have increased impacts on rare species habitat and migration. Two alternative locations on the east side of the right-of-way, within land owned by the Southeast Regional Vocational-Technical School, were evaluated. Both locations are proximate to the right-of-way but within the school's athletic fields. These fields are used by the school athletic programs and by other Easton intermural sports programs. The applicant believes that it is not practicable to eliminate these youth athletic programs.

Minimization

Where construction and rehabilitation of a rail system would occur within or adjacent to rare species habitat, all practicable measures have been taken to minimize adverse impacts. The design refinement process that each of the proposed alternatives and associated stations have undergone since the ENF[52] was published has sequentially reduced impacts to rare species habitat. Measures to minimize impacts would continue through final design, including coordination with the regulatory agencies.

Some of the impact minimization efforts common to all alternatives include:

- Reducing the amount of rare species habitat loss by minimizing the width of work area within sections of the Fall River Secondary and most of the New Bedford Main Line by using single track instead of double track.

- Reducing the amount of rare species habitat loss by not constructing maintenance roads along the rail corridors.

- Replacing and enhancing structurally deficient culverts within the project corridor to allow movement through existing culverts to continue. Design measures would be identified to maintain existing hydrology between wetland systems.

- Further minimization efforts would be pursued during subsequent design phases, for example by using steeper slopes and reducing fill, or retaining walls.

Timing and Methods of Construction

Timing of construction affect the extent of impacts to rare species. Disturbance of habitat during the breeding season is likely to have greater short-term or individual effects on reproductive success; however short-term effects are not likely to have long-term repercussions unless the species population is already unstable. To avoid potential short-term effects to breeding wildlife and rare species (e.g., turtles and salamanders), construction in areas where movement of rare species is a concern, including Hockomock Swamp, and Pine Swamp sections may be phased to reduce disruption during breeding season. In all cases, construction would be limited to normal daylight hours.

Construction impacts to aquatic resources and associated rare species would be avoided and minimized by the appropriate use of erosion and sedimentation controls to minimize and eliminate sedimentation of wetlands and waterways. Erosion and sedimentation controls would be installed before construction begins, properly maintained, and removed after disturbed areas have stabilized. To protect animals during the construction process, the Applicant has indicated that it would provide construction period

[52] Executive Office of Transportation and Public Works, South Coast Rail Environmental Notification Form, November 2008.

protection and monitoring in all areas where work is proposed within mapped estimated habitat. Construction period monitoring would include:

- Staked, entrenched siltation fencing at all limits of work within identified rare species habitat areas
- Inspecting siltation fencing at all limits of work within identified rare species habitat areas
- Inspecting one-way turtle gates which would prevent animals that get onto roadways from being trapped between fences on both sides of the road
- Daily monitoring of the work area by a qualified biologist/technician, on both sides of the fencing, from early Spring through late Fall; more specifically monitoring would be conducted in areas of rare species habitat as required by NHESP in the CMP
- Removing any animals found within the work area
- Relocating any animals found along the drift fence (outside of the work area) to the opposite side of the corridor

Stoughton Alternative (Electric and Diesel)

The Stoughton Alternatives include a trestle through the Hockomock Swamp which would minimize loss of rare species habitat and barrier effects that would prevent turtle and salamander species from crossing the tracks. Wildlife passages (under-rail troughs) in the Pine Swamp may be considered as a mitigation measure.

Whittenton Alternative (Electric and Diesel)

As with the Stoughton Alternatives, the Whittenton Alternatives would minimize loss of rare species habitat and barrier effects by constructing the trestle through the Hockomock Swamp. In addition, this alternative would use wildlife passages along the Whittenton Branch to minimize impacts to the migration of eastern box turtles.

Specific Mitigation Measures

This section describes general mitigation measures common to all alternatives and mitigation measures specific for each of the proposed alternatives. It should be noted, however, that the mitigation measures described herein have been proposed by the applicant/proponents as conceptual mitigation options, and have not been officially endorsed by the USACE. Mitigation options could include, but are not limited to, those described here and could and may become part of a permitted project in the event that a permit is issued.

Common to All

Some of the general mitigation measures common to all alternatives would include:

- Constructing wildlife corridors/passages (e.g., enhanced stream culverts/oversized culverts, bridges, between tie crossings and under-rail troughs)
- Timing and methods of construction

- Post-construction maintenance
- Enhancing or replacing habitat by off-site habitat protection and preservation
- Funding research programs to benefit state-listed species

Provide Wildlife Corridors

Wildlife crossings are specially-designed culverts intended to allow small vertebrates to safely pass under the railroad. These have been conceptually designed in accordance to guidelines based on each species requirements. For example some culverts include skylights to allow natural light to illuminate the culvert; a natural substrate on the bottom of the culvert; and extended drift-fence wing walls to direct animals to the crossings. NHESP suggests that as the project design advances, site-specific information (topographic profile, elevation of track, groundwater) and conceptual designs at each recommended location should be developed and a variety of types of mitigation measures should be incorporated.

Chapter 4.14, *Biodiversity*, *Wildlife, and Vegetation*, provides an analysis of wildlife crossings and types of culverts and crossing structures evaluated as well as impacts to vernal pool habitat, general wildlife. Impacts to state-owned open space are addressed in Chapter 4.10, *Open Space*. Some of the proposed wildlife corridors include underpasses such as enhanced stream culverts, bridges and tunnels. Enhanced/oversized stream culverts are relatively simple concrete box culverts that pass underneath the ballast of the rail line. If there are no structural constraints, existing 5-foot culverts may be replaced with 8-foot wide culverts to provide additional wildlife crossing opportunities. Such enhanced culverts can be embedded to provide natural substrate within the culvert and to maintain hydraulic connectivity under a variety of flow conditions (Figure 4.15-19).

Enhanced stream culverts would be used at key locations to provide small vertebrates with riparian corridor connections. At selected bridges and culverts, the existing structure would be replaced with a structure that provided a shelf, a minimum of 16 inches wide, above the water elevation on each side of the stream channel. These would also be provided with extended drift fence wing-walls to direct animals to the crossing (Figure 4.15-20). Constructing rare species and/or wildlife underpasses and maintaining existing riparian corridors allows wildlife movement to continue. Many species, including large and small mammals, reptiles, and amphibians, will use areas under bridges to access breeding and feeding areas. Wildlife underpasses can maintain travel passages for rare species that may be unable to cross the tracks (such as salamanders and turtles). Drift fences would be installed to facilitate rare species/wildlife passage by directing movement to these underpasses. Additional fencing may be necessary to prevent larger turtles such as the Blanding's turtle from getting between the rails

Underpasses would also be constructed in the vicinity of vernal pools as well as in or near areas with landscape features that provide a connective function (such as shrubby areas that provide cover). The underpasses would be designed with a natural substrate and, where feasible, natural light to encourage some species to use culverts.[53] Topography presents a constraint to installing dry wildlife underpasses. Where the railroad is at-grade or in a cut, it is not practicable to install underpasses unless extensive excavation is done (potentially extending outside of the right-of-way) to create a 6-foot deep slope to the underpass. In such situations, under-rail troughs are preferable.

[53] Jackson, S.D. and C.R. Griffin. 1998. In Proceedings of the international conference on wildlife ecology and transportation (G.L. Evink, P. Garrett, D. Zeigler, and J. Berry, eds.). Report No. FL-ER-69-98. Tallahassee, FL.

Under rail troughs would be constructed within upland areas where no railroad infrastructure currently occurs, in areas where the reconstructed tracks could interrupt migratory patterns of blue-spotted salamander, eastern box turtle, or Blanding's turtle. This crossing structure was used successfully in another rail project in Massachusetts, the Greenbush Rail Line Project. This crossing structure was used successfully in another rail project in Massachusetts, the Greenbush Rail Line Project. This type of crossing structure has been previously reviewed and approved by regulatory agencies as a successful wildlife crossing structure. This crossing demonstrated to work well for spotted turtles, and may need refining and testing to appropriately size for larger turtles such as Blanding's turtle and eastern box turtles. The under-rail troughs include a liner between or below three consecutive rail ties that creates a 7- to 8-inch gap underneath the rails (Figure 4.15-20). Drift fences are installed on either side of the crossing to direct animals to the opening. These under-rail troughs could also be installed adjacent to grade crossings to allow turtles that wander onto the tracks to escape. NHESP recommended that the troughs be as deep as possible and lined with a natural material (not plastic), the wingwall guides should be a permanent material (not wood), and that a long-term monitoring and maintenance program established for continued function.

To mitigate for impacts to blue spotted salamander and Blanding's turtle, existing culverts would be enhanced along the segment between Depot Street and south of Foundry Street, and a new bridge that meets Commonwealth of Massachusetts stream crossing standards would be provided at Black Brook. NHESP requested that each of these structures be as wide as possible, preferably using bridges at all locations. If feasible, and there are no structural and/or grading constraints, additional wildlife crossings may be provided adjacent to some of the enhanced culverts. These additional crossings may take the form of dry culverts that can provide crossing opportunities for non-water dependent species. Mitigation for impacts to eastern box turtles would include constructing up to three under-rail troughs between the proposed Raynham Park Station site and Bridge Street to allow passage of wildlife between habitats separated by the tracks. Figures 4.15-21 and 4.15-22 shows potential locations for these passages. The final design and locations of these passages would be identified in consultation with NHESP; however, preliminary locations of these measures are identified in the Chapter 4.14, *Biodiversity, Wildlife, and Vegetation,* and on Figures 4.14-11a-e, 4.14-12a-d, 4.14-13a-c, 4.14-14a-b.

Post-Construction Maintenance

Right-of-way maintenance is critical to the protection of the tracks and ties and to maintaining railroad safety. Right-of-way maintenance is done in accordance with an approved VMP and YOPs. Adherence to an approved VMP, as implemented in conjunction with YOP, restricts the use of herbicides in areas adjacent to wetlands or sensitive resources. Sensitive areas include wetlands within 10 feet of surface waters or wetlands where there is no herbicide use application. Water resources and proposed stormwater management is described separately in Chapter 4.17, *Water Resources.*

Enhance and Replace Habitat

Opportunities to enhance and replace habitat for eastern box turtles, Blanding's turtles and blue-spotted salamanders are limited along the railroad right-of-way through Easton and Raynham. Adjacent areas are permanently protected open space, intact natural landscapes, or maintained golf courses. One mitigation opportunity in Easton would be to restore an abandoned gravel pit potentially used for turtle nesting. This could be planted with low, clump-forming native perennials interspersed with shrub species. This proposed nesting habitat could be maintained to provide sunny, well drained habitat preferred by nesting females. The area would need to be fenced and signed to exclude ATVs, which currently use the sand pit.

The applicant would enhance, restore, and replace wetlands and their respective functions and values impacted by the project corridors. Wetland mitigation areas adjacent to the project corridors would provide suitable habitat for several rare species and would be planted with water-willow and shrub species used by the pale green pinion moth.

Wetlands and their respective functions and values that are impacted by the Alternatives would need to be enhanced, restored, and replaced. Wetland mitigation areas adjacent to the Alternatives corridors could provide suitable habitat for several rare species. Wetland impacts and proposed mitigation are described separately in Chapter 4.16, *Wetlands*.

Native species such as Atlantic white cedars would be planted along the project alignment in areas where temporary wetland impacts would be restored, in Pine Swamp and the Assonet Cedar Swamp, to discourage invasion by weedy species in newly disturbed areas along the right-of-way. In addition, the applicant would investigate control methods that would remove or restrict invasive species that could spread into adjacent, high-value forested wetlands used by state-listed species. Chapter 4.14, *Biodiversity*, *Wildlife, and Vegetation*, provides more detailed information on the invasive species monitoring and control program.

Habitat Protection/Preservation

Long-term net benefits to rare species found along the project corridors would be provided by assuring permanent protection of the wetland and upland habitats of these species. Examples of habitat protection/preservation include:

- Acquiring land or conservation restrictions that protect identified critical habitats that are at risk of loss or degradation.

- Contributing to the mitigation bank for land protection of species such as the eastern box turtle.

NHESP, through its BioMap Program, has identified the Hockomock Swamp, Pine Swamp and other areas along the project corridors as "Core Habitat', and has identified adjacent areas of "Supporting Natural Landscape." Little of the Supporting Natural Landscape of these locations is protected. Portions of the Assonet Cedar Swamp are owned by the Massachusetts Audubon Society (although not protected by a Conservation Restriction). Areas adjacent to the Hockomock Swamp include suitable habitat for eastern box turtle and Blanding's turtle, but are currently not protected.

Eastern Box Turtle (*Terrapene carolina carolina*) Habitat Bank—

The MESA regulations at 321 CMR 10.23(6)(b)(2), applicable to the eastern box turtle, state that:

> "The applicant shall provide off-site mitigation, or a combination of on-site and off-site mitigation subject to the Division's approval, that achieves the long-term Net Benefit standard in 321 CMR 10.23(1), as determined by the Division [of Wildlife]. Any off-site mitigation provided by the applicant in the form of a financial contribution will be used to fund habitat management or the protection of land or other appropriate mitigation within one or more conservation protection zones established in the conservation plan issued by the Division pursuant to 321 CMR 10.26. The amount of any such off-site mitigation payment will be determined by the Division based on a formula set forth in written guidance that, at a minimum, considers the area

of impact on the on-site habitat of the affected State-listed Species of Special Concern and the land values within one or more of the conservation protection zones."

The off-site mitigation proposed to achieve the long-term Net Benefit standard for impacts to eastern box turtle habitat consists of a financial contribution from the applicant to the NHESP's eastern box turtle habitat bank. The amount of such payment would be determined by the Division.

Once an appropriate mitigation ratio (the amount of land to be protected vs. the amount of habitat loss) is established by NHESP and the Corps, and an appropriate parcel is identified, the property would be acquired either through acquisition in fee or permanent conservation restriction.

Research Program

The majority of the species potentially affected by the rail reconstruction have also been studied at other locations in Massachusetts, and further investigations may not provide useful data that would contribute to the long-term health of these species. However, funding could be provided for scientific research on other state-listed species to enhance knowledge of their conservation biology and protection. Funding could also be provided for research programs within important Priority and Estimated Habitats impacted by the project corridors such as the Hockomock Swamp. The scope of these research programs focused on two of the species affected by the project could yield valuable information that would contribute to their protection and conservation.

Blanding's Turtle (*Emydoidea blandingii*)—Very little information is available about the Hockomock Swamp population of Blanding's turtle, other than anecdotal evidence and a few road-kills. The size, age structure, distribution, movements, and critical habitat areas (nesting, overwintering) have not been determined. A detailed study of this population would provide a net benefit to the species by helping to ensure that critical habitats are protected, and that effective measures to reduce road mortality are developed and installed.

Hessel's Hairstreak (*Callophrys hesseli*)—Very little information about the distribution and abundance of this species in Southeastern Massachusetts is available. The population may have been extirpated from the Hockomock Swamp since 2000 as a result of aerial spraying for mosquitos, and the abundance in Pine Swamp and the Assonet Cedar Swamp has not been recorded. The butterfly is not reported from the Acushnet Cedar Swamp despite the occurrence of suitable habitat. Studies to ascertain the distribution and abundance of this species within the Hockomock, Pine, Assonet, and Acushnet Cedar Swamps would inform the management plans for these properties, and could provide a net benefit by implementing mosquito control measures in sensitive areas that are not/are less lethal to Lepidoptera.

Stoughton Electric Alternative

For the Stoughton Alternative, mitigation would be focused on sections of the Stoughton Line within mapped habitat of blue-spotted salamander, Blanding's turtle, and eastern box turtle in areas outside of the limits of the proposed trestle. The Stoughton Line is an inactive line without tracks and ties for most of its length, and construction of a new rail would interrupt migratory corridors potentially used by these species. Impacts to these species would be avoided where the trestle is constructed through the Hockomock Swamp. Areas of mapped habitat for these species also exist between Depot Street and Foundry Street and between the proposed Raynham Park station site and Bridge Street, beyond the limits of the proposed trestle. For these segments, additional mitigation measures such as wildlife crossings would be required.

As a state threatened species, MESA regulations at 321 CMR 10.23(7) establish certain performance standards including mitigation ratios to achieve the long-term Net Benefit performance standard. These ratios are based on the amount of areal habitat impacted and the category of state-listed species. Accordingly, for Blanding's turtle, a 2:1 mitigation ratio is required. This species would have a loss of 12.5 acres of potential upland habitat, and approximately 1.9 miles of new track (with one new bridge, enhanced culverts and between-the-ties crossing structures) would create a barrier to movement in three segments. To provide a net benefit, the applicant has agreed to provide funding to protect 25 acres of land potentially used by the Hockomock Swamp population of Blanding's turtle, as well as to fund a study of this population that would determine the size and status of the population, identify nesting areas, identify important non-breeding areas, and identify locations where migratory pathways cross Route 138.

As a state species of special concern, MESA regulations at 321 CMR 10.23(7) establish certain performance standards including mitigation ratios to achieve the long-term Net Benefit performance standard. These ratios are based on the amount of areal habitat impacted and the category of state-listed species. Accordingly, for eastern box turtle, a 1.5:1 mitigation ratio is required. This species would experience a loss of 12.6 or 13.8 acres of potential habitat with the Stoughton or Whittenton Alternative, respectively (successional habitats along the railbed) and approximately 0.9 to 1.3 miles of new track (with between-the-ties crossing structures) would create a barrier to movement. To provide a net benefit, applicant has agreed to provide funding to the eastern box turtle mitigation bank equivalent to protecting 17 acres, or to protect 17 acres of habitat available to this population.

As a state species of special concern, MESA regulations at 321 CMR 10.23(7) establish certain performance standards including mitigation ratios to achieve the long-term Net Benefit performance standard. These ratios are based on the amount of areal habitat impacted and the category of state-listed species. Accordingly, for the blue-spotted salamander (State Special Concern), a 1.5:1 mitigation ratio is required. This species would have a loss of approximately 7.5 acres of upland habitat, and approximately 0.4 mile of new track (with enhanced culverts and a dry wildlife crossing) would create a barrier to movement in two locations. To provide a net benefit, the applicant has agreed to provide funding to protect approximately 11 acres of land potentially used by the Hockomock Swamp population of blue-spotted salamander.

The applicant anticipates that the land protection for the Blanding's turtle and blue-spotted salamander may overlap, and may be combined with wetlands preservation required for wetland mitigation

The re-establishment of commuter rail service along the rail bed would effectively eliminate the use of the corridor by ATVs, bicycles and pedestrians. Further measures could be taken to ensure that other ATV tracks throughout priority habitats are closed and extant vernal pools are protected from ATV use that negatively affects turtle and salamander habitat.

For the remainder of the species potentially impacted by this alternative, no mitigation has been proposed because:

- there would only be minor losses on the edge of the Priority Habitats and on the edge of the right-of-way;
- there would be no interruption of their migratory corridors; and
- impacts could be eliminated or reduced in final design.

In areas where no mitigation is proposed, there are culverts that would be replaced and are expected to benefit and provide improved crossing opportunities for rare and/or other wildlife species. For example, if there are no structural constraints, existing 5-foot culverts may be replaced with 8-foot wide culverts to provide additional wildlife crossing opportunities. Such enhanced culverts can be embedded to provide natural substrate within the culvert and to maintain hydraulic connectivity under a variety of flow conditions.

As previously suggested, habitat could be enhanced and restored for species dependent on particular habitat types. This could be accomplished by planting native species such as Atlantic white cedar.

Stoughton Diesel Alternative

Mitigation measures for impacts to rare species for the Stoughton Diesel Alternative are the same as the mitigation identified in the Stoughton Electric Alternative, because the impacts to rare species habitat would be the same.

Whittenton Electric Alternative

The mitigation measures proposed for the Whittenton Alternative would be similar to those proposed for the Stoughton Alternative. The major difference would be measures proposed for the eastern box turtle habitat found along the Whittenton Branch. Under-rail troughs would be constructed to connect upland areas within this Priority Habitat. Figure 4.15-30-31 shows the potential location for these passages. The final design and locations of these passages would be identified in consultation with NHESP.

Whittenton Diesel Alternative

Mitigation measures for impacts to rare species along the Whittenton Diesel Alternative are the same as the mitigation identified the Whittenton Electric Alternative, because the impacts to rare species habitat would be the same.

Some of the general mitigation measures common to all alternatives include:

- Constructing wildlife corridors/passages (e.g., enhanced stream culverts/oversized culverts, between-tie crossings and under-rail troughs)
- Timing and methods of construction
- Post-construction maintenance
- Enhancing and replacing habitat by off-site habitat protection and preservation
- Funding of research programs to benefit state-listed species

Specific mitigation measures (wildlife passages/corridors) would be provided and focused on project corridors where there would be loss of migratory route habitat. These areas include rare species Priority and Estimated Habitat found within out-of-service portions of the Stoughton Line and Whittenton Branch. No mitigation would be provided for the impacts for the Rapid Bus Alternative other than contribution to the eastern box turtle mitigation bank.

Table 4.15-13 provides a summary of the proposed structural mitigation measures for the rare species impacted by the South Coast Rail alternatives. Coordination with regulatory agencies has continued throughout the determination of the LEDPA, and would continue through selection of a final design, fine-grained analysis of actual habitat boundaries and impacts, and development of a detailed mitigation plan.

Table 4.15-13 Proposed Mitigation Measures for Rare Species

Element	Description	Quantity
Wildlife Crossings	Reconstruct culverts within Blanding's turtle (*Emydoidea blandingii*), blue-spotted salamander (*Ambystoma laterale*), eastern box turtle (*Terrapene carolina carolina*) habitat to enhance wildlife passage	To Be Determined (TBD)
	Construct between-the-ties crossing structures	TBD
	Construct below-grade wildlife crossing	TBD
Habitat Enhancement	Protect Easton sand pit	TBD
	Restore areas of temporary wetland impact in Pine Swamp and Acushnet Cedar Swamp with host plant species for state-listed Lepidoptera	TBD
Population Studies	Blanding's turtle (*Emydoidea blandingii*)	Hockomock Swamp population
	Hessel's hairstreak *(Callophrys hesseli)*	Southeastern Massachusetts
Habitat Protection[1]	Blanding's turtle (*Emydoidea blandingii*)	TBD (up to 25 acres)
	Blue-spotted salamander (*Ambystoma laterale*)	TBD (up to 11.25 acres)
Mitigation Bank (or habitat protection)	Eastern box turtle (Terrapene carolina carolina)	TBD (up to 17 acres)

4.15.4 Regulatory Compliance of the Alternatives

This section describes the federal and state regulations that protect rare species and, in some instances, their habitats, and describes how each alternative would comply.

4.15.4.1 Federal Endangered Species Act

The ESA of 1973, (16 USC 1531 *et seq.,* as amended),[54] authorizes the determination and listing of species as Endangered and Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species.

Section 7 of the Act[55] requires federal agencies to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. The USFWS and NMFS administer the Act. Under Section 7, Federal agencies must

[54] Endangered Species Act of 1973, Section 7(16 USC 1531 *et seq.,* as amended), United States Fish and Wildlife Service.
[55] 6 U.S.C. 1536.

consult with the appropriate ESA agency when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species.

The NMFS, a division of the U.S. Department of Commerce, is the federal agency responsible for protecting living marine resources including endangered marine life under the ESA. On December 4, 2008 a letter was submitted to the NMFS requesting information on any threatened and endangered fisheries resources located within the project area. NMFS response was received on January 12, 2009, with the determination that there are no federally endangered fisheries resources in the vicinity of the proposed project. Since the publication of the DEIS, the New York Bight Distinct Population Segment of Atlantic sturgeon was listed as endangered under the ESA by the NMFS on April 6, 2012.[56] Therefore, the Corps coordinated with NMFS to determine whether the Build Alternatives would affect this species. However, the NMFS stated in its May 13, 2013, response letter it is unlikely that any species listed under their jurisdiction will be exposed to any direct or indirect effects of the proposed South Coast Rail project, including the Atlantic sturgeon (see correspondence in Appendix 4.15-A). Therefore, further Section 7 consultation with NMFS is not necessary.

4.15.4.2 Massachusetts Endangered Species Act

Massachusetts enacted MESA in 1990. The Act (M.G.L. Chapter 131A) and its regulations (321 CMR 10.00) prohibit the "taking" of any state-listed rare plants and animals unless specifically permitted for scientific, educational, or propagation purposes, or where a Conservation and Management Permit is issued. "Take" includes protection of rare species habitat, and is defined as, "*in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat*."

The regulations (321 CMR 10.05) state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats… and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the project design. The Massachusetts Department of Fish and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP) is the agency responsible for ensuring compliance with MESA. If a proposed project would result in a "take," the project must obtain a Conservation and Management Permit from the NHESP.

With the exception of the No-Build Alternative, the two rail alternatives would result in a "take" of rare species and would require that NHESP issue a Conservation and Management Permit. As demonstrated in this chapter, the applicant has assessed practical alternatives that would avoid and minimize impacts to state-listed species, and could therefore comply with the regulatory performance standards. The amount of habitat impacted would ultimately be determined in the permitting process based on actual field delineation of rare species habitat, and would include a detailed analysis of actual habitat boundaries. Coordination with regulatory agencies has continued throughout the determination of the

[56] Federal Register: February 6, 2012 (Volume 77, Number 24, page 5880-5912), Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region.

LEDPA, and would continue throughout subsequent phases including selection of a final design, and development of a detailed mitigation plan.

Avoidance and Minimization

MESA regulations at 321 CMR 10.05 state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the project design.

As documented in this chapter, the applicant has evaluated two route alternatives (Stoughton, and Whittenton) and determined neither of these alternatives would avoid impacts to rare species habitat. Potential impacts to state-listed species habitats have been minimized to the extent practicable, as described in this chapter. Impacts to state-listed species within the Hockomock Swamp have been minimized through the construction of a 1.8 mile elevated trestle, which would not create a barrier to the movement of reptiles or amphibians between wetland habitats. Table 4.15-13 describes the mitigation measures that would further minimize the effects of the alternatives by minimizing impacts during construction, enhancing migratory routes, and restoring areas of temporary alteration.

Alternatives

321 CMR 10.23(2)(a) requires that an applicant adequately assess alternatives to both temporary and permanent impacts to state-listed species. The applicant has evaluated two alternatives (Stoughton, and Whittenton) and determined that neither of these alternatives would avoid impacts to rare species habitat. The Stoughton and Whittenton Alternative meet the project purpose, and would have equivalent impact to state-listed species.

Insignificant Portion of the Local Population

321 CMR 10.23(2)(b) requires that a Conservation and Management Permit may only be issued where "an insignificant portion of the local population would be impacted by the Project or Activity".

As demonstrated in this chapter, the impacts to habitat of each of the state-listed species affected by the two alternatives would be a negligible portion of the total available habitat.

Net Benefit

321 CMR 10.23(2)(c) requires that a Conservation and Management Permit may only be issued where "the applicant agrees to carry out a conservation and management plan that provides a long-term Net Benefit to the conservation of the State-listed species".

The MESA regulations at 321 CMR 10.23(7) establish certain performance standards including mitigation ratios to achieve the long-term Net Benefit performance standard. These ratios are based on the amount of areal habitat impacted and the category of state-listed species.

- Endangered species require a mitigation ratio of 3:1 (three times the amount of affected habitat).
- Threatened species require a mitigation ratio of 2:1.

- Special Concern species require a mitigation ratio of 1.5:1.

The Director may approve an alternative mitigation approach that differs from these ratios where the alternative approach is appropriate, considering factors that include but are not limited to:

- The size and configuration of the habitat impact
- The threats to the affected state-listed species posed by uses or activities located adjacent to or in close proximity to the project
- The size, configuration and quality of the habitat proposed to be protected
- The population density of the affected state-listed species
- The habitat management and research needs associated with the affected species

The proposed project would provide a net benefit to the affected species by funding the protection of habitat at the appropriate ratio taking into consideration the loss of wetland and upland habitat as well as the length of the potential barrier to movement and the number and effectiveness of the proposed enhanced culverts and between-the-ties crossing structures.

For Blanding's turtle, a 2:1 mitigation ratio is required. This species would have a loss of 12.5 acres of potential upland habitat, and approximately 1.9 miles of new track (with new bridge, enhanced culverts and between-the-ties crossing structures) would create a barrier to movement in three segments. To provide a net benefit, the applicant has agreed to provide funding to protect 25 acres of land potentially used by the Hockomock Swamp population of Blanding's turtle, as well as to fund a study of this population that would determine the size and status of the population, identify nesting areas, identify important non-breeding areas, and identify locations where migratory pathways cross Route 138.

For eastern box turtle (State Special Concern), a 1.5:1 mitigation ratio is required. This species would experience a loss of 12.6 and 13.8 acres of potential habitat (successional habitats along the railbed) and approximately 0.9 to 1.3 miles of new track (with between-the-ties crossing structures) would create a barrier to movement by the Stoughton and Whittenton Alternatives, respectively. To provide a net benefit, the applicant has agreed to provide funding to the eastern box turtle mitigation bank equivalent to protecting 17 acres, or to protect 17 acres of habitat available to this population.

For the blue-spotted salamander (State Special Concern), a 1.5:1 mitigation ratio is required. This species would have a loss of approximately 7.5 acres of upland habitat, and approximately 0.4 mile of new track (with two enhanced culverts and a dry wildlife crossing) would create a barrier to movement in two locations. To provide a net benefit, the applicant has agreed to provide funding to protect approximately 11 acres of land potentially used by the Hockomock Swamp population of blue-spotted salamander.

The applicant anticipates that the land protection for the Blanding's turtle and blue-spotted salamander may overlap, and may be combined with wetlands preservation required for wetland mitigation.

4.15.4.3 Massachusetts Wetlands Protection Act

The Wetlands Protection Act Regulations (WPA [310 CMR 10.00 et seq.]) state that proposed projects that alter estimated rare wildlife habitat shall not be permitted to have any short-term or long-term

adverse effects on the habitat of the local population of that species. The regulations only apply to proposed projects that would alter the habitat of a rare animal species occurring in a wetland resource area for which an occurrence has been entered into the official NHESP database. Rare plants are not regulated under the WPA. The NHESP maintains an atlas of Estimated Habitat for state-listed rare species, which it updates every two years (most recently in 2008).

The NHESP has been consulted regularly by the Applicant throughout the course of the project and if work is proposed within Estimated Habitat, a Notice of Intent for a proposed project must be submitted to NHESP concurrent with the conservation commission submittal. All of the alternatives would likely result in a "take" of state-listed species and would result in both short- and long-term impacts to wetlands containing rare species habitat, and therefore would not comply with WPA performance standards. A variance under the WPA regulations, if granted, could be issued following NHESP's approval of the CMP.