

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 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 of 1973² defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.” The Act 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 Federal Endangered Species Act of 1973³ 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 Federal Endangered Species Act (ESA) of 1973, Section 7 (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 Act⁵ 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 the Massachusetts Endangered Species Act (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.

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 it updates every two years (most recently 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. 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. On February 4, 2009 a letter was submitted to the USFWS requesting information on the Northern red bellied cooter (*Pseudemys rubriventris*)⁶ and its habitat. Review of the USFWS list of Federally Listed Endangered And Threatened Species In Massachusetts⁷ (revised 6/22/2009) indicates the Northern red bellied cooter is the only federally listed species that may exist within the Study Area, specifically in rivers and inland pond habitat found in Taunton. In October 2006,⁸ the USFWS submitted a petition to

⁶ This species is listed by the USFWS as Plymouth Redbelly Turtle (*Pseudemys rubriventris bangsi*) in 50 CFR 17.11.

⁷ U.S. Fish and Wildlife Service, New England Field Office. Endangered Species Reviews/Consultations http://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm

⁸ Federal Register: October 3, 2006 (Volume 71, Number 191, page 58363-58364), Notice of 90-day petition finding and initiation of status Review, United States Fish and Wildlife Service.

delist the Northern red bellied cooter. The status review for this species is still pending. The above correspondence is included in Appendix 4.15-A. The Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form (ENF) dated April 3, 2009⁹ 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.

4.15.2 EXISTING CONDITIONS

4.15.2.1 REGIONAL OVERVIEW OF EXISTING CONDITIONS

This chapter includes a general description of the South Coast Rail 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 South Coast Rail Study Area is considered to be the region of southeastern Massachusetts consisting of southern Bristol and Plymouth Counties, bordering on Buzzards Bay or Mount Hope Bay, including the cities of Fall River and New Bedford and nearby towns. The Study Area is the portion of the South Coast region that is adjacent to or crossed by the alternatives. Within the Study Area, the alignment corridors of each alternative intersect 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 from 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, Fowl Meadow, Chartley Pond, and Forge Pond (Figure 4.14-1). In some cases, these ecosystems are within Areas of Critical Environmental Concern (ACEC) such as the Hockomock Swamp ACEC, the Fowl Meadow and Ponkapoag ACEC, the Canoe River Aquifer ACEC, and the Three Mile River ACEC (Figure 4.14-2). ACECs are described in Chapter 4.10– *Protected Public Open Space and Areas of Critical Environmental Concern*. Rare species represent one of the most sensitive elements of biodiversity. Other elements of biodiversity are addressed in Chapter 4.14 – *Biodiversity, Vegetation and Wildlife*.

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 the Massachusetts Endangered Species Act (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.

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

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

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, in response to a formal request for a detailed list of species found within these Estimated and Priority Habitats (Figures 4.15-1 through 4.15-7).

Table 4.15-1 Priority and Estimated Habitats Within or Adjacent to the Project Alternatives

Project Alternative (segments)	Priority (PH) (Identification #)	Habitat (Identification #)	Estimated Habitat (EH) (Identification #)	Location
Southern Triangle (New Bedford Main Line) (see Figures 4.15-1a-b)	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 4.15-1b-c)	1158		372	Apponquet Regional High School, Cedar Swamp River
Southern Triangle (New Bedford Main Line) (see Figures 4.15-1c-d)	1349		1	Acushnet Cedar Swamp
Southern Triangle (Fall River Secondary) (see Figure 4.15-2a)	1093		951	Assonet River
Attleboro Alternative (Northeast Corridor) (see Figure 4.15-3a)	12		73	Fowl Meadow and Ponkapoag Bog ACEC, Fowl Meadow, Neponset River Reservation, Blue Hills Reservation
Attleboro Alternative (Northeast Corridor) (see Figure 4.15-3c)	298*		198	Canoe River Aquifer ACEC, Canoe River Wilderness Area and Conservation Area
Attleboro Alternative (Northeast Corridor, Attleboro Bypass) (see Figures 4.15-3e and 4.15-4a)	236		121	Wading River, Sweet Pond Conservation Area, Attleboro Conservation Commission Land
Attleboro Alternative (Attleboro Secondary, Attleboro Bypass) (see Figure 4.15-4a)	620		545	Area near Chartley Pond
Attleboro Alternative (Attleboro Secondary) (see Figure 4.15-4b)	1439		948	Three Mile River ACEC, Three Mile River
Attleboro Alternative (Attleboro Secondary) (see Figure 4.15-4c)	261		153	Three Mile River ACEC
Stoughton Alternative (Stoughton Line) (see Figures 4.15-5c-d)	1392		59	Hockomock Swamp ACEC, Hockomock Swamp WMA
Stoughton Alternative (Stoughton Line) (see Figure 4.15-5d)	1297		1077	Pine Swamp
Whittenton Alternative (Whittenton Branch –) (see Figure 4.15-6a)	261		153	Tributary to Mill River
Rapid Bus Alternative (see Figures 4.15-7a-b)	229*		111*	Blue Hills Reservation
Rapid Bus Alternative 5 (see Figures 4.15-7a-b)	454*		350*	Blue Hills Reservation
Rapid Bus Alternative (see Figures 4.15-7a-b)	451*		328*	Blue Hills Reservation, Fowl Meadow and Ponkapoag Bog ACEC
Stoughton Alternative ; Rapid Bus Alternative (see Figures 4.15-7e-f)	1392		59	Hockomock Swamp ACEC, Hockomock Swamp WMA
Rapid Bus Alternative (see Figures 4.15-7f)	282*		179*	Basset Brook

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

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

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 (<i>Ambystoma laterale</i>)	SC	PH1392/EH59
Marbled Salamander (<i>Ambystoma opacum</i>)	T	PH620/EH545; PH454/EH350
Reptiles		
Wood Turtle (<i>Clemmys insculpta</i>)	SC	PH1093/EH951; PH1439/EH948
Blanding's Turtle (<i>Emydoidea blandingii</i>)	T	PH1392/EH59; PH12/EH73; PH236/EH121; PH451/EH328
(<i>Pseudemys rubriventris pop1</i>)	E	
Eastern Box Turtle (<i>Terrapene carolina carolina</i>)	SC	PH1392/EH59; PH1349/EH1; PH1093/EH951; PH298/EH198; PH261/EH153; PH282/EH179
Crustacean		
Coastal Swamp Amphipod (<i>Synurella chamberlaini</i>)	SC	PH1349/EH1
Dragonflies		
Mocha Emerald (<i>Somatochlora linearis</i>)	SC	PH1093/EH951
Butterflies and Moths		
Hessel's Hairstreak (<i>Callophrys hesseli</i>)	SC	PH1093/EH951; PH1297/EH1077
Pale Green Pinion Moth (<i>Lithophane viridipalle</i>)	SC	PH1349/EH1
Water-Willow Stem Borer Moth (<i>Papaipema sulphurata</i>)	T	PH1349/EH1
Plants		
Gypsywort (<i>Lycopus rubellus</i>)	E	PH1392
Long-Leaved Panic-Grass (<i>Panicum rigidulum ssp. pubescens</i>)	T	PH1158
Long's Bulrush (<i>Scirpus longii</i>)	T	PH12; PH1196

E = State Endangered, T = State Threatened, SC = State Special Concern. Fed E = Federal Endangered

Priority and Estimated Habitats (PH1158/EH372) and (PH229/EH111) have data sensitive species that were not released by NHESP.

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 4.15-1d).

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 (*Leptodea ochracea*, tidewater mucket; *Alasmidonta undulata*, triangle floater; *Ligumia nasuta*, eastern pondmussel); damselflies (*Enallagma laterale*, New England bluet); birds (*Botaurus lentiginosus*, American bittern); amphibians (*Scaphiopus holbrookii*, eastern spadefoot); and plants (*Bidens eatonii*, Eaton's beggar-ticks; *Cardamine longii*, Long's bitter cress; *Carex typhina*, cat-tail sedge; *Ludwigia sphaerocarpa*, round-fruited false-loosestrife; *Lygodium palmatum*, climbing fern; *Panicum philadelphicum*, Philadelphia panic-grass; *Platanthera flava* var. *herbiola*, pale green orchis; *Spiranthes vernalis*, grass-leaved ladies tresses).

4.15.2.2 RARE SPECIES DESCRIPTION AND HABITAT REQUIREMENTS

This chapter 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. The descriptions of these species contain language taken verbatim from the NHESP website.¹¹

Blue-Spotted Salamander (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.

Marbled Salamander (State Threatened)

The NHESP database indicates that this species is present near the Chartley Pond (PH620/EH545), and in the Blue Hills Reservation polygons (PH454/EH350). The marbled salamander's range in New England includes southern New Hampshire, Massachusetts, Connecticut, and Rhode Island. From this northern extreme, the range broadens greatly, through southern New York and central Pennsylvania, west to southern Illinois and down through the Mississippi basin to eastern Oklahoma and eastern Texas. The eastern border extends south throughout the Southeast down to northern Florida and through the Gulf states. Marbled salamanders have been observed 75 towns in Massachusetts. Over 78 occurrences have been documented since 1981, as well as 27 historic occurrences that were documented prior to 1981.

Marbled salamanders are largely terrestrial and generally occur in deciduous to mixed woods of the southern hardwood type, dominated by oak and hickory species with white pine. They can live in a variety of habitats including moist, sandy areas and dry hillsides. They hide beneath surface materials

¹¹ Natural Heritage and Endangered Species Program: Rare Species Fact Sheets
(http://www.mass.gov/dfwele/dfw/nhosp/species_info/fact_sheets.htm) (accessed on January 2009)

such as logs, bark, boards, stones, and drift that piles up along the margins of streams. Wooded vernal pools or shallow depressions are required as breeding sites.

Unlike most other *Ambystoma* species which breed in the spring (mid-March to April), marbled salamanders breed and deposit their eggs in autumn (September to October) in dry vernal pools.

Wood Turtle (State Special Concern)

The NHESP database indicates that this species is present within polygons that include the Assonet Cedar Swamp (PH1093/EH951) and the Three Mile River (PH1439/EH948). The wood turtle can be found throughout New England, to Nova Scotia, to eastern Minnesota, and to northern Virginia. It appears to be widespread in Massachusetts; however, most of the towns have fewer than five known occurrences.

In Massachusetts, riparian areas are the preferred habitat of wood turtles. Slower moving mid-sized streams with sandy bottoms and heavily vegetated stream banks are favored. The stream bottom and muddy banks provide hibernating sites for overwintering, and open areas with sand or gravel substrate near the streams edge are used for nesting. Wood turtles spend most of the spring and summer in mixed or deciduous forests, fields, hayfields, and riparian wetlands including wet meadows, bogs, and beaver ponds. They return to the streams in late summer or early fall to their favored overwintering location.

Although the peaks in mating activity occur in the spring and fall, wood turtles are known to mate opportunistically throughout their activity period (mid-March through the end of October). In Massachusetts, most nesting occurs over a four-week period, primarily in June.

Blanding's Turtle (State Threatened)

The NHESP database indicates that this species is present within the polygons that include the Hockomock Swamp (PH1392/EH59), Fowl Meadow (PH12/EH7), Wading River and Sweet Pond Conservation Area (PH236/EH121), and the Blue Hills Reservation (PH451/EH328). 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).

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.

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.

Eastern Box Turtle (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), and Canoe River Aquifer ACEC (PH298/EH198), wetlands along the Whittenton Branch corridor (PH261/EH153), and forested and wetland areas that include Basset Brook (PH282/EH179). The eastern box turtle's range is from southeastern Maine to northern Florida to Michigan, Illinois, and Tennessee. Eastern box turtles occur throughout Massachusetts but are more heavily concentrated in the southeastern section of the state.

In Massachusetts, the eastern box turtle inhabits 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.

Coastal Swamp Amphipod (State Special Concern)

The NHESP database indicates that this species is present within the Acushnet Cedar Swamp polygon (PH1349/EH1). In Massachusetts, it 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 (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.

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.

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.

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.

Hessel's Hairstreak (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 (*Cephalanthus 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 (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.

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 (*Clethra alnifolia*), swamp-fetterbush (*Leucothoe racemosa*), maleberry (*Lyonia ligustrina*), and highbush blueberry (*Vaccinium corymbosum*).

Water-Willow Stem Borer (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.

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 (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.

Long-Leaved Panic-Grass (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.

Long's Bulrush (State Threatened)

The NHESP database indicates that this sedge is present within the mapped area of Priority Habitat (PH12) within Fowl Meadow, and an area that includes a portion of the Taunton River (PH1196). The limited range of Long's bulrush includes Maine, New Hampshire, Massachusetts, Rhode Island, and New Jersey. It is rare in each state where it is known to occur, and is presumed to be extirpated from Connecticut and New York. In Massachusetts, it is currently known from Bristol, Essex, Middlesex, Plymouth, and Worcester Counties, and is historically known from Suffolk County.

Long's bulrush inhabits wet or damp, sandy or peaty soils of coastal plain pond shores and fens where seasonally variable water levels, and subsequent flooding, create unsuitable conditions for shrubs.

Data-Sensitive Species

In addition to the above-listed species, three additional data-sensitive, state-protected rare species are known to occur within the polygon that includes a wooded swamp area and the Cedar Swamp River (PH1158/EH372) and within the polygon that includes the Blue Hills Reservation (PH229/EH111). NHESP has requested that no information on these species be published.

4.15.2.3 RARE SPECIES STUDIES

This chapter 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.

The Attleboro Bypass is the only segment of the Attleboro Electric Alternative that would include a new rail corridor through undeveloped land that may provide suitable habitat for rare species. Therefore, in April 2009, field investigations were conducted in conjunction with NHESP within Priority and Estimated Habitat for Blanding's turtle (PH236/EH121; adjacent to the Northeast Corridor) and for marbled salamander (PH620/EH545; adjacent to the Attleboro Secondary). The findings of these investigations are provided in section on impacts from the Attleboro Electric Alternative, below.

In support of the 2002 Final 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 Britannia 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.

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.

Blue-Spotted Salamander

The rare species study conducted in the spring and summer of 2001 documented a substantial population of blue-spotted salamanders (*Ambystoma laterale*) 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 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 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

One eastern box turtle (*Terrapene carolina carolina*) 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 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

The extensive studies conducted in 2001 found no evidence of Blanding's turtles (*Emydoidea blandingii*) 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 miles 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; and
- 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 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 Greyhound Park.

4.15.2.4 EXISTING CONDITIONS WITHIN THE STUDY CORRIDOR

This chapter 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 4.14-1 and 4.15-1a-d).

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 4.14.-1 and 4.15-2a). 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.

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)
Wood Turtle Eastern Box Turtle Mocha Emerald Hessel's Hairstreak	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 Data-sensitive species	1158	372	New Bedford Main Line (Apponquet Regional High School/ Cedar Swamp River/ wooded swamp)
Eastern Box Turtle Coastal Swamp Amphipod Pale Green Pinion Moth Water-Willow Stem Borer Moth	1349	1	New Bedford Main Line (Acushnet Cedar Swamp)

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

Assonet Cedar Swamp (PH1093)

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 4.14-1). 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 (Figures 4.14-1 and 4.15-1a-b). 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. Within the part of the Assonet Cedar Swamp and adjacent areas crossed by the New Bedford Main Line and Fall River Secondary, four state-listed species (wood turtle, eastern box turtle, mocha emerald, and Hessel's hairstreak) are known to be present.¹⁷

Open Space Areas - Apponquet Regional High School (PH1158)

The polygon with Priority Habitat (PH1158) located in Lakeville and Freetown includes open space areas such as the Apponquet Regional High School, wooded swamps, and other wetlands associated with the Cedar Swamp River (Figure 4.15-1b). Within the portion of the polygon (PH1158) crossed by the New Bedford Main Line, two state-listed species (long-leaved panic-grass and one data-sensitive species) are known to be present.¹⁸

Acushnet Cedar Swamp (PH1349)

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 4.14-1 and 4.15-1c-d). 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.¹⁹ 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.²⁰

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.

¹⁷ NHESP letter dated January 8, 2009.

¹⁸ NHESP letter dated January 8, 2009.

¹⁹ 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.

²⁰ NHESP letter dated January 8, 2009.

- Wood turtles may find suitable habitat within portions of the wetlands/riparian areas within the Assonet and Great Cedar Swamp.
- Eastern box turtles may find limited suitable habitat within the forested portions of Priority Habitat adjacent to the New Bedford Main (Acushnet Cedar Swamp and Assonet Cedar Swamp). Eastern box turtles are more likely to be found within the upland portions and the forested upland areas within the Study Area.
- 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, *Decodon verticillata*, 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.

Attleboro Alternative

The Attleboro Alternative (Figures 4.15-3a-e and 4.15-4a-c) would use the Northeast Corridor from South Station to a point just north of the existing Attleboro Station. A new track segment, the Attleboro Bypass, would be constructed to connect the Northeast Corridor to the Attleboro Secondary. This alternative would use the existing Attleboro Secondary to connect with the Southern Triangle at Cotley Junction. One additional station (Barrowsville) would be constructed.

Based on the 2008 NHESP Atlas, the Attleboro Alternative crosses five NHESP Priority and Estimated Habitats (PH12/EH73, PH236/EH121, PH620/EH545, PH1439/EH948, and PH261/EH153) and is adjacent to one Priority and Estimated Habitat (PH298/EH198). These habitats include land within the Fowl Meadow and Ponkapoag ACEC (Neponset River Reservation and Blue Hills Reservation), Chartley Pond, and Three Mile River Watershed ACEC. Two of the Priority Habitats (PH620 and PH236) listed above are within the Attleboro Bypass segment of this alternative.

Table 4.15-5 lists the species found within these Priority and Estimated Habitats.

This section includes a description of the Priority Habitat polygons crossed by the three segments of the Attleboro Alternative and the suitable habitat for rare species within these areas.

Northeast Corridor

The Northeast Corridor (NEC) is an existing active track, used for Amtrak high speed trains, MBTA commuter trains, and freight trains. This segment of the Attleboro Alternative crosses two NHESP Priority and Estimated Habitats (PH12/EH73 and PH236/EH121) and is adjacent to one Priority and Estimated Habitat (PH298/EH198).

Table 4.15-5 Attleboro Alternative Study Area - Priority and Estimated Habitats

Species	Priority Habitat PH) (Polygon Identification #)	Estimated Habitat (EH) (Polygon Identification #)	Project Alternative (Areas of High Biodiversity)
Blanding’s Turtle	12	73	Northeast Corridor (Fowl Meadow and Ponkapoag Bog ACEC/Fowl Meadow/Neponset River Reservation/ Blue Hills Reservation)
Long’s Bulrush			
Eastern Box Turtle	298*	198	Northeast Corridor (Canoe River Aquifer ACEC/Canoe River Wilderness Area and Conservation Area)
Blanding’s Turtle	236	121	Northeast Corridor/ Attleboro Bypass (Wading River/Sweet Pond Conservation Area/Attleboro Conservation Commission Land)
Marbled Salamander	620	545	Attleboro Secondary/ Attleboro Bypass (Attleboro Conservation Commission Land, near Chartley Pond)
Eastern Box Turtle	1439	948	Attleboro Secondary (Three Mile River ACEC/Three Mile River)
Eastern Box Turtle	261	153	Attleboro Secondary (Three Mile River ACEC)

* Mapped habitat is adjacent to the right-of-way

This section includes a description of the Priority Habitats adjacent and crossed by the Northeast Corridor under the Attleboro Alternative.

Fowl Meadow and Ponkapoag Bog ACEC (PH12)

The Fowl Meadow and Ponkapoag Bog ACEC include a polygon with Priority Habitat (PH12). This ACEC covers approximately 8,350 acres in the metropolitan Boston area, including parts of Boston, Canton, Dedham, Milton, Norwood, Randolph, Sharon, and Westwood (Figures 4.14-2 and 4.15-3a-b). The ACEC is fragmented by several major transportation corridors, including I-95, I-93, Route 24, Route 138, Route 1, and other roadways. It also includes upland areas that are developed in commercial and residential land uses as well as undeveloped forested upland and farmland.

An eight-mile stretch of the Neponset River and its tributaries, the adjacent wetlands and floodplains, the associated aquifers and public water supplies, and diverse habitats form the core resources of the Fowl Meadow area. Ponkapoag Bog and Pond and the natural communities and wildlife habitats surrounding them form the core resources of the Ponkapoag Bog area. Within the part of the ACEC crossed by the Northeast Corridor, two state-listed species (Blanding’s turtle and Long’s bulrush) are known to be present.²¹

Canoe River Aquifer ACEC (PH298)

The Canoe River Aquifer ACEC includes a polygon with Priority Habitat (PH298). This ACEC covers approximately 17,200 acres in Easton, Foxborough, Mansfield, Norton, Sharon, and Taunton (Figures 4.14-2 and 4.15-3c). The associated areas within this ACEC include Snake River, Watson Pond, and Lake Sabbatia. The ACEC is fragmented by several major transportation corridors, including I-495, Route 123, Route 106, and other major roadways. It includes substantial upland areas that are developed in commercial and residential uses as well as undeveloped forested upland and farmland.

²¹ NHESP letter dated January 8, 2009.

The Canoe River Aquifer ACEC is located adjacent to the Hockomock Swamp ACEC and is within the Taunton River basin. The ACEC provides a rich and diverse habitat for wildlife including rare and endangered species habitat and Atlantic white cedar swamps. Within the part of the ACEC adjacent to the Northeast Corridor, one state-listed species (eastern box turtle) is known to be present.²²

Wading River (PH236)

The polygon with Priority Habitat (PH236) includes land owned by the Attleboro Conservation Commission, Sweet Pond Conservation Area, Wading River and wetlands areas (wooded swamp and shrub swamp) that are adjacent to and associated with the Wading River (Figures 4.15-3e and 4.15-4a). Within the portion of the polygon (PH236) crossed by the Northeast Corridor, one state-listed species (Blanding's turtle) is known to be present.²³

Attleboro Bypass

The Attleboro Bypass, the section of the Attleboro Alternative where new track construction is proposed, crosses two NHESP Priority and Estimated Habitats (PH236/EH121 and PH620/EH545).

The polygon with Priority Habitat associated with Wading River (PH236/EH121) is also crossed by the Northeast Corridor and has been described previously. Blanding's turtles are reported in this polygon.

The polygon with Priority Habitat associated with Chartley Pond (PH620/EH545) would be crossed by the Attleboro Bypass proposed under the Attleboro Alternative and the existing Attleboro Secondary. The polygon with Priority Habitat (PH620) includes land owned by the Attleboro Conservation Commission and wetland areas (deep marsh and shrub swamp) that are adjacent to and associated with Chartley Pond (Figure 4.15-4a). The pond contains areas of deep marsh and floating aquatic vegetation. Within the portion of the polygon crossed by the Attleboro Bypass and the Attleboro Secondary, one state-listed species (marbled salamander) is known to be present.²⁴

Attleboro Secondary

The Attleboro Secondary crosses three NHESP Priority and Estimated Habitats (PH620/EH545, PH1439/EH948, and PH261/EH153). This section includes a description of the Priority and Estimated Habitats adjacent to and crossed by the Attleboro Secondary. One of the Priority Habitat polygons crossed by the Attleboro Secondary (PH620) was previously described.

Three Mile River Watershed ACEC (PH261 and PH1439)

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 4.14-2 and 4.15-4b). 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.

²² *ibid.*

²³ *ibid.*

²⁴ NHESP letter dated January 8, 2009.

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 the Attleboro Secondary, one state listed species (eastern box turtle) is known to be present.²⁵ 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, and fairy shrimp. The inland wetlands provide food, cover, and shelter for waterfowl, muskrats, 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

This section discusses the potential for rare species habitat to be present within the Priority Habitats that are adjacent to or crossed by the right-of-way for the Attleboro Alternative. Both the Northeast Corridor and the Attleboro Secondary are active railroads (commuter rail and freight rail respectively) with ballasted right-of-way, tracks, and ties. Culverts 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 constrain the movement of turtles and amphibians across the right-of-way except through the culverts. The Attleboro Bypass is the only segment of the Attleboro alternative where there is no track and that could currently provide suitable habitat for rare species using or moving through the area.

Marbled salamanders may find suitable habitat within forested portions of the mapped Priority Habitat (PH620) west of Chartley Pond.

- Blanding's turtles may find suitable habitat within the wetlands of Priority Habitats (PH236 and PH12) associated with the Wading River and Fowl Meadow and Ponkapog Bog ACEC.
- 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.
- Long's bulrush may occur within the shallow marshes/fens within the mapped Priority Habitat (PH12) associated with the Fowl Meadow and Ponkapog Bog ACEC.

Stoughton Alternative

The study area for the Stoughton Alternative, north of Cotley 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 Street or between Whittenton Junction and Route 138 for the Whittenton Alternative). All three options (4A, electric; 4B, diesel; and 4C, through Whittenton) 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 three Priority and Estimated Habitats (PH1392/EH59, PH1297/EH1077, and PH261/EH153). These Priority habitats include land within the Hockomock Swamp ACEC, Pine Swamp, and the Three Mile River ACEC (Figures 4.14-1, 4.14-2, 4.15-5c-d, and 4.15-8a-b). Table 4.15-6 lists the species found adjacent to the Stoughton Alternative corridor within these Priority and Estimated Habitats, based on information provided by NHESP.

²⁵ *ibid.*

Table 4.15-6 Stoughton and Whittenton Alternatives Study Area - Priority and Estimated Habitats

Species	Priority Habitat (PH) (Identification #)	Estimated Habitat (EH) (Identification #)	Project Alternative (Areas of High Biodiversity)
Blue-Spotted Salamander	1392 ¹	59	Stoughton Alternative and Whittenton Alternative (Hockomock Swamp ACEC/ Hockomock Swamp WMA)
Blanding's Turtle			
Eastern Box Turtle			
Gypsywort			
Hessel's Hairstreak	1297	1077	Stoughton Alternative (Pine Swamp)
Eastern Box Turtle	261	153	Whittenton Alternative (Tributary to Mill River/ Three Mile River ACEC)

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 by the Whittenton variant of the Stoughton Alternative (the “Whittenton Alternative”) and the suitable habitat for rare species within these areas.

Hockomock Swamp ACEC (PH1392)

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 4.14-2 and 4.15-5c-d). The ACEC is fragmented by several major transportation corridors, including Route 24, I-495, Route 138, Route 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.²⁶ The Atlantic white cedar stands also provide potential habitat for Hessel's hairstreak. This Priority Habitat is also crossed by the Rapid Bus alternative.

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 4.14-1 and 4.15-5d). 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.²⁷ The right-of-way crosses the Pine Swamp on an elevated berm for approximately 1 mile from King Phillip Street to East Britannia Street.

²⁶ NHESP letter dated January 8, 2009.

²⁷ *ibid.*

Tributary to Mill River (PH261)

The polygon with Priority Habitat (PH261) includes a small portion of the Three Mile ACEC, and a tributary to Mill River and associated wetlands (wooded swamp and shrub swamp) (Figures 4.15-6a-b). Within the portion of the polygon (PH1421) crossed by the Whittenton variant of the Stoughton Alternative (the Whittenton Alternative), one state-listed species (eastern box turtle) is known to be present.²⁸ This Priority Habitat is also crossed by the Attleboro Secondary segment of the Attleboro Alternative.

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 at times of year (e.g., early spring) when ATVs and other users of the track are typically absent. 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-spotted salamanders were found in Pine Swamp or in the Hockomock ACEC south of the 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

²⁸ NHESP letter dated January 8, 2009.

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 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.

Rapid Bus Alternative

The Rapid Bus Alternative would require constructing dedicated bus lanes and would require widening along the perimeter of Route 24 and Route 128/I-93. These highways pass through one NHESP Priority Habitat (PH1392/EH59) and are adjacent to four Priority Habitats (PH229/EH111, PH454/EH350, PH451/EH328, and PH282/EH179). These Priority Habitats include land within the Fowl Meadow and Ponkapoag ACEC (Blue Hills Reservation) as well as the Hockomock Swamp ACEC (Figures 4.14-1, 4.14-2, and 4.15-7e-f). Table 4.15-7 lists the species found within these Priority and Estimated Habitats.

Table 4.15-7 Rapid Bus Alternative Study Area - Priority and Estimated Habitats

Species	Priority Habitat (PH) (Polygon Identification #)	Estimated Habitat (EH) (Polygon Identification #)	Project Alternative (Areas of High Biodiversity)
Data-sensitive species	229*	111*	I-93 (Blue Hills Reservation)
Data-sensitive species			
Marbled Salamander	454*	350*	Route 24 and I-93 (Blue Hills Reservation)
Blanding’s Turtle	451*	328*	Route 24 (Blue Hills Reservation/ Fowl Meadow and Ponkapoag Bog ACEC)
Blue-Spotted Salamander	1392	59	Route 24 (Hockomock Swamp ACEC/ Hockomock Swamp WMA)
Blanding’s Turtle			
Eastern Box Turtle			
Gypsywort			
Eastern Box Turtle	282*	179*	Basset Brook

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

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

Blue Hills Reservation (PH229, PH454 and PH451)

The polygons with Priority Habitat (PH229, PH454, and PH451) include portions of the Blue Hills Reservation. The Blue Hills Reservation consists of over 7,000 acres, extends from Quincy to Dedham and from Milton to Randolph, and provides the largest open space within 35 miles of Boston (Figures 4.14-1 and 4.15-7a-b). Approximately 2,330 acres of the Reservation are included in the Fowl Meadow and Ponkapoag Bog ACEC. There are a diversity of habitats including upland and wetland forests, swamps, ponds, meadows, and an Atlantic white cedar bog. It provides habitat for several state-listed species. Within the part of the Blue Hills Reservation (PH229, PH454, and PH451) that is adjacent to the Bus Route, four state-listed species (Blanding's turtle, marbled salamander, and two data-sensitive species) are known to be present.²⁹

Hockomock Swamp (PH1392)

The polygon with Priority Habitat (PH1392) includes the Hockomock Swamp ACEC, which is also crossed by the Stoughton Alternative and described above (Figures 4.14-2 and 4.15-7e-f).

Basset Brook (PH282)

The polygon with Priority Habitat (PH282) includes Basset Brook and associated wetlands areas (wooded swamp) (Figure 4.15-7f). Within the portion of the polygon (PH282) that is adjacent to the Rapid Bus Alternative, one state listed species (eastern box turtle) is known to be present.³⁰

Potential Rare Species Habitat

This section summarizes the potential rare species habitat adjacent to the route of the Rapid Bus Alternative. The Rapid Bus route is located along the shoulders within the highway median of Route 24 and I-93. There are culverts that convey streams underneath the highway. The highway itself does not provide suitable habitat for any of the rare species and restricts movement between areas of suitable habitat except through the culverts. Potential suitable foraging, breeding, and nesting habitat for amphibians and reptiles could be found adjacent to the highway.

The Hockomock Swamp is the only Priority Habitat (PH1392) that is crossed by the highway route of the Rapid Bus Alternative. However, there are no data to confirm if suitable habitat exists for marbled salamander, blue-spotted salamander, Blanding's turtle, eastern box turtle, gypsywort, or other species reported from this polygon adjacent to the highway.

Stations

This section describes the Priority and Estimated Habitats within the proposed station sites associated with the 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 Place (formerly referred to as Raynham Park Station)

²⁹ NHESP letter dated January 8, 2009.

³⁰ NHESP letter dated January 8, 2009.

is the only station where the platform would be within mapped Priority Habitat (PH1392); the rest of the Raynham Place station site and its parking lot will not be within the Priority Habitat polygon. This station would serve the Stoughton Alternative and is located at the Greyhound Park in Raynham (Figure 4.15-8). The Raynham Place 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.

During a site visit in July 2009, an eastern box turtle was observed at the site of the proposed Barrowsville Station (Figure 4.15-4a). The eastern box turtle is a habitat generalist and could occur at undeveloped station sites such as the Barrowsville Station or Taunton Depot Station sites (Eastern box turtles have not been observed at the Taunton Depot site).

Layover Facilities

This section describes the Priority and Estimated Habitats within the proposed layover facilities.

Five potential layover facilities have been identified in New Bedford, Fall River and Freetown. Two are located on the New Bedford Main Line: the Wamsutta Site and the Church Street Site (Figures 4.15-1d). Three are located on the Fall River Secondary: Weaver's Cove East Site, Weaver's Cove West Site and the ISP Site (Figure 4.15-2b). It is anticipated that one site on each leg of the Southern Triangle would be required for any of the rail alternatives. None of the proposed layover facilities are located within a Priority or Estimated Habitat polygon.

A midday bus layover facility would be required for the Rapid Bus Alternative (Figure 4.15-7a). It is the current location of an existing Park-and-Ride lot for the Logan Express service offered by Massport. No changes to existing site conditions are required for the layover facility. The proposed site is entirely within previously developed land that is not located within a Priority or Estimated Habitat polygon.

One midday rail layover facility is planned for the Boston area, but alternative sites have not been selected, pending a study by the MBTA. Given the anticipated urban context of a future layover site within the Boston area, it is expected that such rail layover facility in Boston would not be within a Priority or Estimated Habitat polygon and would not impact rare species or their habitat. Potential impacts to rare species at such facility will be evaluated when a location is selected.

4.15.2.5 SUMMARY OF EXISTING CONDITIONS

A total of 18 state-listed rare species, including one federally-listed endangered species, have been recorded in areas adjacent to the alternatives corridors. These include two salamanders, four turtles, one bird, one crustacean, four moths and butterflies, one dragonfly, and five plant species.

The Southern Triangle, common to all rail 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 Northeast Corridor and Attleboro Secondary sections of the Attleboro Alternative 1 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 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. Potential suitable foraging, breeding, and nesting habitat for rare species occur adjacent to the right-of-way in some areas.

The Attleboro Bypass section of the Attleboro Alternative is currently undeveloped, with no tracks or ties, and may provide suitable migratory, foraging, and nesting habitat for rare species such as the marbled salamander and Blanding’s turtle.

The Stoughton Alternative is an inactive right-of-way corridor without tracks and ties. 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 route of the Rapid Bus Alternative is located within the highway median of Route 24 and Route 128/I-93. The highway itself does not provide suitable habitat for any rare species and restricts movement between areas of suitable habitat except through culverts. Potential suitable foraging, breeding, and nesting habitat for amphibians and reptiles could be found adjacent to the highway.

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 Place), 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 sites. An eastern box turtle was observed on the site of the proposed Barrowsville Station during a site visit in July 2009. The eastern box turtle is a habitat generalist and could occur at undeveloped station sites such as the Barrowsville Station or Taunton Depot Station sites. Eastern box turtles have not been observed at the Taunton Depot site. Table 4.15-8 provides a summary of existing conditions and compares the different alternatives.

Table 4.15-8 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	9
Fall River Secondary	3	9
Attleboro Alternative		
Northeast Corridor	2 / 1	3
Attleboro Bypass	1 ¹	1
Attleboro Secondary	3	2
Stoughton Alternative		
Stoughton Alignment	2	5
Whittenton Alternative		
Whittenton Alignment	2	5
Rapid Bus Alternative		
Rapid Bus Route	1 / 4	7

1 This Priority Habitat (PH620) is also crossed by the Attleboro Secondary.
 2 Includes the federally listed Northern red-bellied cooter.

4.15.3 ANALYSIS OF IMPACTS AND MITIGATION

4.15.3.1 INTRODUCTION

This chapter describes and evaluates impacts that the proposed South Coast Rail alternatives and associated stations and layover facilities 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 minimize, mitigate and compensate for impacts are described for each of the project elements. Regulatory jurisdiction and compliance with state, and federal regulations are also discussed.

State-listed (rare) species are protected under the Massachusetts Endangered Species Act (MESA) of 1990,³¹ 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 Massachusetts Department of Fish and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP) is the agency responsible for ensuring compliance with MESA. The Federal Endangered Species Act of 1973³² protects species that are listed as Endangered or Threatened on a national basis.

This chapter addresses the requirements of the Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form (ENF) dated April 3, 2009.³³ The Secretary's Certificate on the ENF required that the Draft Environmental Impact Report (Draft EIR):

- 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,
- describe the endangered species permitting process for each alternative based on consultations with NHESP, and
- discuss how costs associated with permitting, including mitigation requirements, are incorporated in the alternatives analysis.

The Certificate 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.

Section 4.15.3.2 of this chapter 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,

³¹ Massachusetts Endangered Species Act of 1990 (321 CMR 10.00: M.G.L. c. 131A.), Natural Heritage Endangered Species Program.

³² Endangered Species Act of 1973, (16 U.S.C. 1531 *et seq.*, as amended) United States Fish and Wildlife Service.

³³ Executive Office of Transportation and Public Works, *South Coast Rail Environmental Notification Form*, November 2008.

Section 4.15.3.6 presents mitigation approaches, and Section 15.3.6 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 Environmental Notification Form (ENF) dated April 3, 2009, as described above.

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, loss of habitat, as well as loss of rare plant and animal species. Potential temporary construction related impacts are described in Section 4.15.3.3. 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 or highway 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 or road reconstruction and minor re-alignment of track or highway segments 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 LEDPA is determined and the final design is developed. The cover type data were produced based on interpretation of GIS aerial mapping, land use layers for upland areas, and MassGIS wetlands layers for wetland cover types.

In addition to calculating “total loss of acres” within natural areas of Priority and Estimated Habitat polygons intersected by the limit of permanent alteration, the “potential habitat loss” expected to be used by rare species were also calculated. Table 4.15-9 shows how the potential habitat loss was estimated based on habitat types (cover types) assumed to be used by each of the rare species. The

potential habitat could be the same or less than the total loss of acres (all intersected cover types) depending if the rare species present within a polygon uses some or all of the habitat types (cover types) intersected by the limit of permanent alteration. For example, the loss of natural area in polygon X might be 20 acres, of which 18 acres is upland. If the species documented from polygon X is restricted to wetlands, the potential habitat loss would be only 2 acres.

Table 4.15-9 Rare Species and Habitat (Cover Type) Use Assumptions

Species	Assumed Cover Type Use ¹
Marbled Salamander	UF
Blue-spotted Salamander	UF
Wood Turtle	SS, M, W, RM/AWC
Blanding's Turtle	SS, M, W, RM/AWC
Eastern Box Turtle	all cover types except W
Coastal Swamp Amphipod	M, RM, AWC, RM/AWC
Mocha Emerald	W
Hessel's Hairstreak	AWC
Pale Green Pinion Moth	SS, RM, AWC, RM/AWC
Water-Willow Stem Borer Moth	M
Gypsywort	M
Long-Leaved Panic-Grass	M
Long's Bulrush	M

¹ Cover type abbreviations:

RM = Red maple swamp, AWC = Atlantic white cedar, RM/AWC = red maple

Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF =

upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL =

cleared land *e.g.*, gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

Several of the species may use habitat types that were not included in assumptions listed in Table 4.15-9. For example, water-willow stem borer (*Papaipema sulphurata*) is found in a variety of wetland types supporting water-willow (*Decodon verticillatus*) which are not classified as "marsh" (e.g., pond margins, abandoned cranberry bogs, some shrub swamps, bogs). These assumptions serve as a general guide to coarsely estimating the level of impact. Once the LEDPA is determined, the amount of habitat impacted will ultimately be determined in the permitting process based on actual field delineation of rare species habitat, and will be a fine-grained analysis of actual habitat boundaries.

Method for Assessing Indirect Impacts

The Council on Environmental Quality (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, including ecosystems. These impacts are generally not quantifiable, and may occur over a larger area or over a longer time. 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.³⁴ 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.^{35,36,37,38} 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 will only occur on proposed new tracks. For the Attleboro Alternative this includes the new proposed Attleboro Bypass track and 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 ROW would reduce the porosity typical of abandoned tracks and as such could impact migration. It was assumed that there will be no new impacts to migration in areas with existing active tracks.

A specific discussion of each project element and the anticipated impacts to rare species is presented in Section 15.3.2 of this chapter. Chapter 4.14 - *Biodiversity, Vegetation and Wildlife* provides a broader analysis of the indirect impacts to natural habitats and communities. Chapter 5.0 evaluates potential indirect effects and cumulative impacts.

³⁴ 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.

³⁵ 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.

³⁶ Reijnen, R., R. Foppen, and H. Meeuwssen. 1996. *The effects of traffic on the density of breeding birds in Dutch agricultural grasslands*. Biological Conservation. 75: 255-260.

³⁷ 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.

³⁸ Orman, R.T.T. and L.E. Alexander. 1998. *Roads and their major ecological effects*. Annual Review of Ecological Systematics. 29:207-31.

NHESP Analysis Method

NHESP conducted a preliminary endangered species impacts analysis for each state-listed species by intersecting the species' site specific habitat polygons with the limit of work for each of the build alternatives. The major difference between NHESP's analysis method and the analysis method described in the previous section is that NHESP was able to use more precise habitat polygons for each species than are available to the public, and thus can more accurately calculate the impacts to individual rare species habitat. The polygons for each species are mapped by NHESP staff based on their best professional judgment and on factors such as the actual location of sighting, aerial photo interpretation of habitats likely to be used, and home range dimensions of each species. The results of the analysis are presented in Section 4.15.3.5 - *Summary of Impacts*.

NHESP was provided with GIS shapefiles defining the approximate limits of work for each build alternative, as well as the approximate limits of existing disturbed land (e.g. pavement, rail ballast) within the limits of work. The NHESP then intersected the limits of work with each species' habitat boundaries to determine the approximate acreage of mapped habitat impacted by each of the alternatives. In calculating these acreages, disturbed land was excluded from the calculations, since it would generally not function as habitat.

A special potential habitat condition exists along the segment of the Stoughton Alternative that consists of an existing abandoned railroad embankment. This embankment lacks ballast, rails, or ties, and has trees growing on portions of its sideslopes. As the railbed may function as habitat for some species (e.g. low quality nesting habitat for turtles) NHESP calculated impacts under two scenarios within this section for several species including Blanding's turtle, eastern box turtle, and blue-spotted salamander. In the first scenario, the railbed was assumed not to provide habitat; in the second, the railbed was assumed to provide habitat. The resulting range of acreage was presented for each affected species along the abandoned Stoughton line embankment. NHESP's impacts analysis is summarized for each of the build alternatives. In its analysis, NHESP noted that the ringed boghaunter (*Williamsonia lintneri*) occurs near the Lakeville/Freetown border. A Priority Habitat polygon covering this area is expected to be included by NHESP in the 2010 NHESP Atlas. It should be noted, however, that frequent use of the corridor by bicycles, pedestrians and (in particular) ATVs probably results in major limitations to habitat along the corridor, and it is thus unlikely that the railbed does in fact provide viable turtle habitat.

The following analysis is based on the distribution of assumed potential habitat within Priority and Estimated Habitat MassGIS polygons, for each element. NHESP rated the migration impacts and overall impacts to rare species with impact scores ranging from zero to two (none=0, none/minor=0.5, minor=1, minor/moderate=1.5, and moderate=2) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined. NHESP noted that *ranking* of alternatives by assigning qualitative impact ratings (e.g., none, minor, moderate), particularly for the barrier effect, is more important than the calculated acreage of impacts. Estimated impacts serve as a general guide to coarsely estimating the relative level of impact to rare species. The amount of habitat impacted will ultimately be determined in the permitting process for the selected alternative based on actual field delineation of rare species habitat, and will be a fine-grained analysis of actual habitat boundaries.

4.15.3.3 IMPACTS OF ALTERNATIVES BY ELEMENT

This chapter 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), Attleboro Alternative (Electric and Diesel), Stoughton Alternative (Electric and Diesel), Whittenton Alternative (Electric and Diesel), and the Rapid Bus Alternative (Figure 1.4-1).

The majority of the rail 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 proposed Attleboro Bypass proposed under the Attleboro Alternative and the out-of-service portions of the Stoughton Line (Stoughton Alternative) 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 is located near the southwest corner of the intersection of Routes 106 and 24;
- The Mount Pleasant Street Park-and-Ride is 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 is 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 rail 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 rail build alternatives. The northern part of the South Coast Rail Study Area is encompassed by the other rail build alternatives described in subsequent sections.

Fall River Secondary Rail Segment

The Fall River Secondary rail segment would require upgrading and reconstruction of the existing freight rail tracks (Figures 4.15-2a-c). 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. Three potential layover sites (ISP site, Weaver's Cove East, and Weaver's Cove West) are under consideration along the Fall River Secondary. Impacts to rare species from developing the new stations and layover facilities are discussed later in this Section.

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 4.15-2a). There are no Areas of Critical Environmental Concern (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 rail build alternatives is an active rail road and the majority of the improvements for the rail build alternatives will 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 four state listed species are known to be present:³⁹ wood turtle (*Clemmys insculpta*), eastern box turtle (*Terrapene carolina carolina*), mocha emerald (*Somatochlora linearis*), and Hessel's hairstreak (*Callophrys hesseli*).

Proposed improvements to the existing Fall River Secondary rail segment would result in the loss of approximately 1.9 acres (0.1 percent) of rare species habitat within Priority and Estimated Habitat (PH1093/EH951). The potential habitat loss is estimated to be 1.9 acres (the same as the total loss) which includes approximately 0.1 acres of habitat potentially used by wood turtle and 1.9 acres of habitat potentially used by eastern box turtle. No loss of habitat is anticipated for mocha emerald or Hessel's hairstreak, because there would be no loss of open water nor Atlantic white cedar habitats that are used by mocha emerald or Hessel's hairstreak, respectively. No traction power stations are proposed within this Priority Habitat polygon. Table 4.15-10 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-11 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

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 areas (cleared and scrub-shrub) as basking and foraging habitat. Table 4.15-11 lists the species reported to be found within Priority Habitat polygon and the potential habitat functions that could be impacted.

³⁹ NHESP letter dated January 8, 2009.

Table 4.15-10 Impacts of Rail Build Alternatives to Rare Species Habitat by Cover Type – Fall River Secondary Rail Segment)

Polygon (ID #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 1093/ EH 951	2,398	0.4	--	0.1	--	--	--	1.2	0.2	--	--	--	1.9	0.1	1.9
Total	2,398	0.4	--	0.1	--	--	--	1.2	0.2	--	--	--	1.9	0.1	1.9

1 Cover type abbreviations:

RM = Red maple swamp, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land *e.g.*, gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss is based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9-1).

Table 4.15-11 Impacts of Rail Build Alternatives to Rare Species by Habitat Functions Fall River Secondary Rail Segment

Polygon (ID #)	Species	Potential Habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 1093/ EH 951	Wood Turtle	0.1 (RM/AWC)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
	Eastern Box Turtle	1.9 (RM/AWC, UF, USS)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
	Mocha Emerald	0 (W)	No loss	Potential impacts from herbicide use	No loss	No loss
	Hessel's Hairstreak	0 (AWC)	No loss	Potential impacts from herbicide use	No loss	No loss

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., wood turtle and 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.

New Bedford Main Line Rail Segment

The New Bedford Main Line rail segment would require upgrading and reconstructing the existing freight rail tracks (Figures 4.15-1a-e). 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. Two potential layover sites (Church Street and Wamsutta Street) are under consideration along the New Bedford Main Line. 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 4.15-1a-d). No Areas of Critical Environmental Concern (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 rail 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.⁴⁰ These species are: wood turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, long-leaved panic-grass (*Panicum rigidulum* ssp. *pubescens*), coastal swamp amphipod (*Synurella chamberlaini*), pale green pinion moth (*Lithophane viridipallens*), and water-willow stem borer moth (*Papaipema sulphurata*).

Proposed improvements to the New Bedford Main Line under all rail build alternatives would result in the loss of approximately 3.4 acres (0.1 percent) of rare species habitat within Priority and Estimated Habitat (PH1093/EH951), 0.5 acres (0.2 percent) within (PH1158/EH372), and 1.2 acres (<0.1 percent) within (PH1349/EH1). The sum of these losses totals 5.1 acres (0.4 percent). The potential habitat loss is estimated to be 4.6 acres (0.5 acres less than the total loss), because approximately 0.5 acres of upland forest within (PH1158/EH372) are not suitable for use by long-leaved panic grass. The potential habitat loss includes approximately 0.5 acres of habitat potentially used by wood turtle, 4.5 acres potentially used by eastern box turtle, 0.1 acres potentially used by coastal swamp amphipod, and 0.1 acres potentially used by pale green pinion moth. No loss of habitat is anticipated for mocha emerald, Hessel's hairstreak, long-leaved panic-grass, or water-willow stem borer moth, because there will be no loss of open water, Atlantic white cedar, nor marsh habitat respectively, that are used by these species. One traction power station (TPSS-2) is proposed within Priority and Estimated Habitat (PH1349/EH1) which would impact approximately 0.8 acres of habitat (0.8 acres of upland forest and <0.1 acres of developed area). Table 4.15-12 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-13 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

⁴⁰ NHESP letter dated January 8, 2009.

Table 4.15-12 Impacts of Rail Build Alternatives to Rare Species Habitat by Cover Type – New Bedford Main Line Rail Segment

Polygon (Identification #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 1093/ EH 951	2,398	0.1	--	0.5	<0.1	--	--	2.8	--	--	--	--	3.4	0.1	3.4
PH 1158/ EH 372	226	<0.1	--	--	--	--	--	0.5	--	--	--	--	0.5	0.2	0.0
PH 1349/ EH 1	3,898	0.1	--	<0.1	--	--	--	1.1	--	--	--	--	1.2	<0.1	1.2
Total	6,522	0.2	--	0.5	0.1	--	--	4.4	--	--	--	--	5.1	0.4	4.6

1 Cover type abbreviations:

RM = Red maple swamp, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land e.g., gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss is based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

Table 4.15-13 Impacts of Rail Build Alternatives to Rare Species by Habitat Functions New Bedford Main Line

Polygon (Identification #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 1093/ EH 951	Wood Turtle	0.5 (SS, RM/AWC)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
	Eastern Box Turtle	3.4 (RM,SS, RM/AWC, UF)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
	Mocha Emerald	0 (W)	No loss	Potential impacts from herbicide use	No loss	No loss
	Hessel's Hairstreak	0 (AWC)	No loss	Potential impacts from herbicide use	No loss	No loss
PH 1158/ EH 372	Long-Leaved Panic-Grass	0(M)	--	--	--	--
PH 1349/ EH 1	Eastern Box Turtle	1.1 (RM, RM/AWC, UF)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
	Coastal Swamp Amphipod	0.1 (RM, RM/AWC)	--	Minor loss and potential impacts from herbicide use	Minor loss	--
	Pale Green Pinion Moth	0.1 (RM, RM/AWC)	--	Minor loss and potential impacts from herbicide use	Minor loss	--
	Water-Willow Stem Borer Moth	0 (M)	--	No loss	No loss	--

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. Table 4.15-13 lists the species reported to be found within the Priority Habitat polygons and the potential habitat functions that could be impacted by improvements to the New Bedford Main Line Rail Segment under all rail build alternatives.

This alternative would require modification and reconstruction of freight rail bridges across the Taunton River, potentially with temporary impacts to Atlantic sturgeon (*Acipenser oxyrinchus*) habitat. Atlantic sturgeon is currently a Candidate Species for listing as a Federal threatened or endangered species. 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. No further coordination with NMFS on the effects of the project on listed species is expected to be necessary. In addition, NHESP, in their comment letter on the ENF⁴¹ and in subsequent consultations, has not identified adverse impacts to the State endangered Atlantic sturgeon.

Indirect impacts to rare species associated with improvements to the New Bedford Main Line Rail Segment under the rail build alternatives 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., wood turtle and 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 and are not able to get out.
- 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.

Attleboro Electric Alternative

North of the Southern Triangle, the build alternatives vary in alignment and technology (electric or diesel). The Attleboro Electric Alternative alignment would be comprised of three railroad segments north of the Southern Triangle: the Northeast Corridor, the Attleboro Bypass, and the Attleboro Secondary (Figures 4.15-3a-e through 4.15-4a-c).

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

The Attleboro Bypass segment would connect the Northeast Corridor with the Attleboro Secondary segment. The Attleboro Secondary segment connects to the New Bedford Main line at Weir Junction in Taunton, at the northern end of the Southern Triangle.

Based on the 2008 NHESP Atlas, the Attleboro Alternative crosses five NHESP Priority and Estimated Habitats (PH12/EH73, PH236/EH121, PH620/EH545, PH1439/EH948, and PH261/EH153) and is adjacent to one Priority and Estimated Habitat (PH298/EH198). These habitats include land within the Fowl Meadow and Ponkapoag ACEC (Neponset River Reservation and Blue Hills Reservation), Canoe River Aquifer ACEC, Chartley Pond, and Three Mile River Watershed ACEC.

The following sections describe both direct and indirect impacts of the three segments comprising the northern elements of the Attleboro Electric Alternative; the two Southern Triangle components were discussed above.

Northeast Corridor Segment of the Attleboro Alternative

The existing Northeast Corridor would be used for the Attleboro Electric Alternative from Boston's South Station to the north end of the Attleboro Bypass (Figures 4.15-3a-e). The existing double-track (triple-track north of Readville Station) supports both electric- and diesel-powered regional freight and passenger service.

A third track would be added along the Northeast Corridor between the Readville Station and the Attleboro Bypass, which would connect to the Northeast Corridor near the Mansfield/Attleboro town line. The Northeast Corridor segment of this alternative would include reconstructing three existing stations (Canton Junction, Mansfield, and Sharon). No layover facilities are planned within this segment. Impacts to rare species potentially resulting from changes to these stations are discussed later in this chapter.

Direct Impacts of the Attleboro Alternative: Northeast Corridor Rail Segment

The Northeast Corridor is an active rail corridor and the addition of the third track would occur mostly within the existing disturbed area. Minor temporary and permanent impacts would occur within narrow strips immediately adjacent to the right-of-way as necessary for track reconstruction and minor realignment of track segments in certain areas.

The proposed improvements to the Northeast Corridor would result in the loss of potential habitat of three state-listed species that are known to be present within the Priority Habitats crossed by this segment.⁴² These species are: eastern box turtle, Blanding's turtle (*Emydoidea blandingii*), and Long's bulrush (*Scirpus longii*).

This segment of the Attleboro Alternative would result in the loss of approximately 3.4 acres (0.3 percent) of rare species habitat within Priority and Estimated Habitat (PH12/EH73), 2.3 acres (0.4 percent) within (PH298/EH198) and 6.5 acres (0.5 percent) within (PH236/EH121). The sum of these losses totals 12.2 acres (1.3 percent). The potential habitat loss is estimated to be 3.3 acres (8.9 acres less than the total loss), because approximately 2.8 acres (0.1 acres of red maple swamp and 2.7 acres of upland forest) within (PH12/EH73) are not likely to be used by Blanding's turtle and Long's bulrush, and approximately 6.1 acres (1.0 acres of red maple, 5.0 acres of upland forest, and 0.1 acres of upland scrub

⁴² NHESP letter dated January 8, 2009.

shrub) within (PH236/EH121) are not likely to be used by Blanding’s turtle. The potential habitat loss includes approximately 2.3 acres of habitat potentially used by eastern box turtle, 1 acre of habitat potentially used by Blanding’s turtle, and 0.3 acres of habitat potentially used by Long’s bulrush. No traction power stations are proposed within any of these Priority Habitat polygons. Table 4.15-14 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-15 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

Table 4.15-14 Impact to Rare Species Habitat by Cover Type – Attleboro Electric Alternative (Northeast Corridor)

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ³
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 12/ EH 73	1,074	0.1	--	--	--	0.3	0.3	2.7	<0.1	--	--	--	3.4	0.3	0.6
PH 298/ EH 198	586	--	--	--	--	--	--	1.7	0.6	--	--	--	2.3	0.4	2.3
PH 236/ EH 121 ²	1,197	1.0	--	0.2	0.2	--	--	5.0	0.1	--	--	--	6.5	0.5	0.4
Total	2,857	1.1	--	0.2	0.2	0.3	0.3	9.4	0.8	--	--	--	12.2	1.3	3.3

1 Cover type abbreviations:

RM = Red maple swamp, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land *e.g.*, gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

3 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

Improvements to the Northeast Corridor rail segment would potentially impact rare species habitat within the Fowl Meadow and Ponkapoag Bog ACEC and the Canoe River ACEC, which encompass most of Priority and Estimated Habitat polygons (PH12/EH73) and (PH298/EH198) respectively. Approximately 4.4 acres of habitat potentially used by Blanding’s turtle and Long’s bulrush would be impacted within the Fowl Meadow and Ponkapoag Bog ACEC; and approximately 4.6 acres of habitat potentially used by the eastern box turtle would be impacted within the Canoe River ACEC. Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Table 4.15-15 Impacts to Rare Species by Habitat Functions Attleboro Electric Alternative - Northeast Corridor Segment

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 12/ EH 73	Blanding’s Turtle	0.6 (M, W)	Improved (culvert and bridges)	Minor loss	No loss	No loss
	Long’s Bulrush	0.3 (M)	--	--	Potential impacts from herbicide use	--
PH 298/ EH 198	Eastern Box Turtle	2.3 (UF, USS)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss
PH 236/ EH 121	Blanding’s Turtle	0.4 (SS, RM/AWC)	Improved (culvert and bridges)	Minor loss	No loss	Minor loss

Indirect Impacts of the Attleboro Alternative: Northeast Corridor Rail Segment

Upgrading this track would result in marginal loss of nesting, foraging, and wintering habitat for rare species. There would be no habitat fragmentation because all of the 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 areas (cleared land and scrub-shrub) as basking and foraging habitat. Table 4.15-15 lists the species reported to be found within the Priority Habitat polygons and the potential habitat functions that could be impacted.

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 Blanding's turtle) and reduce fragmentation.
- Increase in turtle mortality from being struck by trains if they are able to climb the rail, but this is unlikely because the steel rails represent a physical barrier 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.
- Long's bulrush may occur within the shallow marshes/fens within the mapped Priority Habitat (PH12) associated with the Fowl Meadow and Ponkapog Bog ACEC and could be impacted 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.

Attleboro Bypass Rail Segment of the Attleboro Electric Alternative

The Attleboro Bypass would be a new 2.8-mile long, double-track segment that would be constructed to connect the existing Northeast Corridor in Mansfield with the existing Attleboro Secondary in Attleboro (Figure 4.15-4a). One traction power station would be built along this track segment. No new stations or layover facilities are planned within this segment. There are no Areas of Critical Environmental Concern (ACECs) crossed by the Attleboro Bypass.

Direct Impacts of the Attleboro Electric Alternative: Attleboro Bypass Rail Segment

The Attleboro Bypass segment of the Attleboro Alternative would consist of a new rail corridor through undeveloped land that includes mapped areas of rare species habitat. The Bypass would result in the loss of potential habitat of two state-listed species (Blanding's turtle and marbled salamander, *Ambystoma opacum*) and would interrupt migratory corridors potentially used by these species. These species are known to be present within the Priority Habitats crossed by this segment of the Attleboro Alternative.⁴³

The construction of this segment of the Attleboro Alternative would result in the loss of approximately 4.2 acres (0.3 percent) of rare species habitat within Priority and Estimated Habitat (PH236/EH121) and 4.1 acres (3.8 percent) within (PH620/EH545). The sum of these losses totals 8.3 acres (4.2 percent). The potential habitat loss is estimated to be 4.4 acres (3.9 acres less than the total loss), because

⁴³ NHESP letter dated January 8, 2009.

approximately 3.8 acres (1.5 acres of red maple and 2.3 acres of upland forest) within (PH236/EH121) are not likely to be used by Blanding’s turtle, and approximately 0.1 acres of scrub swamp within (PH620/EH545) are not likely to be used by marbled salamander. The potential habitat loss includes approximately 0.4 acres of habitat potentially used by Blanding’s turtle, and 4.0 acres of habitat potentially used by marbled salamander. No traction power stations are proposed within any of these Priority Habitat polygons. Table 4.15-16 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-17 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

**Table 4.15-16 Impact to Rare Species Habitat by Cover Type
Attleboro Electric Alternative - Attleboro Bypass Rail Segment**

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ³
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 236/ EH 121 ²	1,197	1.5	--	--	0.4	--	--	2.3	--	--	--	--	4.2	0.3	0.4
PH 620/ EH 545	109	--	--	--	0.1	--	--	4.0	--	--	--	--	4.1	3.8	4.0
Total	1,306	1.5	--	--	0.6	--	--	6.3	--	--	--	--	8.3	4.2	4.4

1 Cover type abbreviations:

RM = Red maple, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land (e.g., gravel pit).
Based on orthophoto aerial interpretation of Study Area cover types.

2 Polygon (PH236/EH121) is crossed by both the Northeast Corridor and the Attleboro Bypass.

3 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

**Table 4.15-17 Impacts to Rare Species Habitat Functions
Attleboro Electric Alternative - Attleboro Bypass Segment**

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 236/ EH 121	Blanding’s Turtle	0.4 (SS)	2,500 feet	Minor loss	No loss	Minor loss
PH 620/ EH 545	Marbled Salamander ¹	4.0 (UF)	2,200 feet	Minor loss	No vernal pool found	Minor loss

1 NHESP determined that the Attleboro Alternative does not need to be reviewed for impacts to the marbled salamander

Indirect Impacts of the Attleboro Electric Alternative: Attleboro Bypass Rail Segment

The Attleboro Bypass is the only segment of the Attleboro Electric Alternative that would include a new rail corridor through undeveloped land that may provide suitable habitat for rare species. Construction of this track would result in habitat loss which could lead to habitat fragmentation and loss of genetic diversity. However, the loss of a small percentage of habitat is not considered significant given the large area of suitable habitat for these species in, and in the vicinity of, the project areas.

In April 2009, field investigations were conducted in conjunction with NHESP within Priority and Estimated Habitat for Blanding’s turtle (PH236/EH121; adjacent to the Northeast Corridor) and for marbled salamander (PH620/EH545; adjacent to the Attleboro Secondary). NHESP noted that the

habitat crossed by the Bypass does not provide prime habitat for the Blanding's turtle because most of the wetlands do not have deep pools. No evidence of a vernal pool was found within the area reported to contain marbled salamander habitat. As a result of the site visit, NHESP determined that the Attleboro Alternative does not need to be reviewed for impacts to the marbled salamander, and that minor effects to Blanding's turtle habitat are not considered significant due to the small amount of habitat affected and the fact that this habitat is located next to an existing barrier to turtle movement (the Northeast Corridor).

Table 4.15-17 lists the species reported to be found within the Priority Habitat polygons and the potential habitat functions that could be impacted. Additional investigations will be required to evaluate these potential impacts if the Attleboro Alternative were determined to be the LEDPA.

Indirect impacts to rare species associated with the Attleboro Bypass segment of the Attleboro Alternative include:

- Loss of migratory routes (barrier effect) and increase in habitat fragmentation, because the new track for the Attleboro Bypass segment of the Attleboro Alternative would be constructed within an undeveloped forested area. The barrier effect would extend for approximately 2,500 feet used by the Blanding's turtle at the northern end of the Bypass, and approximately 2,200 feet potentially used by the marbled salamander at the southern end of the Bypass. 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
- Increase in indirect impacts of noise and vibration (avoidance) as a result of constructing the new rail in an undeveloped area.
- Increase in turtle mortality from being struck by trains to the extent that the turtles are able to climb the new rails, 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.

Attleboro Secondary Rail Segment of the Attleboro Electric Alternative

The existing Attleboro Secondary freight track would be upgraded as part of the Attleboro Electric Alternative (Figures -4.15-4a-c). Two new train stations would be constructed along this alignment in Norton and Taunton (Barrowsville and Downtown Taunton, respectively). One traction power station would be built along this track segment of the Attleboro Electric Alternative. No new layover facilities would be constructed along the Attleboro Secondary segment. Impacts to rare species potentially resulting from developing the new stations are discussed later in this chapter.

Direct Impacts of the Attleboro Electric Alternative: Attleboro Secondary Rail Segment

The Attleboro Secondary segment of the Attleboro Alternative is an active rail corridor and the majority of the improvements 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.

The proposed improvement to the Attleboro Secondary rail segment would result in the loss of potential habitat of one state-listed species (eastern box turtle). This species is known to be present within the two Priority Habitats crossed by this segment.⁴⁴

The Attleboro Secondary segment of the Attleboro Electric Alternative would result in the loss of approximately 1.0 acres (0.1 percent) of rare species habitat within Priority and Estimated Habitat (PH1439/EH948) and 2.6 acres (0.6 percent) within (PH261/EH153). No impacts are anticipated within Priority and Estimated Habitat (PH620/EH545). The sum of these losses totals 3.6 acres (0.6 percent). The potential habitat loss is estimated to be 3.6 acres (the same as the total loss) which includes approximately 3.6 acres of habitat potentially used by eastern box turtle. No traction power stations are proposed for the Attleboro Electric Alternative within any of these Priority Habitat polygons. Table 4.15-18 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-19 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

**Table 4.15-18 Impact to Rare Species Habitat by Cover Type
Attleboro Electric Alternative -Attleboro Secondary Rail Segment)**

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 1439/ EH 948	1,783	0.1	--	--	<0.1	--	--	0.7	0.2	--	--	--	1.0	0.1	1.0
PH 261/ EH 153	441	--	--	--	--	--	--	1.6	1.0	--	--	--	2.6	0.6	2.6
Total	2,224	0.1	--	--	<0.1	--	--	2.3	1.2	--	--	--	3.6	0.6	3.6

1 Cover type abbreviations:

RM = Red maple, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land (e.g., gravel pit). Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

**Table 4.15-19 Impacts to Rare Species by Habitat Functions
Attleboro Electric Alternative – Attleboro Secondary Segment**

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 1439/ EH 948	Eastern Box Turtle	1.0 (RM, SS, UF, USS)	Improved (culverts)	Minor loss	No loss	Minor loss
PH 261/ EH 153	Eastern Box Turtle	2.6 (RM, SS, UF, USS)	Improved (culverts)	Minor loss	No loss	Minor loss

The Attleboro Secondary would potentially impact rare species habitat within the Three Mile River ACEC, which completely encompasses Priority and Estimated Habitat polygon (PH1439/EH948). Approximately 1.0 acre of habitat potentially used by eastern box turtle would be impacted within the Three Mile River ACEC. Other rare species and their habitat may occur within the polygon or within the contiguous ACECs.

⁴⁴ NHESP letter dated January 8, 2009.

Indirect Impacts of the Attleboro Electric Alternative: Attleboro Secondary Rail Segment

Upgrading this track could result in marginal loss of nesting, foraging, and wintering habitat for rare species. There would be no habitat fragmentation because all of the 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 true for the eastern box turtles which are habitat generalists and can use other adjacent areas (cleared and scrub-shrub) as basking and foraging habitat. Table 4.15-19 lists the species reported to be found within the Priority Habitat polygons and the potential habitat functions that could be impacted.

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.
- 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.

Attleboro Diesel Alternative

Loss of rare species habitat for the Attleboro Diesel Alternative, north of Weir Junction, would be the same as the impacts identified in Table 4.15-18 for the Attleboro Electric Alternative. Under the Attleboro Diesel Alternative there will be no traction power stations within any of the Priority Habitat polygons. All impacts to rare species are the same for the Attleboro Diesel Alternative as those associated with the Attleboro Electric Alternative.

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 4.15-5c-d). 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 existing 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 were addressed above, and 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.

Two existing train stations along the Stoughton Line would be reconstructed (Canton Center and Stoughton) and five new train stations would be constructed (Easton Village, North Easton, Raynham Place, Taunton, and Taunton Depot). 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 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, *Ambystoma laterale*; gypsywort, *Lycopus rubellus*; and Hessel's hairstreak) and would interrupt a migratory corridor used by turtles and blue-spotted salamander. These species are known to be present within the Priority Habitats crossed by this segment.⁴⁵

The proposed railroad reconstruction along the Stoughton Line would result in the loss of approximately 3.4 acres (<0.1 percent) of rare species habitat within the Hockomock Swamp Priority and Estimated Habitat (PH1392/EH59), and 22.1 acres (2.7 percent) within the Pine Swamp Priority and Estimated Habitat (PH1297/EH1077). The sum of these two Priority and Estimated Habitat polygon losses totals 25.5 acres (2.8 percent) which includes one traction power station (TPSS-1) proposed within the Hockomock Swamp Priority and Estimated Habitat. The traction power station (TPSS-1) would impact approximately 1.1 acres of habitat (0.8 acre of upland forest and 0.3 acres of scrub shrub).

An estimated 3.4 acres of habitat assumed to be used by the four rare species known to be present within Hockomock Swamp Priority and Estimated Habitat (PH1392/EH59) polygon could potentially be lost. These 3.4 acres of potentially impacted habitat include approximately 0.3 acres of habitat potentially used by Blanding's turtle, 3.4 acres of habitat potentially used by eastern box turtle, and 2.0 acres of habitat potentially used by blue-spotted salamander (some portions of the 3.4 acres serve as habitat for more than one rare species). No loss of habitat is anticipated for gypsywort within the Hockomock Swamp Priority and Estimated Habitat polygon, because gypsywort utilizes swamps and marshy shores of ponds and potential impacts to marsh habitat would be negligible. No potential habitat loss within the Pine Swamp Priority and Estimated Habitat (PH1297/EH1077) polygon is anticipated. The Hessel's hairstreak, the only rare species known to be present within this habitat polygon, utilizes Atlantic white cedar swamp which would not be impacted. Table 4.15-20 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-21 summarizes the

⁴⁵ NHESP letter dated January 8, 2009.

impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

**Table 4.15-20 Impact to Rare Species Habitat by Cover Type
Stoughton Electric Alternative – Stoughton Rail Segment**

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 1392/ EH 59	9,668	0.8	--	0.1	0.2	<0.1	--	2.0	0.3	--	--	--	3.4	<0.1	3.4
PH 1297/ EH 1077	814	1.6	--	<0.1	--	--	--	20.4	0.1	--	--	--	22.1	2.7	0
Total	10,482	2.4	--	0.1	0.2	<0.1	--	22.4	0.4	--	--	--	25.5	2.8	3.4

1 Cover type abbreviations:

RM = Red maple swamp, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land (e.g., gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

**Table 4.15-21 Impacts to Rare Species by Habitat Functions
Stoughton Electric Alternative -- Stoughton Segment**

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/ Nesting	Wintering
PH 1392/ EH 59 ¹	Blue-Spotted Salamander	2.0 (UF)	1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle	Minor loss	Loss of vernal pool habitat	Minor loss
	Blanding's Turtle	0.3 (SS, M, RM/AWC)	9,700 feet of barrier effect between Depot Street and Foundry Street	Minor loss	Minor loss	Minor loss
	Eastern Box Turtle	3.4 (RM, SS, M, RM/AWC, UF, USS)	8,400 feet of barrier effect between the southern limit of the trestle and Bridge Street	Minor loss	Minor loss	Minor loss
	Gypsywort	0 (M)	--	--	--	--
PH 1297/ EH 11077	Hessel's Hairstreak	0 (AWC)	No loss	Potential impacts from herbicide use	No loss	No loss

1 Priority and Estimated Habitat (PH1392/EH59) includes an additional 11 state-listed species which do not occur adjacent to the rail corridor.

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). Approximately 22 acres of 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.

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 4.15-21 lists the species reported to be found within Priority Habitat polygons and the potential habitat functions that could be impacted.

Reconstruction of the track of the former Stoughton line would result in habitat loss which could lead to habitat fragmentation and loss of genetic diversity. However, the loss of a small percentage of habitat is not considered significant given the large area of suitable habitat for these species in, and in the vicinity of, the project area. In addition, the Stoughton Alternative would include constructing an 8,500-foot long trestle through part of the Hockomock Swamp (PH1392/EH59), to reduce impacts to wetlands, biodiversity, and rare species. The trestle would be constructed between south of Foundry Street and north of Raynham Place station site. Additional description of the trestle is included in Section 4.15.7 of this chapter.

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 19,500 feet. The barrier effect would be approximately 9,700 feet potentially used by Blanding's turtle between Depot Street and Foundry Street, approximately 1,400 feet used by blue-spotted salamander between Foundry Street and the northern limit of the trestle, and approximately 8,400 feet 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 1.1 acres less impact than the Stoughton Electric Alternative, which includes 0.8 acres of upland forest and 0.3 acres of upland shrub scrub within the site proposed for traction power station TPSS-1. All other rare species impacts are the same as those associated with the Stoughton Electric Alternative.

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.

Two existing train stations along the Stoughton Line would be reconstructed (Canton Center and Stoughton) and five new train stations would be constructed (Easton Village, North Easton, Raynham Place, Taunton Depot, and Downtown Taunton). 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 4.15-6a). The following sections describe both direct and indirect impacts as they relate to this alternative; the two 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), and from to Raynham Junction to Whittenton Junction (Whittenton Branch).

The Whittenton Alternative would result in the loss of potential habitat of four state-listed species (Blanding’s turtle, eastern box turtle, blue-spotted salamander, and gypsywort) and would interrupt a migratory corridor used by turtles and blue-spotted salamander. These species are known to be present within the Priority Habitats crossed by this segment.⁴⁶

The proposed railroad reconstruction along the Whittenton Alternative will result in the loss of approximately 3.4 acres (<0.1 percent) of rare species habitat within Priority and Estimated Habitat (PH1392/EH59), and 2.6 acres (0.6 percent) within (PH261/EH153). The sum of these losses totals 6.0 acres (0.6 percent). The potential habitat loss is estimated to be 6.0 acres (the same as the total loss) which includes approximately 0.3 acres of habitat potentially used by Blanding’s turtle, 6.0 acres of habitat potentially used by eastern box turtle, and 2.0 acres of habitat potentially used by blue-spotted salamander. Under the Whittenton Electric Alternative one traction power station (TPSS-1) is proposed within Priority and Estimated Habitat (PH1392/EH59) which would impact approximately 1.1 acres of habitat (0.8 acres of upland forest and 0.3 acres of scrub shrub). Table 4.15-22 summarizes the direct impacts to Priority and Estimated Habitats by cover type for the Whittenton Electric Alternative. Table 4.15-23 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

**Table 4.15-22 Impact to Rare Species Habitat by Cover Type
Whittenton Electric Alternative**

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		R	M	AWC	RM/AWC	SS	M	W	UF	USS	AG	P			
PH 1392/ EH 59	9,668	0.8	--	0.1	0.2	<0.1	--	2.0	0.3	--	--	--	3.4	<0.1	3.4
PH 261/ EH 153	441	0.1	--	--	--	--	--	1.6	1.0	--	--	--	2.6	0.6	2.6
Total	10,109	0.9	--	0.1	0.2	<0.1	--	3.6	1.3	--	--	--	6.0	0.6	6.0

1 Cover type abbreviations:

RM = Red maple, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land (e.g., gravel pit).

2 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

**Table 4.15-23 Impacts to Rare Species by Habitat Functions
Whittenton Electric Alternative**

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 1392/ EH 59 ¹	Blue-Spotted Salamander	2.0 (UF)	1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle	Minor loss	Loss of vernal pool habitat	Minor loss
	Blanding’s Turtle	0.3 (SS, M, RM/AWC)	9,700 feet of barrier effect between Depot Street and Foundry Street	Minor loss	Minor loss	Minor loss
	Eastern Box Turtle	3.4 (RM, SS, M, RM/AWC, UF, USS)	8,400 feet of barrier effect between the southern limit of the trestle and Bridge Street	Minor loss	Minor loss	Minor loss
	Gypsywort	0 (M)	--	--	--	--
PH 261/ EH 153	Eastern Box Turtle	2.6 (RM, UF, USS)	2,100 feet	Minor loss	Minor loss	Minor loss

1 Priority and Estimated Habitat (PH1392/EH59) includes an additional 11 state-listed species which do not occur adjacent to the rail corridor.

⁴⁶ NHESP letter dated January 8, 2009.

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). Approximately 22 acres of 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.

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

The Whittenton Branch and 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 the blue-spotted salamander and eastern box turtle. 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 the Blanding's turtle and eastern box turtle, 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. Table 4.15-22 lists the species reported to be found within the Priority Habitat polygons and the potential habitat functions that could be impacted.

Reconstruction of this abandoned track would result in habitat loss which could lead to habitat fragmentation, and loss of genetic diversity. However, the loss of a small percentage of habitat is not considered significant given the large area of suitable habitat for these species in, and in the vicinity of, the project areas. In addition, the Whittenton Electric Alternative would include constructing an 8,500 feet trestle through part of the Hockomock Swamp (PH1392/EH59), to avoid and minimize impacts to wetlands, biodiversity, and rare species. The trestle would be constructed between south of Foundry Street and north of the Raynham Place station site. Additional description of the trestle is included in Section 15.7. Unlike the Stoughton Alternative, which crosses Pine Swamp between Raynham Junction and Weir Junction, the Whittenton Alternative would not utilize this segment and thus 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 will 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 19,500 feet. The barrier effect would be approximately 9,700 feet for Blanding's

turtle between Depot Street and Foundry Street, approximately 1,400 feet for blue-spotted salamander between Foundry Street and the northern limit of the trestle, and approximately 8,400 feet for eastern box turtle between the southern limit of the trestle and Bridge Street. Within the Whittenton Branch (PH261/EH153) there is approximately 2,100 feet 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 or bridges 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 1.1 acres less impact than the Whittenton Electric Alternative, which includes 0.8 acres of upland forest and 0.3 acres 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.

Rapid Bus Alternative

The Rapid Bus Alternative would provide rapid express bus service to Boston from Fall River and New Bedford along a dedicated, primarily reversible bus lane to be built along I-93 from the existing High Occupancy Vehicle (HOV) lane in Braintree to the Route 24 interchange and along Route 24 from I-93 to I-495, and a short segment through mixed traffic on Route 24 from I-495 to Route 140 in Taunton. New mixed-use lanes would be added on the latter segment; south of Route 140, the buses would use the existing road network.

Modifications would be required along I-93 and Route 24 to improve the existing highway capacity, construct new exclusive bus lanes, and reconfigure existing interchanges. This chapter evaluates impacts to rare species only along the bus route from Braintree to Taunton as this is the only portion where the Rapid Bus Alternative requires new construction.

Seven existing or new bus stations are proposed for the Rapid Bus Alternative. They include the Battleship Cove Station, Fall River Depot Station, Freetown Station, Galleria Station, King's Highway Station, Downtown Taunton Station, and Whale's Tooth Station. A mid-day bus layover facility would be required for the Rapid Bus Alternative. Potential impacts to rare species from using the existing or developing the new stations are discussed later in this chapter.

The route of the Rapid Bus Alternative passes through one NHESP Priority Habitat (PH1392/EH59) and is adjacent to four Priority Habitats (PH229/EH111, PH454/EH350, PH451/EH328, and PH282/EH179). These Priority Habitats include land within the Fowl Meadow and Ponkapoag ACEC (Blue Hills Reservation) as well as the Hockomock Swamp ACEC (Figure 4.15-7a-f). The following sections describe both direct and indirect impacts as they relate to this alternative.

Direct Impacts of the Rapid Bus Alternative

The majority of construction would be within the existing highway right-of-way and would not impact rare species and their habitat. However, minor temporary and permanent impacts may occur within

narrow strips immediately adjacent to the highway right-of-way during roadway widening and construction.

The Rapid Bus Alternative could result in the loss of potential habitat of five state-listed species (Blanding’s turtle, eastern box turtle, blue-spotted salamander, marbled salamander, and gypsywort). These species are known to be present within the Priority Habitats crossed by this roadway.⁴⁷

The proposed Rapid Bus Alternative will result in the loss of approximately 0.1 acres (<0.1 percent) of rare species habitat within Priority and Estimated Habitat (PH454/EH350), 15.7 acres (0.2 percent) within (PH1392/EH59), and 0.4 acres (<0.1 percent) within (PH282/EH179). The sum of these losses totals approximately 16.2 acres (0.3 percent). The potential habitat loss is estimated to be 16.2 acres (the same as the total loss) which includes approximately 2.0 acres of habitat potentially used by Blanding’s turtle, 15.7 acres of habitat potentially used by eastern box turtle, 8.3 acres of habitat potentially used by blue-spotted salamander, 0.1 acres of habitat potentially used by marbled salamander, and 1.9 acres of habitat potentially used by gypsywort. There will be no direct impacts to adjacent Priority and Estimated Habitats (PH229/EH111 and PH451/EH328). Table 4.15-24 summarizes the direct impacts to Priority and Estimated Habitats by cover type. Table 4.15-25 summarizes the impacts by species and serves as a general guide to coarsely estimate the relative level of impact to each species.

Table 4.15-24 Impact to Rare Species Habitat by Cover Type – Rapid Bus Alternative

Polygon (Ident. #)	Total Area (acres)	Cover Type ¹ (acres)											Total Polygon Loss	Percent Loss	Potential Habitat Loss ²
		RM	AWC	RM/AWC	SS	M	W	UF	USS	AG	P	CL			
PH 454/ EH 350	248	--	--	--	--	--	--	0.1	--	--	--	--	0.1	<0.1	0.1
PH 1392/ EH 59	9,668	0.7	--	0.1	--	1.9	--	8.3	4.7	--	--	--	15.7	0.2	15.7
PH 282/ EH 179	688	<0.1	--	--	--	--	--	0.3	<0.1	--	--	--	0.4	<0.1	0.4
Total	10,604	0.8	--	0.1	--	1.9	--	8.8	4.8	--	--	--	16.2	0.3	16.2

1 Cover type abbreviations:

RM = Red maple, AWC = Atlantic white cedar, RM/AWC = red maple Atlantic white cedar mix, SS = shrub swamp, M = marsh/fen, W = open water, UF = upland forested, USS = upland scrub shrub, AG = agricultural, P = powerline, CL = cleared land (e.g., gravel pit).

Based on orthophoto aerial interpretation of Study Area cover types.

2 Habitat loss based on habitat (cover types) assumed to be used by rare species known to be present within the mapped polygon (see Table 4.15-9).

Table 4.15-25 Impacts to Rare Species by Habitat Functions – Rapid Bus Alternative

Polygon (Ident. #)	Species	Potential habitat Loss (acres)	Habitat Functions			
			Migration	Foraging	Breeding/Nesting	Wintering
PH 454/ EH 350	Marbled Salamander	0.1 (UF)	No loss	Minor loss	No loss	Minor loss
PH 1392/ EH 59 ¹	Blue-Spotted Salamander	8.3 (UF)	No loss	Minor loss	No loss	Minor loss
	Blanding’s Turtle	2.0 (M, RM/AWC)	No loss	Minor loss	No loss	Minor loss
	Eastern Box Turtle	15.7 (RM, M, RM/AWC, UF, USS)	No loss	Minor loss	No loss	Minor loss
PH 282/ EH 179	Gypsywort	1.9 (M)	--	--	--	--
	Eastern Box Turtle	0.4 (RM, UF, USS)	No loss	Minor loss	No loss	Minor loss

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

⁴⁷ NHESP letter dated January 8, 2009.

The Rapid Bus would potentially impact rare species habitat within the Fowl Meadow and Ponkapoag Bog ACEC and the Hockomock Swamp ACEC, which encompass most of Priority and Estimated Habitat polygons (PH454/EH350), and (PH1392/EH59) respectively. Approximately 0.3 acres of habitat potentially used by marbled salamander would be impacted within the Fowl Meadow and Ponkapoag Bog ACEC; and approximately 22 acres of habitat potentially used by eastern box turtle 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.

Indirect Impacts of the Rapid Bus Alternative

The Rapid Bus Alternative is located along the existing highway corridors of Route 24 and I-93. Existing culverts carry streams beneath the highway and may provide migratory habitat to wildlife species. The highway itself does not provide suitable habitat for any of the rare species and restricts movement between areas of suitable habitat except through the culverts. Potential suitable foraging, breeding, and nesting habitat for amphibians and reptiles could be found adjacent to the highway. This alternative would result in minor habitat losses from roadway widening. Table 4.15-25 lists the species found within the Priority Habitat polygons and the potential habitat functions that could be impacted.

The majority of the proposed work would be within the existing highway right-of-way median and would not impact rare species and their habitat. However, there would only be a minor loss of habitat along the periphery of the Priority and Estimated Habitats polygons. This minor loss of habitat is not likely to affect the persistence of rare species populations.

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 Place 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 Place station would serve the Stoughton Alternatives (electric and diesel) and the Whittenton Alternatives (electric and diesel) (Figure 4.15-5d and 4.15-8). The Raynham Place 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.

During a site visit in July 2009, an eastern box turtle was observed at the site of the proposed Barrowsville Station (Figure 4.15-4a). Development of the proposed Barrowsville station would result in the loss of natural vegetation on the perimeter of a large undeveloped forested block that extends north to John B. Scott Boulevard. Approximately 5 acres of habitat (0.01 acre of red maple swamp, 1.9 acres of upland forest, and 3 acres of cleared land) would be lost within this station site.

Layover Facilities

Five potential rail layover facilities have been identified in New Bedford, Fall River and Freetown and were evaluated for their potential for impacts to rare species. Three are located on the Fall River Secondary: the ISP Layover Facility Site, the Weaver's Cove East Layover Facility Site, and the Weaver's Cove West Layover Facility Site (Figure 4.15-2b). Two layover facility sites are located on the New

Bedford Main Line. They include the Church Street Layover Facility Site and the Wamsutta Layover Facility Site (Figures 4.15-1d-e). It is anticipated that each rail alternative would require one layover facility site on each leg of the Southern Triangle. None of the proposed layover facilities are located within Priority or Estimated Habitat polygons.

A mid-day bus layover facility for the Rapid Bus Alternative is proposed at the current location of an existing Park-and-Ride lot for the Logan Express service offered by Massport (Figure 4.15-7a-f). No changes to existing site conditions are required for the proposed bus layover facility. The proposed bus layover site is entirely within previously developed land that is not located within a Priority or Estimated Habitat polygon.

One midday rail layover facility is planned for the Boston area, but alternative sites have not been selected, pending a study by the MBTA. Given the anticipated urban context of a future rail layover site within the Boston area, it is expected that such rail layover facility in Boston would not be within a Priority or Estimated Habitat polygon and would not impact rare species or their habitat. Potential impacts to rare species at such facility will be evaluated when a location is selected.

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.

All of the rail alternatives, within the New Bedford Main Line, would require reconstructing freight rail bridges across the Taunton River, potentially with temporary impacts to Atlantic sturgeon habitat. As noted above, NMFS noted that it is unlikely that this species occurs in the vicinity of the proposed project.

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 placing 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 Attleboro Bypass, 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, will be conducted from early Spring through late Fall. In all cases, construction will 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) will 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 will follow Best Management Practices to avoid impacts to streams and rare species using them.

Detailed site-specific, species-specific mitigation measures will 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 will 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.

4.15.3.5 SUMMARY OF IMPACTS BY ALTERNATIVE

A total of 14 state-listed rare species have been recorded in areas adjacent to the project corridors. These include two salamanders, three turtles, one crustacean, three moths and butterflies, two dragonflies, and three plant species. 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 - the Attleboro Bypass, 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.

Attleboro Electric Alternative

The Attleboro Electric Alternative would adversely affect habitat of nine state-listed species (wood turtle, Blanding's turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, pale green pinion moth, water-willow stem borer moth, ringed boghaunter, and Long's bulrush) and result in a total loss of approximately 31.2 acres within natural areas of nine Priority and Estimated Habitat polygons. The Attleboro Bypass is the only segment of the Attleboro Alternative that proposes development of a new rail corridor through undeveloped land with mapped areas of rare species habitat. It is anticipated that the Attleboro Bypass segment would interrupt migratory corridors for one rare species within one polygon. The barrier effect would be approximately 2,500 feet for Blanding's turtle found within (PH236/EH121). NHESP determined that the Attleboro Alternative does not need to be reviewed for impacts to the marbled salamander found within the Attleboro Bypass polygon (PH620/EH545).

Table 4.15-26 includes the analysis performed by NHESP and summarizes the impacts to each of the rare species potentially found within the Priority and Estimated Habitat polygons. According to the NHESP scoring system, both of the Attleboro alternatives would result in an overall impacts score of 7.5 and a total barrier effects score of 1.5 for two species (Table 4.15-26). Blanding's turtle, and eastern box turtle have the highest barrier effect scores (minor=1 and non/minor=0.5 respectively).

The highest barrier effect score would be for Blanding's turtle (minor=1) and eastern box turtle (none/minor=0.5). In April 2009, field investigations were conducted in conjunction with NHESP within the Attleboro Bypass Priority and Estimated Habitat for Blanding's turtle (PH236/EH121; adjacent to the Northeast Corridor) and for marbled salamander (PH620/EH545; adjacent to the Attleboro Secondary). NHESP determined that the Attleboro Alternative does not need to be reviewed for impacts to marbled salamander, and that minor effects to Blanding's turtle habitat are not considered significant due to the small amount of habitat affected and the fact that this habitat is located next to an existing barrier to turtle movement (the Northeast Corridor tracks).

The Northeast Corridor, Attleboro Secondary, and the Southern Triangle construction for the Attleboro Alternative would be mostly within existing disturbed areas and the only major change would be an increase in train speed and frequency from the existing track usage. However, 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, and construction of traction power facilities in certain areas. Upgrading these tracks would result in only marginal loss of nesting, foraging, and wintering habitat for rare species, and would not create a new barrier to movement. Reconstructing these tracks also presents opportunities to improve migratory passage of rare species and reduce fragmentation by reconstructing existing culverts or bridges. None of the proposed station sites would impact Priority and Estimated Habitat. During a site visit in July 2009, an eastern box turtle was observed at the site of the proposed Barrowsville Station which would result in the loss of approximately 5 acres of habitat (0.01 acre of red maple swamp, 1.9 acres of upland forest, and 3 acres of cleared land).

Three ACECs containing three Priority and Estimated Habitats (PH12/EH73, PH298/EH198 and PH1439/EH948) would be impacted by the Attleboro Alternatives. Based on general, publicly available habitat polygons for each species, the Northeast Corridor would impact approximately 4.4 acres of rare species habitat within the Fowl Meadow and Ponkapoag Bog ACEC; and approximately 4.6 acres of rare species habitat within the Canoe River ACEC. The Attleboro Secondary would impact approximately 1.0 acre of rare species habitat within the Three Mile River ACEC. There are no ACECs crossed by the

Table 4.15-26 Impacts by Species – Attleboro Electric Alternative

Species	Potential Habitat Loss (acres)	NHESP Habitat Loss Assessment (acres)	Impact scores		
			Overall Habitat Functions Lost ¹	NHESP Score	NHESP Score
Marbled Salamander	4.0	--	None	0	0
Wood Turtle	0.6	3.0	None/Minor (F, W)	0.5	0
Blanding’s Turtle	1.4	17.8	Minor/Moderate (M, F,W)	1.5	1
Eastern Box Turtle	12.4	17.1	Minor/Moderate (F,W)	1.5	0.5
Coastal Swamp Amphipod	0.1	--	F,B	--	0
Mocha Emerald	0	1.3	Minor	1	0
Hessel’s Hairstreak	0	1.2	Minor	1	0
Pale Green Pinion Moth	0.1	0.1	None/Minor (F,B)	0.5	0
Water-Willow Stem			None/Minor	0.5	0
Borer Moth	0	0.4			
Ringed Boghaunter	--	0.8	None/Minor	0.5	0
Long-Leaved Panic-Grass	0	--	None	0	0
Long’s Bulrush	0.3	0.3	None/Minor	0.5	0
Total impact Scores²	--	--	--	7.5	1.5

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

Attleboro Bypass nor by the Southern Triangle. Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Attleboro Diesel Alternative

Impacts to rare species for the Attleboro Diesel Alternative are similar to the impacts identified in Table 4.15-26 for the Attleboro Electric Alternative. These impacts include habitat loss for nine state-species and associated habitat fragmentation/barrier effect for two of these species (Blanding’s turtle and eastern box turtle). The diesel alternative would result in approximately 0.8 acre less impact to upland forest than the electric alternative because it does not require the proposed traction power station (TSS-2) located on the New Bedford Main Line. There would be are no other traction power stations within any of these Priority Habitat polygons.

Stoughton Electric Alternative

The Stoughton Electric Alternative would adversely affect habitat of nine state-listed species (blue-spotted salamander, wood turtle, Blanding’s turtle, eastern box turtle, mocha emerald, Hessel’s hairstreak, pale green pinion moth, water-willow stem borer moth, and ringed boghaunter) and result in a loss of approximately 32.6 acres within natural areas of five Priority and Estimated Habitat polygons. 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 (19,500 feet of barrier effect) for rare species. North of the trestle, the barrier effect would be approximately 9,700 feet and 1,400 feet within areas

used by Blanding’s turtle and blue-spotted salamander respectively; south of the trestle, the barrier effect would be approximately 8,400 feet within areas used by eastern box turtle.

Table 4.15-27 includes the analysis performed by NHESP and summarizes the impacts to each of the rare species potentially found within the Priority and Estimated Habitat polygons. According to NHESP scoring system, both of the Stoughton alternatives would result in overall impacts score of 10.5 and total barrier effects score of 6 for three species (Table 4.15-27). Blue-spotted salamander, Blanding’s turtle, and eastern box turtle have the highest barrier effect scores (moderate=2).

Table 4.15-27 Impacts by Species – Stoughton Electric Alternative

Species	Potential Habitat Loss (acres)	NHESP Habitat Loss Assessment (acres)	Impact Scores			
			Overall Habitat Functions Lost ¹	NHESP Score	Barrier Effect	NHESP Score
Blue-Spotted Salamander	2.0	3.7 – 5.4	Moderate (M,F,N/B,W)	2	Moderate (1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle)	2
Wood Turtle	0.6	1.8	None/Minor (F,W)	0.5	None	0
Blanding’s Turtle	0.3	12.1 – 16.1	Moderate (M,F,N/B,W)	2	Moderate (9,700 feet of barrier effect between Depot Street and Foundry Street)	2
Eastern Box Turtle	9.9	19.7 – 21.8	Moderate (M,F,N/B,W)	2	Moderate (8,400 feet south of the trestle within the Stoughton Line)	2
Coastal Swamp Amphipod	0.1	--	F, B	--	None	0
Mocha Emerald	0	1.3	Minor	1	None	0
Hessel's Hairstreak	0	3.5	Minor/Moderate	1.5	None	0
Pale Green Pinion Moth	0.1	0.1	None/Minor	0.5	None	0
Water-Willow Stem Borer Moth	0	0.4	None/Minor	0.5	None	0
Ringed Boghaunter	0	0.8	None/Minor	0.5	None	0
Gypsywort	0	--	None	0	None	0
Long-Leaved Panic-Grass	0	--	None	0	None	0
Total impact Scores²	--	--	--	10.5	--	6

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

Raynham Place 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 Place 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.

One ACEC containing Priority and Estimated Habitat (PH1392/EH59) would be impacted by the Stoughton alternatives. Based on general, publicly available habitat polygons for each species, approximately 22 acres of rare species habitat would be impacted within the Hockomock Swamp ACEC. Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Stoughton Diesel Alternative

The Stoughton Diesel Alternative would result in approximately 1.9 acres less impact (1.1 acres of upland forest and scrub shrub within TPSS-1 and 0.8 acre of upland forest within TPSS-2) 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 nine 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 nine state-listed species (blue-spotted salamander, wood turtle, Blanding's turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, pale green pinion moth, water-willow stem borer moth, and ringed boghaunter) and result in a loss of approximately 13.2 acres within natural areas of five Priority and Estimated Habitat polygons.

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 (21,600 feet of barrier effect) for rare species. North of the trestle, the barrier effect would be approximately 9,700 feet and 1,400 feet within areas used by Blanding's turtle and blue-spotted salamander respectively, and south of the trestle, the barrier effect would be approximately 8,400 feet used by eastern box turtle. There is approximately 2,100 feet of additional barrier effect for the eastern box turtle within the Whittenton Branch.

Table 4.15-28 includes the analysis performed by NHESP and summarizes the impacts to each of the rare species potentially found within the Priority and Estimated Habitat polygons. According to NHESP scoring system, both of the Whittenton alternatives would result in overall impacts score of 10 and total barrier effects score of 6 for three species (Table 4.15-28). Blue-spotted salamander, Blanding's turtle, and eastern box turtle have the highest barrier effect scores (moderate=2).

Raynham Place 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 Place 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.

One ACEC containing one Priority and Estimated Habitat (PH1392/EH59) would be impacted by the Whittenton Alternatives. Based on general, publicly available habitat polygons for each species, approximately 22 acres of rare species habitat would be impacted within the Hockomock Swamp ACEC. Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Table 4.15-28 Impacts by Species – Whittenton Electric Alternative

Species	Potential Habitat Loss (acres)	NHESP Habitat Loss Assessment (acres)	Overall Habitat Functions Lost ¹	NHESP Score	Impact Scores	
					Barrier Effect	NHESP Score
Blue-Spotted Salamander	2.0	3.7 – 5.4	Moderate (M,F,N/B,W)	2	Moderate (1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle)	2
Wood Turtle	0.6	1.8	None/Minor (F,W)	0.5	None	
Blanding’s Turtle	0.3	12.1 – 16.1	Moderate (M,F,N/B,W)	2	Moderate (9,700 feet of barrier effect between Depot Street and Foundry Street)	2
Eastern Box Turtle	9.9	24 – 27.8	Moderate (M,F,N/B,W)	2	Moderate (8,400 feet south of the trestle within the Stoughton Line and 2,100 feet within the Whittenton Branch)	2
Coastal Swamp Amphipod	0.1	--	F, B	--	None	0
Mocha Emerald	0	1.3	Minor	1	None	0
Hessel’s Hairstreak	0	1.2	Minor	1	None	0
Pale Green Pinion Moth	0.1	0.1	None/Minor	0.5	None	0
Water-Willow Stem Borer Moth	0	0.4	None/Minor	0.5	None	0
Ringed Boghaunter	0	0.8	None/Minor	0.5	None	0
Gypsywort	0	--	None	0	None	0
Long-Leaved Panic-Grass	0	--	None	0	None	0
Total impact Scores²	--	--	--	10	--	6

1. Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2. NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the preferred alternative is selected.

Whittenton Diesel Alternative

The Whittenton Diesel Alternative would result in approximately 1.9 acres less impact (1.1 acres of upland forest and scrub shrub within TPSS-1 and 0.8 acre of upland forest within TPSS-2) 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 nine state-species and associated habitat fragmentation/barrier effect for three of these species (blue-spotted salamander, Blanding’s turtle, and eastern box turtle).

Rapid Bus Alternative

The Rapid Bus Alternative would adversely affect habitat of three state-listed species (marbled salamander, Blanding’s turtle, and eastern box turtle) and result in loss of approximately 16.2 acres within natural areas of three Priority and Estimated Habitat polygons. Impacts would occur where the highway needs to be widened to accommodate the bus lane.

Table 4.15-29 includes NHESP analysis and summarizes the impacts to each of the rare species potentially found within the Priority and Estimated Habitat polygons. According to NHESP scoring system, it shows that the Rapid Bus Alternative would result in overall impacts and barrier effects scores

Table 4.15-29 Impacts by Species – Rapid Bus Alternative

Species	Potential Habitat Loss (acres)	NHESP Habitat Loss Assessment (acres)	Impact Scores			
			Overall Habitat Functions Lost ¹	NHESP Score	Barrier Effect	NHESP Score
Marbled Salamander	0.1	0.1	Minor (F, W)	1	None	0
Blue-Spotted Salamander	8.3	--	F, W	--	None	0
Blanding’s Turtle	2.0	13.0	Minor (F, W)	1	None	0
Eastern Box Turtle	16.1	2.2	Minor (F, W)	1	None	0
Gypsywort	1.9	--	None	0	None	0
Total impact Scores²	--	--	--	3	--	0

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

of 3 and zero (Table 4.15-29). Blanding’s turtle, eastern box turtle, and marbled salamander have the highest overall effect scores (minor=1). The majority of the proposed work would be within the existing highway right-of-way median and would not impact rare species and their habitat. In locations where the proposed work occurs outside of the existing developed area, there would only be loss of habitat along the periphery of the Priority and Estimated Habitats polygons. This minor loss of habitat is not likely to affect the persistence of rare species populations. None of the proposed station sites would impact Priority and Estimated Habitat.

Two ACECs that contain two Priority and Estimated Habitats (PH454/EH350 and PH1392/EH59) would be impacted by the Rapid Bus Alternative. Based on general, publicly available habitat polygons for each species, approximately 0.3 acres of habitat would be impacted within the Fowl Meadow and Ponkapoag Bog ACEC; and approximately 22 acres of habitat would be impacted within the Hockomock Swamp ACEC. Other rare species and their habitat may occur within the polygons or within the contiguous ACECs.

Summary of Impacts

Each of the rail alternatives could impact nine (9) state listed species, and would result in the loss of migratory route habitat because all rail alternatives require construction of new rail lines where currently there are none. The Rapid Bus Alternative could impact three (3) state listed species. The Rapid Bus Alternative would result in minor losses of their habitat on the edge of the Priority Habitats and on the edge of the highway, because most of the construction of the bus route would be within the existing highway median, and there would be no new interruption of rare species migratory corridors.

The Stoughton and Attleboro alternatives would intersect the largest area of Priority and Estimated Habitat polygons, approximately 32.6 acres and 30.7 acres for the Stoughton Electric and Diesel alternatives respectively, and approximately 31.2 acres and 30.4 acres for the Attleboro Electric and Diesel Alternatives respectively. The Whittenton alternatives and Rapid Bus Alternative would intersect

the smallest area of Priority and Estimated Habitat polygons, approximately 13.2 acres and 11.3 acres for the Whittenton Electric and Diesel alternatives, and approximately 16.2 acres for the Rapid Bus Alternative.

Based on the habitat use assumptions for each species (see Table 4.15-9), the Stoughton and Whittenton alternatives would have the smallest impacts on potential suitable rare species habitat: approximately 9.9 acres and 8.0 acres for the Stoughton Electric and Diesel alternatives, and approximately 12.6 acres and 10.7 acres for the Whittenton Electric and Diesel Alternatives (Table 4.15-30). The Attleboro alternatives and Rapid Bus Alternative would have the largest impacts on potential suitable rare species habitat, approximately 17.8 acres and 17.0 acres for the Attleboro Electric and Diesel Alternatives, and approximately 16.2 acres for the Rapid Bus Alternative (Table 4.15-30). As indicated by NHESP, these calculations may overestimate the impacts to some species because they were performed without using the polygon boundaries of each individual species habitat. For example, in the calculation of impacts for the Rapid Bus Alternative, the majority of the impacts are to eastern box turtle habitat. Area calculations for this species included the sum of all cover types (except open water) within the Priority Habitat polygons.

Table 4.15-30 Direct and Indirect Effects to Rare Species from the South Coast Rail Alternatives

Alternative	# of Priority Habitat (PH)	Direct Effects			Indirect Effects and Impact Scores ⁴		
		Acres of PH/EH Polygon Intersected by Alternative ¹	# of Rare Species Impacted ²	Potential Habitat Loss (acres) ³	Migratory Route (Barrier effect)	NHESP Score	Overall Habitat Functions Lost/ NHESP Score
Attleboro Electric	9	31.2	9	17.8	2,500 feet	1.5	7.5
Attleboro Diesel	9	30.4	9	17.0	2,500 feet	1.5	7.5
Stoughton Electric	5	32.6	9	9.9	19,500 feet	6	10.5
Stoughton Diesel	5	30.7	9	8.0	19,500 feet	6	10.5
Whittenton Electric	5	13.2	9	12.6	21,600 feet	6	10
Whittenton Diesel	5	11.3	9	10.7	21,600 feet	6	10
Rapid Bus Stations	3	16.2	3	16.2	--	0	3
Layovers	0	0	--	--	--	--	--
Layovers	0	0	--	--	--	--	--

1 Includes only natural habitats

2 Based on NHESP impact analysis, dated September 4, 2009.

3 Based on analysis of general, publicly available polygons and habitat assumptions (Table 4.15-9).

4 Based on NHESP impact analysis, dated September 4, 2009.

The Attleboro, Stoughton, and Whittenton alternatives would result in the loss of migratory route habitat (barrier effect) of approximately 2,500 feet, 19,500 feet, and 21,600 feet respectively.

Tables 4.15-30 and 4.15-31 summarize the impacts to rare species for each of the Build Alternatives. Estimated impacts presented in these tables serve as a general guide to coarsely estimating the relative level of impact to rare species. As noted by NHESP, this coarse-scale analysis is reasonable for comparing alternatives at this stage in the project planning process. This level of detail is also considered appropriate at this time for the purpose of MESA review.

Table 4.15-31 Potential Rare Species Habitat Loss from the South Coast Rail Alternatives

Species	NHESP Habitat Loss Assessment (acres) ¹										
	Attleboro Alternatives		Stoughton Alternatives		Whittenton Alternatives		Rapid Bus		Stations		Layers
	Score	Acres	Score	Acres	Score	Acres	Score	Acres	Name	Acres	
Marbled Salamander	--	--	--	--	--	--	Minor	0.1	--	--	--
Blue-Spotted Salamander	--	--	Moderate	3.7–5.4	Moderate	3.7–5.4	--	--	--	--	--
Wood Turtle	None/Minor	3.0	Minor	1.8	Minor	1.8	--	--	--	--	--
Blanding’s Turtle	Moderate/Minor	17.8	Moderate	12.1–16.1	Moderate	12.1–16.1	Minor	13.0	--	--	--
Eastern Box Turtle	Moderate	17.1	Moderate	19.7–21.8	Moderate	24–27.8	Minor	2.2	Barrowsville ²	5.0	--
Mocha Emerald	Minor	1.3	Minor/Minor	1.3	Minor	1.3	--	--	--	--	--
Hessel's Hairstreak	Minor	1.2	Moderate	3.5	Minor	1.2	--	--	--	--	--
Pale Green Pinion Moth	None/Minor	0.1	None/Minor	0.1	None/Minor	0.1	--	--	--	--	--
Water-Willow Stem Borer Moth	None/Minor	0.4	None/Minor	0.4	None/Minor	0.4	--	--	--	--	--
Ringed Boghaunter	Minor/None	0.8	Minor	0.8	Minor	0.8	--	--	--	--	--
Long’s Bulrush	Minor	0.3	--	--	--	--	--	--	--	--	--

1 Based on NHESP impact analysis, dated September 4, 2009.

2 Not within mapped Priority and Estimated Habitat polygon, but based on a site visit conducted on July 2009.

Based on NHESP impact analysis, where the limits of work were intersected with each species habitat boundaries to determine the approximate acreage of mapped habitat impacted by each of the alternatives, the impact numbers differ from the potential habitat impacts calculated based on general, publicly available habitat polygons for each species. The NHESP analysis, which was based on detailed polygons, includes a summary of the impacts for each of the alternatives based on a numerical coding of the impact scores (e.g., none=0, minor=1, and moderate=2). The scoring system shows that the Stoughton and Whittenton alternatives would have the greatest relative impacts to state listed species and their habitat, with overall impacts and barrier effects scores of 10.5 and 6 for the Stoughton alternatives, and 10 and 6 for the Whittenton alternatives. The Attleboro alternatives and Rapid Bus Alternative would have the least impacts to state-listed species and their habitat, with overall impacts and barrier effects scores of 7.5 and 1.5 for the Attleboro alternatives and 3 and zero for the Rapid Bus Alternative. Table 4.15-31 summarizes the impacts by species as reported in the NHESP analysis.

In their preliminary finding, NHESP concluded that for this project, barriers (habitat fragmentation) are a more important consideration than acreage of habitat loss for evaluating the relative impacts of the various alternatives on endangered species. Once the LEDPA is determined, the amount of habitat impacted will ultimately be determined during the permitting process using field delineation of rare species habitat and will consist of a fine-grained analysis of actual habitat boundaries.

Analysis by NHESP confirms that the proposed project elements on the Fall Secondary, New Bedford Main Line, Northeast Corridor, Attleboro Secondary and Rapid Bus corridor would result in relatively minor impacts to state-listed species. NHESP expressed greater concern about impacts to migration routes of the Blanding’s turtle across the Attleboro Bypass and impacts to the movement of Blanding’s turtles, blue-spotted salamanders, and eastern box turtles across the out-of-service portions along the Stoughton and Whittenton alternatives. Coordination with regulatory agencies will continue through the

determination of the LEDPA, selection of a final design, fine-grained analysis of actual habitat boundaries and impacts, and development of a detailed mitigation plan.

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:

- 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;
- Acquire of land or conservation restrictions that protect identified critical habitats that are at risk of loss or degradation, and
- 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.
- When possible, the track construction and improvements were kept within the existing footprint.
- Both the Stoughton and Whittenton Alternatives would avoid impacts to most of the habitat of rare turtles and salamander species by constructing an 8,500-foot trestle, 20 feet wide for the diesel alternatives and 28 feet wide for the electric alternatives. The trestle would be an elevated structure 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 north of the proposed Raynham Place station site (Figure 4.15-9). 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 a minimum of 3 feet. At selected intervals, the existing berm would be excavated to create a minimum of 5 vertical feet of clearance, sufficient for an unrestricted deer

and/or other large mammal crossing. At each end, the height of the trestle above the ground would decrease to approximately two 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.

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 ENF⁴⁸ 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 will be identified to maintain existing hydrology between wetland systems.
- Further minimization efforts will be pursued during subsequent design phases, for example by using steeper slopes and reducing fill, or retaining walls.

Attleboro Alternative (Electric and Diesel)

The Attleboro Alternatives would minimize impact to rare species habitat by maintaining single track with one siding, instead of double track, along the Attleboro Secondary.

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.

⁴⁸ Executive Office of Transportation and Public Works, *South Coast Rail Environmental Notification Form*, November 2008.

Rapid Bus Alternative

The Rapid Bus would minimize impacts to rare species habitat by using the median and working mostly within the existing highway right-of-way.

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 U.S. Army Corps of Engineers. 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, and under-rail troughs);
- Timing and methods of construction;
- Post-construction maintenance;
- Enhancing and replacing habitat;
- Habitat Protection and Preservation (off-site mitigation); and
- 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. Specific wildlife crossings locations will be selected in consultation with NHESP based on existing rare species data and as constrained by topography and the elevation of the rail.

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. 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 4.15-10). NHESP suggested, as the project design advances that site-specific information (topographic profile, elevation of track, groundwater) and conceptual designs at each recommended location be developed and that a variety of types of mitigation measures be incorporated. During final design, each bridge or culvert

selected to be removed or replaced would be analyzed in order to avoid causing adverse hydrologic changes to affected wetlands.

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 will be designed with a natural substrate and, where feasible, natural light to encourage some species to use culverts (Jackson and Griffin 1998).⁴⁹

Under-rail troughs would be constructed within upland areas where eastern box turtle and marbled salamander habitat would be impacted. 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 4.15-11). 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.

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 Attleboro Bypass, Hockomock Swamp, and Pine Swamp sections may be phased to reduce disruption during breeding season. In all cases, construction will be limited to normal daylight hours.

Construction impacts to aquatic resources and associated rare species will 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 will provide construction period protection and monitoring in all areas where work is proposed within mapped estimated habitat. Construction period monitoring will include:

⁴⁹ 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.

- Staked, entrenched siltation fencing at all limits of work within identified rare species habitat areas;
- 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 will be conducted in areas of rare species habitat as required by NHESP in the CMP;
- Removal of any animals found within the work area;
- Relocation of 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 VMP and YOPs. 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. 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

Replacing impacted wetlands adjacent to large, productive wetland systems can improve rare species habitat and reduce fragmentation. In addition, mitigation impacts to rare species such as eastern box turtle and Blanding's turtle can be accomplished by providing suitable nesting habitat in areas where individuals have been recorded. For example, portions of abandoned gravel pits could be used as a potential mitigation site and 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. This may also provide benefits to turtle species that also currently use the project corridor for nesting.

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 can be planted along the project alignment to discourage invasion by weedy species in newly disturbed areas along the right-of-way. In addition, control methods may be considered that would remove or restrict invasive species that could spread into adjacent, high-value forested wetlands used by state-listed species.

Habitat Protection/Preservation

Long-term net benefits to rare species found along the project corridors would be provided by ensuring 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.

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.” The BioMap indicates that some parts of these Core Habitats are not currently protected, including half of Pine Swamp, and that little of the Supporting Natural Landscape of either location is protected.

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 will 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 would be determined by the NHESP.

Attleboro Electric Alternative

For the Attleboro Alternative, mitigation would be focused on the Attleboro Bypass segment within mapped habitat of Blanding’s turtle, because construction of a new rail through undeveloped land would interrupt migratory corridors potentially used by this species (see Table 4.15-32). As a result of the site visit conducted in April 2009, NHESP determined that the Attleboro Alternative does not need to be reviewed for impacts to the marbled salamander. The Blanding’s turtle mitigation would involve constructing up to two enhanced culverts to allow passage of this species between different habitats. Figure 4.15-12 shows the potential location for these passages. The final design and location of these passages will be identified in consultation with NHESP.

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

- there would be only 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 currently being 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.

Table 4.15-32 Proposed Mitigation – Attleboro Electric Alternative

Species	NHESP Habitat Loss Assessment (acres)	Habitat Functions Lost ^{1,2}	Barrier Effect	Segment	Proposed Mitigation
Wood Turtle	3.0	None/Minor (F,W)	None	Fall River Secondary, New Bedford Main Line	Enhanced culverts
Blanding’s Turtle	17.8	Minor/Moderate (M, F,W)	Minor (2,500 feet within the Bypass)	Northeast Corridor, Bypass	Up to two enhanced culvert; Enhance/ create nest habitat
Eastern Box Turtle	17.1	Minor/Moderate (F,W)	None/Minor	Northeast Corridor, Attleboro Secondary, Fall River Secondary, New Bedford Main Line	Payment to mitigation bank; Enhance/ create nest habitat
Mocha Emerald	1.3	Minor	None	Fall River Secondary, New Bedford Main Line	None
Hessel's Hairstreak	1.2	Minor	None	Fall River Secondary, New Bedford Main Line	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site
Pale Green Pinion Moth	0.1	None/Minor (F,B)	None	New Bedford Main Line	None
Water-Willow Stem Borer Moth	0.4	None/Minor	None	New Bedford Main Line	None
Ringed Boghaunter	0.8	None/Minor	None	Lakeville/ Freetown	None
Long’s Bulrush	0.3	None/Minor	None	Northeast Corridor	Transplant any individual plants in impacted area to suitable wetland mitigation site

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

Attleboro Diesel Alternative

Mitigation measures for impacts to rare species for the Attleboro Diesel Alternative are the same as the mitigation identified in Table 4.15-32 of the Attleboro Electric Alternative, because the impacts to rare species habitat would be the same.

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 if the proposed trestle (Table 4.15-33). 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 Place 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.

Table 4.15-33 Proposed Mitigation – Stoughton Electric Alternative

Species	NHESP Habitat Loss Assessment (acres)	Habitat Functions Lost ^{1,2}	Barrier Effect	Segment	Proposed Mitigation
Blue-Spotted Salamander	3.7 – 5.4	Moderate (M, F, N/B,W)	Moderate (1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle)	Stoughton Line	Three enhanced culverts and one bridge
Wood Turtle	1.8	None/Minor (F,W)	None	Fall River Secondary, New Bedford Main Line	Enhanced culverts
Blanding's Turtle	12.1 – 16.1	Moderate (M, F, N/B,W)	Moderate (9,700 feet of barrier effect between Depot Street and Foundry Street)	Stoughton Line	Three enhanced culverts and one bridge; Enhance/ create nest habitat
Eastern Box Turtle	19.7 – 21.8	Moderate (M, F, N/B,W)	Moderate (8,400 feet south of the trestle within the Stoughton Line)	Stoughton Line, Fall River Secondary, New Bedford Main Line	Up to three under-rail troughs within the Stoughton Line; Payment to mitigation bank; Enhance/ create nest habitat
Mocha Emerald	1.3	Minor	None	Fall River Secondary, New Bedford Main Line	None
Hessel's Hairstreak	3.5	Minor/ Moderate	None	Fall River Secondary, New Bedford Main Line	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site
Pale Green Pinion Moth	0.1	None/Minor	None	New Bedford Main Line	None
Water-Willow Stem Borer Moth	0.4	None/Minor	None	New Bedford Main Line	None
Ringed Boghaunter	0.8	None/Minor	None	Lakeville/ Freetown	None

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

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.

To mitigate for impacts to blue-spotted salamander and Blanding's turtle three existing culverts would be enhanced along the segment between Depot Street and south of Foundry Street, and a new bridge that meets stream crossing standards would be provided at Black Brook. NHESP requested that each of these three 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 Place station site and Bridge Street to allow passage of wildlife between habitats separated by the tracks. Figures 4.15-13a-b shows the potential location for these passages.

The final design and locations of these passages will be identified in consultation with NHESP.

For the remainder of the species potentially impacted by this alternative, no mitigation is being 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 being 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 dependant 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 Table 4.15-33 of 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 (Table 4.15-34). The major difference would be measures proposed for the eastern box turtle habitat found along the Whittenton Branch. Two under-rail troughs would be constructed to connect upland areas within this Priority Habitat. Figure 4.15-14 shows the potential location for these passages. The final design and locations of these passages will 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 in Table 4.15-34 of the Whittenton Electric Alternative, because the impacts to rare species habitat will be the same.

Rapid Bus Alternative

No mitigation is being proposed for the impacts of the Rapid Bus Alternative (Table 4.15-35) because:

- most of the construction will be within the highway median;
- there would only be minor losses on the edge of the Priority Habitats and on the edge of the highway;

Table 4.15-34 Proposed Mitigation – Whittenton Electric Alternative

Species	NHESP Habitat Loss Assessment (acres)	Habitat Functions Lost ^{1,2}	Barrier Effect	Segment	Proposed Mitigation
Blue-Spotted Salamander	3.7 – 5.4	Moderate (M, F, N/B,W)	Moderate (1,400 feet of barrier effect between Foundry Street and the northern limit of the trestle)	Stoughton Line	Three enhanced culverts and one bridge
Wood Turtle	1.8	None/Minor (F,W)	None	Fall River Secondary, New Bedford Main Line	Enhanced culverts
Blanding’s Turtle	12.1 – 16.1	Moderate (M, F, N/B,W)	Moderate (9,700 feet of barrier effect between Depot Street and Foundry Street)	Stoughton Line	Three enhanced culverts and one bridge; Enhance/ create nest habitat
Eastern Box Turtle	24 – 27.8	Moderate (M, F, N/B,W)	Moderate (8,400 feet south of the trestle within the Stoughton Line)	Stoughton Line, Fall River Secondary, New Bedford Main Line	Up to three under-rail troughs within the Stoughton Line and two within the Whittenton Branch; Payment to mitigation bank; Enhance/ create nest habitat
Mocha Emerald	1.3	Minor	None	Fall River Secondary, New Bedford Main Line	None
Hessel's Hairstreak	1.2	Minor	None	Fall River Secondary, New Bedford Main Line	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site
Pale Green Pinion Moth	0.1	None/Minor	None	New Bedford Main Line	None
Water-Willow Stem Borer Moth	0.4	None/Minor	None	New Bedford Main Line	None
Ringed Boghaunter	--	None/Minor	None	Lakeville/ Freetown	None

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

- there will be no interruption of rare species migratory corridors;
- impacts could be eliminated or reduced in final design; and
- It would not be feasible to upgrade crossings/culverts due to high costs.

Summary of Mitigation

Where reconstruction and creation of a rail corridor will occur within or adjacent to rare species habitat, all practicable measures have been taken to minimize and avoid adverse impacts.

Table 4.15-35 Proposed Mitigation – Rapid Bus Alternative

Species	NHESP Habitat Loss Assessment (acres)	Habitat Functions Lost ^{1,2}	Barrier Effect	Segment	Proposed Mitigation
Marbled Salamander	0.1	Minor (F, W)	None	Rapid Bus (I-93/Route 24)	None
Blue-Spotted Salamander	--	F, W	None	Rapid Bus (Route 24)	None
Blanding’s Turtle	13.0	Minor (F, W)	None	Rapid Bus (Route 24)	None
Eastern Box Turtle	2.2	Minor (F, W)	None	Rapid Bus (Route 24)	Payment to mitigation bank
Gypsywort	--	None	None	Rapid Bus (Route 24)	None

1 Habitat Functions abbreviations:

M = Migration, F = Foraging, B/N = Breeding/Nesting, W= Wintering

2 NHESP rated the overall impacts to each of the rare species (none, minor and/or moderate) depending on final project design, mitigation structures and field verification that would be conducted once the LEDPA is determined.

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

- Constructing wildlife corridors/passages (e.g., enhanced stream culverts/oversized culverts, and under-rail troughs);
- Timing and methods of construction;
- Post-construction maintenance;
- Enhancing and replacing habitat; Habitat Protection and Preservation (off-site mitigation); and
- Funding of research programs to benefit state-listed species.

Specific mitigation measures (wildlife passages/corridors) will be provided and focused on project corridors where there will be loss of migratory route habitat. These areas include rare species Priority and Estimated Habitat found within the undeveloped portions of the Attleboro Bypass and 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 4.15-36 provides a summary of the proposed structural mitigation measures for the rare species impacted by the South Coast Rail alternatives. Coordination with regulatory agencies will continue throughout the determination of the LEDPA, selection of a final design, fine-grained analysis of actual habitat boundaries and impacts, and development of a detailed mitigation plan.

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 Federal Endangered Species Act (ESA) of 1973, Section 7 (16 USC 1531 *et seq.*, as amended),⁵⁰ authorizes the determination and listing of species as Endangered and Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species.

⁵⁰ Endangered Species Act of 1973, Section 7(16 USC 1531 *et seq.*, as amended), United States Fish and Wildlife Service.

Table 4.15-36 Proposed Structural Mitigation Measures for Rare Species

Species	Attleboro Alternatives	Stoughton Alternatives	Whittenton Alternatives	Rapid Bus Alternative
Blue-Spotted Salamander	--	Three enhanced culverts and one bridge	Trestle; Three enhanced culverts and one bridge	None
Wood Turtle	Enhanced culverts	Enhanced culverts	Enhanced culverts	--
Blanding’s Turtle	Up to two enhanced culvert; Enhance/ create nest habitat	Three enhanced culverts and one bridge; Enhance/ create nest habitat	Three enhanced culverts and one bridge	None
Eastern Box Turtle	Payment to mitigation bank; Enhance/ create nest habitat	Up to three under-rail troughs within the Stoughton Line; Payment to mitigation bank; Enhance/ create nest habitat	Up to three under-rail troughs within the Stoughton Line and two within the Whittenton Branch Payment to mitigation bank; Enhance/ create nest habitat	None
Hessel's Hairstreak	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site	Plant Atlantic cedars in suitable adjacent area or wetland mitigation site	None
Long’s Bulrush	Transplant any individual plants in impacted area to suitable wetland mitigation site	--	--	--

Section 7 of the Act⁵¹ 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. Under Section 7, Federal agencies must consult with the U.S. Fish and Wildlife Service when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species. Inasmuch as portions of the project occur within known habitat of the Northern red bellied cooter, consultation under Section 7 will be completed to determine whether this project would affect the species or critical habitat of this federally-listed threatened species, and if so, to seek a biological opinion from USFWS that the proposal would not jeopardize the continued existence of this species.

The National Marine Fisheries Service (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. However, no federally-listed species occur within the project Study Area. 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.

4.15.4.2 MASSACHUSETTS ENDANGERED SPECIES ACT

Massachusetts enacted the Massachusetts Endangered Species Act (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

⁵¹ *ibid.*

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, all the other alternatives would result in a “take” of rare species and would require that NHESP issue a Conservation and Management Permit. This chapter identified and assessed alternatives to avoid and minimize impacts on state listed species in order to comply with the regulatory performance standards. Once the LEDPA is determined, the amount of habitat impacted will ultimately be determined in the permitting process based on actual field delineation of rare species habitat, and will include a detailed analysis of actual habitat boundaries. Coordination with regulatory agencies will continue through the determination of the LEDPA, selection of a final design, and development of a detailed mitigation plan.

None of the alternatives is anticipated to affect the long term persistence of these species’ populations. The Applicant has indicated that it will implement and develop a Conservation and Management Plan (CMP) that will provide a long-term benefit to impacted species. The CMP would be developed in consultation with NHESP. Elements of the CMP could include:

- On and/or off-site permanent habitat protection;
- On and/or off-site habitat restoration and management;
- Research to enhance conservation efforts and rare species recovery;
- Contribution toward development or implementation of an off-site conservation and protection plan for the impacted species.

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. The written opinion of NHESP on whether a project will have an adverse effect on rare species habitat shall be presumed to be correct by the issuing authority. 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.