7.6 Ecological Resources

7.6 ECOLOGICAL RESOURCES

7.6.1 Introduction

This chapter evaluates the effects to ecological resources, which include terrestrial and aquatic environments and species, associated with the Preferred Alternative. Other chapters, such as 7.3, Agricultural Lands (Prime Farmland and Timberlands), 7.4, Parklands and Wild and Scenic Rivers, and 7.5, Hydrologic Resources, provide additional information of specific terrestrial and aquatic environments. This effects-assessment reflects comments received from the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency (EPA), as well as the public and other stakeholders.

Ecological Resources

- Regulated by numerous federal, state, and local laws, regulations, and Executive Orders.
- Adverse impacts may be difficult to permit or unallowable and may influence implementation of a Preferred Alternative.
- Types of effects include loss or fragmentation of habitat; changes to migratory patterns of transient species; effects on protected species.

Understanding locations of ecologically sensitive resources was an important consideration in identifying the Preferred Alternative. Various federal, state, and local laws and regulations protect many of these ecologically sensitive areas and resources. As such, impacts to the resources may present permitting challenges that could prevent implementation of an action. This Tier 1 Final Environmental Impact Statement (Tier 1 Final EIS) analysis identifies the locations of and the potential for impacts to ecologically sensitive resources associated with the Existing NEC + Hartford/Springfield Line and Preferred Alternative. More Tier 2 site-specific analysis and future stages of program development will be required to determine the extent of impacts on ecologically sensitive resources.

In general, the Study Area consists of many undeveloped terrestrial habitats, including forests, parks, and refuges. Aquatic ecological resources encompass waterbodies that are located along coastlines and inland, including estuaries, inlets, bays, and rivers. Impacts to these sensitive habitats and the species occurring in these habitats would result from the construction and operation of the Existing NEC + Hartford/Springfield Line and Preferred Alternative, and include the following:

- Habitat fragmentation—the process by which large, continuous habitats are divided into smaller, more isolated areas
- Bisection or fragmentation of an ecologically sensitive habitat (ESH) within the project corridor, resulting in habitat loss and detrimental effects to the sustainability of viable populations of threatened and endangered (T&E) fauna and flora occurring within the sensitive habitat

The Federal Railroad Administration (FRA) identified ecological resources within the 3,000-foot-wide Affected Environment and the Representative Route of both the Existing NEC + Hartford/Springfield Line and Preferred Alternative, summarized in Table 7.6-1 through Table 7.6-12 (see Appendix EE.06, for a complete list of all identified ecological resources, categorized based on type of protection as ESH, T&E, and Essential Fish Habitat [EFH]). In addition to the sensitive species and their habitats reviewed in this chapter, **Chapter 7.4, Parklands and Wild and Scenic Rivers,** and **Chapter 7.5, Hydrologic/Water Resources,** identify sensitive terrestrial and aquatic resources

(where possible) and the advisory/regulatory commissions protecting these habitats. Volume 2, Appendix E.06, contains the detailed Ecological Resources methodology.

7.6.2 Resource Overview

Ecological resources occur throughout the Study Area; higher concentrations tend to occur in Maryland and Connecticut for ESH, Connecticut for T&E, and New York, Connecticut, and Rhode Island for EFH. States with the most ESH (Maryland and Connecticut) tend to include large, undeveloped ESH areas with comparably small, concentrated metropolitan centers. Connecticut is one of the geographically larger states with substantial tracts of contiguous forested and undeveloped land and therefore tends to have the most ecologically sensitive resources, including T&E species occurrence. Also, much of the Representative Route of the Preferred Alternative within New York, Rhode Island, and Connecticut lies along states' coastlines and coastal waterbodies, contributing to higher concentrations of EFH and federally managed fish species. In contrast, Washington, D.C., tends to have the fewest ecological resources since it is a highly developed and relatively small geographic area.

The following are the key findings of the analysis:

- **Benefits:**
  - The Preferred Alternative increases the use of elevated structures and tunnels throughout the project corridor that could minimize impacts on ecological sensitive resources. Elevated structures and tunnels allow for passage of transient species and can minimize direct impacts to ecologically sensitive resources.
- **Impacts:**
  - Impacts to ecologically sensitive areas are greater where new segments are added as part of the Preferred Alternative.
  - By state, Connecticut has the highest potential ecological resource impacts (ESH, T&E, EFH), including highest total ESH acreage, T&E species occurrences, and number of crossings of waters identified as EFH.
  - The Existing NEC and Preferred Alternative routes bisect or clip a number of ESHs including Perryman Park, North Deen Park, and the Anita C. Leight Estuary Center and Park in Harford, MD; Merrill Park in Middlesex, NJ; and the Greenway in Washington, RI.
  - Gasheys Run, in Harford County, MD, is the only designated T&E critical habitat occurring within the Affected Environments/Representative Routes of the Existing NEC + Hartford/Springfield Line and Preferred Alternative. This is also the only known habitat of the Maryland darter, an endangered species.
  - The FRA has identified a Preferred Alternative that would minimize effects on the Patuxent Research Refuge in Maryland, John Heinz National Wildlife Refuge in Pennsylvania, and the Stewart B. McKinney National Wildlife Refuge in Connecticut. The Preferred Alternative would minimize direct impacts to Patuxent Research Refuge in Maryland and the Stewart B. McKinney National Wildlife Refuge in Connecticut. The Preferred Alternative has been modified to stay within the existing rail corridor near the John Heinz National Wildlife

Refuge to minimize effects. However, the increased service and the increase in train speed and frequency have the potential to result in indirect impacts to these resources. The endangered roseate tern is known to occur in the Stewart B. McKinney National Wildlife Refuge.

– The addition of the Hartford/Springfield Line to the Preferred Alternative would result in limited increases in the amount of ESH and occurrences of T&E species affected by the Preferred Alternative, though no new T&E species occur, nor are there changes in EFH or occurrences of federally managed fish species.

7.6.3 Affected Environment

7.6.3.1 Ecologically Sensitive Habitat

The FRA identified ESH by creating a single ESH GIS data layer using federal GIS data sources. This ESH layer consists of three categories of ESHs: terrestrial, saltwater aquatic, and freshwater aquatic. The FRA quantitatively and qualitatively assessed ESHs within the Affected Environments of the Existing NEC + Hartford/Springfield Line and Preferred Alternative, including ESH by type (terrestrial, aquatic) and acreage. (Appendix EE.06, contains further details.)

The Affected Environment of the Preferred Alternative in Washington, D.C., has the least and Connecticut has the most total ESH acreage (Table 7.6-1). The Existing NEC + Hartford/Springfield Line has lower overall and state total, terrestrial, freshwater, and saltwater ESH acreages compared to the Preferred Alternative.

Table 7.6-1: Affected Environment: Ecologically Sensitive Habitats

Geography	Existing NEC + Hartford/Springfield Line (acres)	Preferred Alternative (acres)
D.C.	230	230
MD	8,840	14,230
DE	1,585	2,115
PA	2,055	2,430
NJ	4,775	4,925
NY	1,155	1,240
CT	17,085	22,415
RI	5,960	7,250
MA	5,610	5,620
TOTAL	**47,295**	**60,455**

Source: NEC FUTURE team, 2016

Within the Affected Environment of the Preferred Alternative, New York has the lowest and Connecticut has the most freshwater ESH acreage; Massachusetts has the lowest quantifiable saltwater ESH acreage while Connecticut has the most saltwater ESH acreage (Washington, D.C., and Pennsylvania have no saltwater ESH acreage); and Washington, D.C., has the lowest and Connecticut has the most terrestrial ESH acreage (see Appendix EE.06).

7.6.3.2 Threatened and Endangered Species

The FRA presents, within this Tier 1 Final EIS, the occurrence of T&E species and their federally designated habitats within the Affected Environment of both the Existing NEC + Hartford/Springfield Line and Preferred Alternative. Table 7.6-2 lists federally listed T&E species identified in this analysis, as well as their status as either "T" or "E", the type of species (e.g., plant, mammal, and reptile), habitat description and location/range, federally designated critical habitats, and presence within the Affected Environment of the Existing NEC + Hartford/Springfield Line and Preferred Alternative.

Table 7.6-2: Affected Environment: List of Threatened and Endangered Species

Scientific Name	Common Name	Species Type	Threatened or Endangered	States Where Species Occur	Existing NEC	Preferred Alternative
Helonius bullata	swamp pink	Plant	T	MD, NJ	X	X
Clemmys muhlenbergii	bog turtle	Reptile	T	MD, DE, PA, NJ	X	X
Myotis sodalis	Indiana bat	Mammal	E	PA, NJ	X	X
Myotis septentrionalis	northern long-eared bat	Mammal	T	PA, NJ, CT, RI, MA	X	X
Acipenser brevirostrum	shortnose sturgeon	Fish	E	PA	X	X
Charadrius melodus	piping plover	Bird	T	NY, CT	X	X
Sterna dougalli dougalli	roseate tern	Bird	E	NY, CT, MA	X	X
Calidris canutus rufa	rufa red knot	Bird	T	NY, CT, RI, MA	X	X
Amaranthus pumilus	seabeach amaranth	Plant	T	NY	X	X
Isotria medeoloides	small-whorled pogonia	Plant	T	CT		X
Alasmidonta heterodon	dwarf wedgemussel	Mussel	E		X	X
Etheostoma sellare	Maryland darter	Fish	E	MD	X	X
Lepidochelys kempii	Kemp's ridley sea turtle	Reptile	E	CT	X	X
Dermochelys coriacea	leatherback sea turtle	Reptile	E		X	X
Caretta caretta	loggerhead sea turtle	Reptile	T		X	X
Chelonia mydas	green sea turtle	Reptile	T		X	X
Megaptera novaeangliae	humpback whale	Mammal	E		X	X
Balaenoptera musculus	fin whale	Mammal	E		X	X
Eubalaena glacialis	right whale	Mammal	E		X	X

Source: NEC FUTURE team, 2016

Note: Species/habitats listed are identified as a species/areas of concern. Species/habitats identified as "species/habitats that needs no further evaluation" are not included in this Tier 1 Final EIS but are listed in Volume 2, Appendix E.06, T&E data table.

The FRA developed this species list using federal databases, in accordance with federal regulations. As requested by the USFWS comments, this list has been updated from the Tier 1 Draft EIS. Subsequent Tier 2 project studies will entail more-detailed and local (state and county) investigations into Rare and T&E species, including conducting field surveys and consultations with state and federal agencies.

The Affected Environment/Representative Route of the Preferred Alternative potentially contains 18 federally listed T&E species and their habitats. The Affected Environment/Representative Route of the Existing NEC + Hartford/Springfield Line potentially contains 17 species (Table 7.6-3). These species types include plants, fish, reptiles, mammals, birds, and insects.

Table 7.6-3: Affected Environment: Threatened and Endangered Species

Geography	Existing NEC + Hartford/Springfield Line (Number of Occurrences)	Preferred Alternative (Number of Occurrences)
D.C.	0	0
MD	3	3
DE	4	4
PA	5	5
NJ	4	4
NY	6	6
CT	14	14
RI	4	4
MA	5	5

Source: NEC FUTURE team, 2016
Note: Totals for the Existing NEC + Hartford/Springfield Line and Preferred Alternative are not counted since species occur in multiple states per Alternative.

In all states, the number of potential species occurrences identified within the Affected Environment/Representative Route of the Preferred Alternative's would be reduced from the Action Alternatives (Volume 2, Chapter 7.6). This is the result of the identification of the Preferred Alternative, as well as updated federal T&E databases that reduced the habitat ranges of a number of T&E species. With the exception of Connecticut, states resulted in 0 to 4 species occurrences (Table 7.6-3). Consistent with the Action Alternatives, Washington, D.C., has the fewest and Connecticut has the most T&E species potentially within the Affected Environments of the Existing NEC + Hartford/Springfield Line and Preferred Alternative.

Based on feedback received during the public comment period, the Preferred Alternative reflects additional planning to avoid and/or minimize crossings through highly sensitive habitats identified within the Action Alternatives. The Preferred Alternative routing does not cross the Long Island Sound, a particularly concentrated source of ecologically sensitive species and habitats, and would minimize effects on sensitive natural areas such as the Patuxent Research Refuge, John Heinz National Wildlife Refuge, and Stewart B. McKinney National Wildlife Refuge. The identified routing would also reduce the potential for affecting species identified within the Preferred Alternative's Affected Environment/Representative Route (Table 7.6-2). The potential for occurrence of listed T&E sea turtles and whales, highly migratory species with deep water habitat, would be limited to areas where the Preferred Alternative crosses waterbodies along the Connecticut coastline.

Updated federal databases and new analysis resulted in removing a number of species listed in the Action Alternatives. The Puritan tiger beetle (*Cicindela puritan*), sandplain gerardia (*Agalinis acuta*), and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) were not identified within the Preferred Alternative's Affected Environment/Representative Route. Furthermore, species distribution was reduced for the shortnose sturgeon (*Acipenser brevirostrum)*, bog turtle (*Clemmys muhlenbergii)*, Indiana bat (*Myotis sodalist)*, and small-whorled pogonia (*Isotria medeoloides)*. In contrast, analyses identified increases in the species distribution of the northern long-eared bat (*Myotis septentrionalis)*, red knot (*Calidris canutus rufa*), and swamp pink (*Helonius bullata*). There are no newly identified species within the Preferred Alternative's Affected Environment/Representative Route from those listed in the Action Alternatives.

Additional Species under Consideration. In response to correspondence from the National Marine Fisheries Service (NMFS), the FRA removed the hawksbill sea turtle (*Eretmochelys imbricate*) from this Tier 1 Final EIS Affected Environment/Representative Route list of T&E species. Despite the removal of this species, the FRA will continue to monitor this sea turtle. Given its migratory patterns and habitat preferences, it has the potential to occur within the Study Area and therefore should continue to be considered at the Tier 2 level. The New England cottontail (*Sylvilagus transitionalis*) and dusky shark (*Cacharhinus obscures*) have been removed from consideration of Endangered Species Act (ESA) listing. The Cottontail will therefore not be considered at the Tier 2 level, but the dusky shark will continue to be monitored for its NMFS designation as a species of concern. The monarch butterfly (*Danaus plexippus*) and cusk (*Brosme brosme*) are currently under review and will continue to be monitored for their ESA status and occurrence within the Study Area.

7.6.3.3 Essential Fish Habitat

Within the Affected Environment of the Preferred Alternative, 17 federally managed fish species occur in 21 waterbodies (Table 7.6-4). Essential Fish Habitat (EFH) is defined by federally managed fish species (including all life stages, spawning, breeding, and migratory patterns) that inhibit a particular EFH. In many cases, an EFH may have more than one fish species occurrence, and an EFH may span multiple counties and/or states. For example, multiple federally managed fish species inhabit the Delaware River, which in turn spans counties in Delaware and Pennsylvania within the Preferred Alternative.

Washington, D.C., and Pennsylvania have the fewest (zero species) and Connecticut has the most (15 species) federally managed species occurrences within the Affected Environments of the Existing NEC + Hartford/Springfield Line and Preferred Alternative. Both the Existing NEC + Hartford/Springfield Line and Preferred Alternative have similar species occurrence numbers per state, with only 1 species count difference in New York (Table 7.6-5). The increased fish species occurrences in New York, Connecticut, and Rhode Island are the result of the alignment running along the coastlines of these states, and crossing over ecologically sensitive aquatic habitats, including inlets and waterbodies.

Table 7.6-4: Affected Environment: Federally Managed Species' Essential Fish Habitats

Scientific Name	Common Name	Waterbody	States Where Species Occur
Pomatomus saltatrix	bluefish	Gunpowder River, Hutchinson River, Saugatuck River, Pequonnock River, CosCob Harbor, Connecticut River, Long Island Sound, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Fourmile River, Thames River	MD, NY, CT
Paralichthys dentatus	summer flounder	Gunpowder River, Passaic River, Hudson River, Hackensack River, East River, Hutchinson River, Saugatuck River, Pequonnock River, CosCob Harbor, Connecticut River, Long Island Sound, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Fourmile River, Thames River, Narragansett Bay	MD, NJ, NY, CT, RI
Scophthalmus aquosus	window pane flounder	Back River, Bush River, Hutchinson River, Saugatuck River, CosCob Harbor, Pattagansett River, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River, Narragansett Bay, Narragansett Bay – Apponaug Cove	MD, NY, CT, RI
Centropristis striata	black sea bass	Hutchinson River, Saugatuck River, Pequonnock River, CosCob Harbor, Connecticut River, Long Island Sound, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Fourmile River, Thames River, Narragansett Bay	NY, CT, RI
Stenotomus chrysops	scup	Hutchinson River, Saugatuck River, Pequonnock River, CosCob Harbor, Connecticut River, Long Island Sound, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Fourmile River, Thames River, Narragansett Bay	
Peprilus triacanthus	Atlantic butterfish	Saugatuck River, Pattagansett River, Connecticut River, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River	CT
Scomber scombrus	Atlantic mackerel	Long Island Sound	
Clupea harengus	Atlantic herring	Hutchinson River, Saugatuck River, CosCob Harbor, Pattagansett River, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River, Narragansett Bay, Narragansett Bay – Apponaug Cove	NY, CT, RI
Urophycis chuss	red hake	Hutchinson River, Saugatuck River, CosCob Harbor, Pattagansett River, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River, Narragansett Bay, Narragansett Bay – Apponaug Cove	
Pseudopleuronectes americanus	winter flounder	Hutchinson River, Saugatuck River, CosCob Harbor, Pattagansett River, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River, Narragansett Bay, Narragansett Bay – Apponaug Cove	
Leucoraja erinacea	little skate	Hutchinson River, Saugatuck River, CosCob Harbor, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Narragansett Bay	
Merluccius bilinearis	silver hake/ whiting	Long Island Sound	CT

Table 7.6-4: Affected Environment: Federally Managed Species' Essential Fish Habitats (continued)

Scientific Name	Common Name	Waterbody	States Where Species Occur
Leucoraja ocellata	winter skate	Hutchinson River, Saugatuck River, CosCob Harbor, Long Island Sound, Long Island Sound – Stonington Harbor, Long Island Sound Wequetequock Cave, Narragansett Bay	NY, CT
Pollachius pollachius	pollock	Hutchinson River, Saugatuck River, Pattagansett River, CosCob Harbor, Long Island Sound, Long Island Sound – Sherwood Millpond, Fourmile River	
Zoarces americanus	ocean pout	Saugatuck River, Long Island Sound – Sherwood Millpond	CT
Melanogrammus aeglefinus	haddock	Narrangasett Bay, Narragansett Bay – Apponaug Cove	RI
Loligo pealeii	longfin inshore squid	Hutchinson River, Saugatuck River, Pattagansett River, Back River, Long Island Sound, Long Island Sound – Sherwood Millpond, West River, Connecticut River, Fourmile River, Narragansett Bay, Narragansett Bay – Apponaug Cove	NY, CT

Source: NEC FUTURE team, 2016

Table 7.6-5: Affected Environment: Federally Managed Fish Species

Geography	Existing NEC + Hartford/Springfield Line (Number of Occurrences)	Preferred Alternative (Number of Occurrences)
D.C.	0	0
MD	3	3
DE	4	4
PA	0	0
NJ	1	1
NY	12	13
CT	15	15
RI	13	13
MA	1	1

Source: NEC FUTURE team, 2016
Note: Totals for the Existing NEC + Hartford/Springfield Line and Preferred Alternative are not counted since species occur in multiple states per alternative.

From Washington, D.C., north to New Jersey, federally managed species occurrence within the Affected Environment of the Preferred Alternative remains unchanged from the Action Alternatives, with between 0 and 4 species occurring (Table 7.6-5). For the states with possible species occurrence (Maryland, Delaware, and New Jersey), the summer flounder (*Paralichthys dentatus*) occurs in each state, and the bluefish (*Pomatomus saltatrix*) occurs in two of the three states.

From New York north to Rhode Island, the number of federally managed fish species occurrences increases, resulting from the Preferred Alternative passing along the coastlines of New York, Connecticut, and Rhode Island (Table 7.6-5).

Other Aquatic Resources of Concern/Consideration. In addition to those fish species listed in Table 7.6-4, the FRA continues to coordinate with the NMFS and monitor other NMFS-identified sensitive marine species for consideration.

The NMFS identified and recommended consideration of a number of "species of concern" that are not federally managed species (and therefore are not included in the federally managed fish species list) but are wetland, waterway, and/or important foraging species within the Study Area about which the agency has insufficient information and/or concerns regarding status and threats. Table 7.6-6 lists these species of concern that should be further examined during the Tier 2 project studies. The NMFS is also working with the U.S. Fish and Wildlife Service (USFWS) on investigating a number of sensitive species. The NMFS and USFWS concluded a joint status review of the American eel (*Anguilla rostrata*) and determined that listing the eel is not warranted; therefore, the eel will not need to be considered during the Tier 2 project studies. The dusky shark (*Cacharhinus obscures*), as discussed in Section 7.6.2.2, has also been removed from ESA listing, but is still listed as an NMFS species of concern. The cusk (*Brosme brosme),* also discussed in Section 7.6.2.2, is currently undergoing a status review for potential ESA listing. As the NMFS has identified the dusky shark and cusk as species of concern, they would continue to be monitored for status and investigated further during the Tier 2 project studies based on updated/revised data and continued agency coordination.

The NMFS recommended consideration of three federally managed whale species not included in the federally managed fish species list (Appendix EE.06). The sei (*Balaenoptera borealis*), sperm (*Physeter macrocephalus*), and blue (*Balaenoptera musculus*) whales (all endangered species protected under the ESA) generally inhabit the offshore waters of the Greater Atlantic region and are not expected to occur in the coastal waters where the Preferred Alternative primarily runs. However, these whales' habitats extend throughout the region, and as a result, NMFS has identified them as potential species for consideration.

The NMFS also recommended consideration of three federally managed fish species not included in the EFH table in Appendix EE.06. The king mackerel (*Scoberomorus cavalla*), Spanish mackerel (*Scoberomorus maculates*), and cobia (*Rachycentron canadum*) predominantly inhabit the South Atlantic region waters and are not expected to occur near the Study Area. However, these species are also species of consideration by the NMFS because of their extended habitat range into the offshore waters of the Mid-Atlantic region.

These whale and fish species would be investigated further during the Tier 2 environmental compliance processes, but are not anticipated to be affected.

As discussed in Section 7.6.2.2, the NMFS identified the hawksbill sea turtle (*Eretmochelys imbricate*) to be removed from further investigations. The turtle would be reviewed during the Tier 2 environmental compliance processes, and a final determination will be made as to whether it warrants exclusion from future project consideration.

Table 7.6-6: National Marine Fisheries Service "Species of Concern"

Scientific Name	Common Name	Special Designation
Alosa pseudoharnegus	alewife	NMFS species of concern[1]
A. aestivalis	blueback herring	
A. sapidissima	American shad	None[2]
Morone saxatilis	striped bass	
Perca flavescens	yellow perch	
Alosa mediocris	hickory shad	
Trinectes maculatus	hogchoker	
Fundulus diaphanous	banded killifish	
Fundulus heteroclitus	mummichog	
Clupea harengus	Atlantic herring	
Brevoortia tyrannus	Atlantic menhaden	
Anchoa mitchilli	bay anchovy	
Dorosoma cepedianum	gizzard shad	
Morone Americana	white perch	
Menidia menidia	Atlantic silverside	
Menidia beryllina	inland silverside	
Leiostomus xanthurus	spot	
Fundulus majalis	striped killifish	
Carcharhinus obscurus	dusky shark	NMFS species of concern[1]
Brosme brosme	cusk	ESA candidate species[3]

Sources:
[1] NMFS Species of Concern list (*http://www.nmfs.noaa.gov/pr/species/concern/*). These species are listed in the NMFS correspondence.[2]
[2] Species listed in NMFS correspondence to project, "Ecological Resources Effects Assessment Coordination Relative to Section 7 of the Endangered Species Act," received December 19, 2014. The NMFS has concerns over these species, but they are not "Species of concern" or "Federally managed fish species"
[3] NMFS federally managed species (dusky shark only), and Candidate and Proposed Species under the Endangered Species Act list (*http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm*). These species are also listed in the NMFS correspondence.[2]

7.6.4 Environmental Consequences

7.6.4.1 Ecologically Sensitive Habitat

The FRA quantitatively and qualitatively assessed Environmental Consequences for ESH by type and acreage of impact within the Representative Routes of the Existing NEC + Hartford/Springfield Line and Preferred Alternative. The assessment includes identification and discussion of impacts, particularly those areas where the Representative Route has the potential to affect concentrations of identified ESH.

Table 7.6-7 summarizes the total ESH acres by state that are affected by the Existing NEC + Hartford/Springfield Line and Preferred Alternative. (Refer to Appendix EE.06 for county-level and ESH subcategory results.)

Table 7.6-7: Environmental Consequences: Representative Route – Ecologically Sensitive Habitat

Geography	Existing NEC + Hartford/Springfield Line (acres)	Preferred Alternative (acres)
D.C.	5	5
MD	205	635
DE	25	130
PA	25	45
NJ	100	145
NY	50	55
CT	565	805
RI	175	300
MA	205	230
TOTAL	**1,355**	**2,350**

Source: NEC FUTURE team, 2016
* The Preferred Alternative assumes improvements to the Existing NEC + Hartford/Springfield Line; therefore, the data presented include the Environmental Consequences inclusive of improvements to the Existing NEC + Hartford/Springfield Line and any new segment associated with the Preferred Alternative.

Consistent with the Affected Environment, Washington, D.C., has the least and Connecticut has the most total ESH acreage (Table 7.6-7) for both the Existing NEC + Hartford/Springfield Line and the Preferred Alternative. The Existing NEC + Hartford/Springfield Line has lower overall and state total, terrestrial, freshwater, and saltwater ESH acreages compared to the Preferred Alternative.

For the Preferred Alternative, Washington, D.C., and New York have the lowest and Connecticut has the most acreage of freshwater ESH affected; Rhode Island and Massachusetts have the lowest quantifiable saltwater ESH acreage while Connecticut has the most saltwater ESH acreage (Washington, D.C., and Pennsylvania have no saltwater ESH acreage) affected; and Washington, D.C., has the lowest and Connecticut has the most terrestrial ESH acreage (Appendix EE.06) affected. By state, Connecticut has the most total (564-804 acres), terrestrial (457-680 acres), freshwater (20-27 acres), and saltwater (87-98 acres) ESH acreages affected by both the Existing NEC + Hartford/Springfield Line and Preferred Alternative (Table 7.6-7 and Appendix EE.06).

Impacts of 10 Percent or Greater

The FRA conducted an assessment separate to the above ESH analysis to determine where there are more concentrated effects to ecologically sensitive habitats throughout the project corridor. Identification of these concentrations also helps to understand where there is potential for habitat fragmentation to occur. Habitat fragmentation may occur from clipping the edge or border of an ESH, or bisecting an ESH. The FRA recognizes that fragmenting a habitat has potentially detrimental effects to the vitality of the habitat and the sensitive species occurring within those habitats.

The FRA identified contiguous areas of ESH (forested land cover, fresh and saltwater wetlands, wildlife refuges and parklands) along the Preferred Alternative equaling 10 acres or greater. Effects were calculated as areas along the Representative Route equal to or greater than 10 percent of an entire contiguous ESH area. Table 7.6-8 identifies the states and counties where ESH concentrations occur.

Table 7.6-8: Environmental Consequences: Ecologically Sensitive Habitats Impacts 10 Percent or Greater

State	County	ESH Type	Existing NEC + Hartford/Springfield Line (Number of Occurrences)	Preferred Alternative (Number of Occurrences)
MD	Anne Arundel County	ESH Terrestrial	1	1
	Baltimore County		0	3
	Harford County		0	7
	Harford County	ESH Aquatic Saltwater	0	1
	Cecil County	ESH Terrestrial	1	7
		ESH Aquatic Freshwater	0	1
DE	New Castle County	ESH Terrestrial	0	4
NJ	Middlesex County	ESH Terrestrial	1	3
	Hudson County	ESH Aquatic Saltwater	0	1
NY	Kings County	ESH Aquatic Saltwater	0	1
CT	Fairfield County	ESH Terrestrial	1	1
	New Haven County		5	5
	Middlesex County		2	2
	Middlesex County	ESH Aquatic Saltwater	0	1
	Hartford County	ESH Terrestrial	8	8
	New London County		5	12
	New London County	ESH Aquatic Saltwater	3	3
RI	Washington County	ESH Terrestrial	1	3
MA	Norfolk County	ESH Terrestrial	2	3
	Norfolk County	ESH Aquatic Freshwater	1	1
	Hampden County	ESH Terrestrial	1	1
TOTAL ESH IMPACTS			**32**	**69**

Source: NEC FUTURE team, 2016

* The Preferred Alternative assumes improvements to the Existing NEC + Hartford/Springfield Line; therefore, the data presented include the Environmental Consequences inclusive of improvements to the Existing NEC + Hartford/Springfield Line and any new segment associated with the Preferred Alternative.

For the areas of contiguous ESH that have greater than 10 percent impact, the following resources would be potentially affected by habitat fragmentation: Perryman Park, North Deen Park, and the Anita C. Leight Estuary Center and Park in Harford, Maryland; Merrill Park in Middlesex, New Jersey; and the Greenway in Washington, Rhode Island.

7.6.4.2 Threatened and Endangered Species

The lack of precision of the T&E boundaries and the lack of available GIS data did not allow for further assessment at the level of the Representative Route as compared to the Affected

Environment and Context Area. For the purposes of this broad-scale analysis, the FRA identified, at the county level, federally listed T&E "species/areas of concern" for those species/habitats that occur or could occur within the Affected Environment (as identified in Tables 7.6-2 and Table 7.6-3). If the T&E species/habitat "occurs" in a county that is within the Affected Environment, then the FRA assumed for the Representative Route that the species/habitat would be identified as a species/area of concern (refer to Appendix EE.06). If a T&E species or habitat does not occur in a county within the Affected Environment, then the FRA considered the species a "species/habitat that needs no further evaluation" and was not included in this Tier 1 Final EIS (Appendix EE.06). These findings are contingent upon further analysis and consultation with U.S. Fish and Wildlife Service (USFWS) during Tier 2 project studies. The need for subsequent analysis, which would occur during Tier 2 studies for individual projects, for species/habitats identified as "species/areas of concern" and "species/areas that need no further evaluation" would be identified during later stages of planning and design to determine the true extent of species and their habitats.

At the Tier 2 level, the lead federal agency will be responsible for carrying out any required Section 7 consultation and other required environmental reviews; projects sponsors would be responsible for implementing measures to avoid or minimize impacts to T&E species and critical habitats, as determined through those environmental reviews.

Maryland and Connecticut are of particular importance regarding T&E species and their critical habitats.

Gasheys Run within Harford County, MD, is the only designated critical habitat within the Representative Route of the Preferred Alternative. The Maryland darter's (*Etheostoma sellare*) (a federally listed endangered species) only known habitat encompasses the following waterbodies: Deer Creek, Swan Creek, and Gasheys Creek (also referred to as Gasheys Run). Deer and Swan Creek flow outside of the Affected Environment limits; Gasheys Creek, a tributary of Swan Creek, flows for approximately 3,888 linear feet within the Affected Environments for both the Existing NEC and the Preferred Alternative, which would cross Gasheys Creek on the Existing NEC. The Maryland darter, Maryland's only endemic vertebrate is a rare, small freshwater fish known to exist/occur in segments of Gasheys Creek. Updated analyses on T&E species identified the darter within the Affected Environment; therefore, it continues to be a species of concern due to its federal status and extremely specialized habitat requirements.

Connecticut continues to have the highest concentration of T&E species throughout the project corridor. The larger numbers of potentially affected T&E species in Connecticut indicate the greater level of potential impacts to T&E species in this state compared to the rest of the project corridor. In Middlesex County, CT, the roseate tern (*Sterna dougallii dougalli*) is known to occur within the Affected Environments of the Existing NEC and Preferred Alternative, which run adjacent to the Stewart B. McKinney National Wildlife Refuge along the Existing NEC. The roseate tern is a seabird found along the Atlantic Coast that is listed as an endangered species because of sharp declines in population resulting from hunting, changes in vegetation in breeding areas, competition with other birds for nesting sites, and predation.

During the Tier 2 environmental compliance processes, potential effects to the roseate tern, Maryland darter, and darter critical habitat will be further assessed.

Migratory Bird Concerns

This Tier 1 Final EIS does not include an effects-assessment on migratory bird species. However, coordination with USFWS identified the bald eagle (*Haliaeetus leucocephalus*) as a concern. During the production of the Tier 1 Draft EIS the USFWS Pennsylvania Field Office provided technical assistance, identifying several bald eagle nesting sites near the project corridor. The National Park Service and USFWS provided comments on the Tier 1 Draft EIS, noting bald eagle occurrence at Churchman's Marsh in New Castle, DE, and along the Hudson River in New York. The Preferred Alternative avoids Churchman's Marsh and is in a tunnel crossing of the Hudson River into New York City. During Tier 2 project studies, more coordination with the USFWS, field surveys, assessments, and screenings will occur throughout the project corridor, as determined necessary, to ensure compliance with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

7.6.4.3 Essential Fish Habitat

Within the Existing NEC + Hartford/Springfield Line and Preferred Alternative, federally managed fish species occurrence findings are the same as within the Affected Environment, with the exception of 1 less species occurrence in Connecticut (Table 7.6-9). The FRA identified 17 federally managed fish species within both Representative Routes, with Washington, D.C., and Pennsylvania having the fewest (zero species), and Connecticut having the most (14 species).

Table 7.6-9: Environmental Consequences: Representative Route – Federally Managed Fish Species

Geography	Existing NEC + Hartford/Springfield Line (Number of Occurrences)	Preferred Alternative (Number of Occurrences)
D.C.	0	0
MD	3	3
DE	4	4
PA	0	0
NJ	1	1
NY	12	12
CT	14	14
RI	13	13
MA	0	0

Source: NEC FUTURE team, 2016

* The Preferred Alternative assumes improvements to the Existing NEC + Hartford/Springfield Line; therefore, the data presented include the Environmental Consequences inclusive of improvements to the Existing NEC + Hartford/Springfield Line and any new segment associated with the Preferred Alternative.

The FRA developed waterbody crossing data for Existing NEC + Hartford/Springfield Line and Preferred Alternative EFH analysis (Table 7.6-10). Waterbody crossings refer to waterbody locations containing federally managed fish species and their EFH that would be crossed by the Existing NEC + Hartford/Springfield Line and Preferred Alternative. The crossing data calculated by state the number of crossings that occur, the number of federally managed fish species types that could

potentially occur, and the size (acreage and linear footage) of the crossing over each waterbody where these species and their EFH potentially occur. Size of crossing impact took into account the area (acreage) of the crossing over the waterbody, and the linear footage (or width) of the crossing, in the direction of flow, over the waterbody. Refer to Table 7.6-10 for quantities of acreage and linear footage of EFH crossing impacts by state for the Preferred Alternative and Existing NEC + Hartford/Springfield Line.

Table 7.6-10: Environmental Consequences: Representative Route Crossing Impact – Essential Fish Habitat

Geography	Species Occurrence*	Existing NEC + Hartford/Springfield Line			Preferred Alternative		
		# Crossings	Acres	Linear Feet	# Crossings	Acres	Linear Feet
D.C.	0	0	0	0	0	0	0
MD	3	3	30	380	4	30	530
DE	4	0	0	0	1	3	300
PA	0	0	0	0	0	0	0
NJ	1	4	10	560	4	20	860
NY	12	4	25	600	6	45	1,200
CT	14	35	40	3,750	36	60	4,545
RI	13	3	0	300	3	0	305
MA	0	0	0	0	0	0	0
TOTAL	**—**	**49**	**105**	**5,590**	**54**	**158**	**7,740**

Source: NEC FUTURE team, 2016
* Species occurrence is the same for the Existing NEC + Hartford/Springfield Line and Preferred Alternative.

Crossing data were processed with updated, more-accurate GIS tools for analyses of the Existing NEC + Hartford/Springfield Line and Preferred Alternative. Notably, Washington, D.C., and Pennsylvania remain unchanged, with no EFH crossing impacts. South of New York City, crossing impacts are limited, since the Preferred Alternative follows a mostly inland route. Where the route primarily runs along the coastline, increases in federally managed fish species occurrences, crossings, and crossing areas are noted. Highest numbers of federally managed fish species occurrences and EFH crossing impacts span from New York to Rhode Island, with Connecticut resulting in the highest overall impacts (Table 7.6-10).

This section further discusses the potential impacts within new or upgraded segments included in the Preferred Alternative.

Elements South of New York City

- **Maryland/Delaware – Bayview to Newport (new segment) –** A new approximately 60-mile segment extends from Bayview in Baltimore City, MD, to Newport, DE. This two-track segment runs further inland than the Existing NEC, adjacent to U.S. Route 40 (Pulaski Highway). Where the new segment splits from the Existing NEC, this new segment would result in increases in ESH acreage between the Existing NEC and Preferred Alternative for both Maryland and Delaware (Table 7.6-7). The additional track does not affect federally managed fish or T&E species occurrences. This new segment of the Preferred Alternative rejoins with the Existing NEC just after crossing the Christina River.

- **Delaware – Wilmington Segment (bypasses Wilmington Station) –** In Delaware, a new approximately 8-mile segment extends from Newport, just north of where the previous new segment ends, to Holly. This new segment bypasses the Wilmington Station, running closer to the Delaware River, and crossing the Christina River on two occasions. Along with the Bayview to Newport segment, this new segment would result in an increase in ESH acreage affected by the Preferred Alternative as compared to the Existing NEC (Table 7.6-7). The additional track does not affect federally managed fish or T&E species occurrences. This new segment of the Preferred Alternative rejoins with the Existing NEC north of Edgemoor Station, where the alignment runs parallel to I-495 (Governor Printz Boulevard).
- **Pennsylvania – Philadelphia Segments (new segments) –** In Pennsylvania, new segments are proposed between Baldwin and Bridesburg. One of these segments uses or is adjacent to the Existing NEC CSX Chester Secondary right-of-way that runs through the easternmost edge of the John Heinz National Wildlife Refuge, resulting in an increase over the Existing NEC in terms of ESH acreage affected and no change in federally managed fish or T&E species occurrences between the Existing NEC and Preferred Alternative.
- **New Jersey – New Brunswick to Secaucus (new segment) –** A new, approximately 24-mile segment extends from North Brunswick Station to the Passaic River at the Newark Penn Station. The new two-track segment spans Middlesex, Union, Essex, and Hudson Counties, NJ, running mostly parallel to the Existing NEC, with small bump outs (where the new segment splits and then rejoins the Existing NEC) in multiple areas along this span. This new segment would result in an increase in ESH acreage affected and no change in federally managed fish or T&E species occurrences between the Existing NEC and Preferred Alternative.
- **New Jersey – Secaucus/Bergen loop (new segment) –** The Secaucus/Bergen loop is a new segment, extending from the Secaucus Station and running parallel to the Existing NEC NJ TRANSIT Main Line until just prior to Route 1 Tonnelle Avenue crossroads, in Hudson County New Jersey. The new loop and additional track would result in a small increase in ESH acreage affected and no change in federally managed fish or T&E species occurrences.

Elements North of New York City

- **New York/Connecticut – New Rochelle to Greens Farms (new segment) –** A new two-track segment spans from New Rochelle Station in Westchester County, NY, to Greens Farms Station in Fairfield County, CT. This new segment runs parallel to I-95, splitting off from the Existing NEC where the it passes existing local stations (e.g., Port Chester Station), and rejoining after crossing the Saugatuck River, just prior to the Greens Farm Station. This new segment would result in a small increase in ESH acreage affected and no change in federally managed fish or T&E species occurrences for Westchester, NY; in Fairfield, CT, the new segment would result in an increase in ESH acreage affected, no change in federally managed fish occurrence, and an increase of two T&E species occurrence in Fairfield County (piping plover [*Charadrius melodus]* and roseate tern [*Sterna dougalli dougalli]*).
- **Connecticut/Rhode Island – Old Saybrook-Kenyon (new segment) –** A new, approximately 50-mile segment spans from Old Saybrook Station in Middlesex County, CT (just prior to the Connecticut River) through New London, CT, to Kenyon in Washington County, RI. This new segment runs inland through Connecticut parallel to I-95, splitting from the coastal Existing NEC,

then rejoining the Existing NEC just prior to Kingston Station in Rhode Island. The new segment would result in an increase, relative to the Existing NEC, in ESH acreage affected in Connecticut and Rhode Island, no change in federally managed fish species occurrence for either state, and no change in T&E species occurrence in Rhode Island. Where the new segment runs inland through Fairfield County, CT, T&E species affected by the Preferred Alternative would increase by one species (piping plover [*Charadrius melodus*]) over the number affected by the Existing NEC.

- **Connecticut/Massachusetts – Hartford/Springfield Line (upgraded track/electrification) –** The Existing Hartford/Springfield Line runs roughly parallel to I-91 between New Haven, CT, and Springfield, MA. The FRA proposes track upgrades and electrification on the line. This work would result in an increase of ESH acreage affected and no change in federally managed species occurrence for Connecticut and Massachusetts, as well as no change in T&E species for Massachusetts. Where the line runs through Hartford County, T&E species occurrence would increase by one species (dwarf wedgemussel [*Alasmidonta heterodon*]). This species does not occur at any other point throughout the Study Area, and therefore increases the T&E species occurrence in Connecticut from 12 species for the Existing Hartford/Springfield Line to 13 species for the Preferred Alternative (Table 7.6-3).

7.6.5 Stations

In areas where the Preferred Alternative proposes new or modified stations that intersect with ESH, T&E, or EFH, there is the potential for conversion to transportation use and resulting impacts to these ecological resources. The Preferred Alternative proposes 14 new stations and 16 station modifications.

For ESH, 16 new or modified stations would result in potential impacts, by county, of 1 acres or less (Table 7.6-11) throughout the project corridor. New Jersey has the most ESH acreage (21 acres) within the proposed new and modified station footprints. All other states, with the exception of Connecticut (with 18 acres), have less than 10 acres of ESH within the proposed new and modified station footprints.

Due to the limited availability of GIS data, the FRA identified T&E species at the county level for assessing occurrence within new or modified station footprints (Table 7.6-12). By county, all states range between zero and 4 possible species occurrences, with the exception of Connecticut, which has 9 species occurrences in New London County, and 11 species occurrences in Fairfield and New Haven Counties. At the Tier 2 analysis, project sponsors would need to coordinate with state and federal agencies in reviewing the occurrence of these T&E species within the proposed station footprints for more-accurate T&E species findings.

New and modified station footprint intersections with EFH are limited throughout the Study Area (Table 7.6-13). Within the Preferred Alternative, two new stations—in New Castle County, DE, and Bronx County, NY—could affect EFH by encroaching onto waterbodies containing federally managed fish species (Table 7.6-12, Appendix EE.06). This includes 4 species in New Castle County, and 6 species in Bronx County. The FRA found no potential effects to federally managed fish species for the Hartford/Springfield Line.

Table 7.6-11: Environmental Consequences: Preferred Alternative – Modified or New Stations – Ecologically Sensitive Habitats

State	County	Station ID	Station Type	Station Name	Acres
MD	Anne Arundel	**5**	Modified	Odenton	5
	Baltimore City	13	New	Bayview	1
DE	New Castle	28	New	Edgemoor	1
PA	Delaware	44	New	Philadelphia Airport	1
	Bucks				
NJ	Mercer	61	Modified	Princeton Junction	1
	Middlesex	62	New	North Brunswick	5
	Hudson	76	Modified	Secaucus	15
NY	Bronx	81	New	Co-op City	10
CT	Fairfield	101	Modified	Greens Farms	5
	New Haven	189	New	Orange	3
	New London	124	New	Mystic / New London H.S.	10
Hartford/Springfield Line					
CT	New Haven	157	New	North Haven	3
	Hartford	161	New	Newington	4

Source: NEC FUTURE team, 2016

Table 7.6-12: Environmental Consequences: Preferred Alternative – Modified or New Stations – Threatened and Endangered Species

State	County	Station ID	Station Type	Station Name	Species Occurrences
MD	Cecil	23	New	Elkton	3
DE	New Castle	26	New	Newport	4
		28		Edgemoor	
PA	Delaware	34	New	Baldwin	5
		44		Philadelphia Airport	
NJ	Mercer	61	Modified	Princeton Junction	4
	Middlesex	62	New	North Brunswick	3
		64	Modified	New Brunswick	
		68	New	Metropark H.S.	
NY	Bronx	78	New	Hunts Point	3
		79		Parkchester	
		80		Morris Park	
		81		Co-op City	
CT	Fairfield	94	New	Stamford H.S.	14
		101	Modified	Greens Farms	
		107	New	Barnum	
	New London	124	New	Mystic / New London H.S.	11
RI	Kent	127	Modified	TF Green	2
	Providence	130	New	Pawtucket	2

Table 7.6-12: Environmental Consequences: Preferred Alternative – Modified or New Stations – Threatened and Endangered Species (continued)

State	County	Station ID	Station Type	Station Name	Species Occurrences
Hartford/Springfield Line					
CT	New Haven	157	New	North Haven	11
	Hartford	161	New	Newington	3
		186		West Hartford	
		187		Enfield	

Source: NEC FUTURE team, 2016

Table 7.6-13: Environmental Consequences: Preferred Alternative – Modified or New Stations – Essential Fish Habitat

State	County	Station ID	Station Type	Station Name	Species Occurrences
DE	New Castle	26	New	Newport	4
NY	Bronx	81	New	Co-op City	6
Hartford/Springfield Line					
No EFH occurrences.					

Source: NEC FUTURE team, 2016

7.6.6 Context Area

The distribution and quantity of ecological resources within the Context Area are similar to the Affected Environment for ESH, T&E species, and EFH species.

The Context Area includes the Affected Environment, and as a result, any T&E or federally managed fish species listed in the Affected Environment would also occur in the Context Area. The FRA identified Gashy's Run in Harford County, MD, as the only T&E critical habitat to occur in the Context Area and the Affect Environment. The FRA calculated and recorded the area (linear feet) of overlap between the Context Area and critical habitat for the Context Area. (Refer to Appendix EE.06.)

Other T&E species known to occur only within the Context Area of the Preferred Alternative include the Hay's Spring amphipod (*Stygobromus hayi*), an endemic endangered arthropod occurring in springs along Rock Creek in Washington, D.C.; the sensitive joint-vetch (*Aeschynomene virginica*), a threatened plant known to occur within the Context Area in New Jersey; and the sandplain gerardia (*Agalinis acuta*), a threatened plant known to occur within the Context Area in Connecticut and Rhode Island.

Five federally managed fish species are known to occur only within the Context Area of the Preferred Alternative. These species include the American plaice (Hippoglossoides platessoides), Atlantic cod (Gadus morhua), white hake (Urophycis tenuis), Yellowtail Flounder (Pleuronectes ferruginea), and the Atlantic halibut (*Hippoglossus hippoglossus*), all occurring within the Context Area in Suffolk County, MA (Boston Harbor).

These T&E and federally managed fish species and associated habitats are not likely to be investigated further since they are not known to occur within the Affected Environment, and are considered species requiring no further evaluation. If a shift in the Preferred Alternative alignment were to occur, these species would be reevaluated to determine if they fall within the Affected Environment and are species of concern.

7.6.7 Anthropogenic Influences

This Tier 1 Final EIS considers locations of ESH resources, T&E species, federally managed fish species, and EFH in relation to noise and vibration effects; it does not identify specific attributes of species or habitats with particular sensitivities to noise and vibration. Increased noise and vibration may create unfavorable conditions for a species to exist in those locations, resulting in potential loss of life and habitat. Based on a review of Chapter 7.12, Noise and Vibration, there would be a potential for proximity effects from increased noise and vibration levels to ESH, T&E, and federally managed fish species and their habitats. Moderate to severe noise impacts would occur in all counties along the project corridor except for Kings County, NY; Hartford County, CT; and Hampden County, MA. The Hartford/Springfield Line would have moderate to severe noise impacts in New Haven and Hartford Counties, CT, and Hampden, MA. Vibration impacts would occur in fewer locations along the project corridor, with no impacts in Washington, D.C., and Massachusetts, and only one county affected in New Jersey, and Rhode Island (refer to Table 7.1-8 in Noise and Vibration, Section 7.12). No vibration impacts would occur along the Hartford/Springfield Line.

In addition to noise and vibration, the FRA recognizes that there are other potential indirect impacts to identified ecological resources, including proposed service improvements and increased frequency and train speeds, addressed in Chapter 4, Preferred Alternative, and Chapter 5, Transportation; secondary growth, addressed in Chapter 6, Economic Effects and Growth, and Indirect Effects; conversion of undeveloped and potentially contiguous sensitive land for transportation uses, addressed in the Chapter 7.2, Land Use; and Chapter 7.20, Cumulative Effects. These indirect impacts and their potential effects on species and their habitats will be evaluated further at the Tier 2 project analysis.

7.6.8 Comparison to the Action Alternatives

In general, the Preferred Alternative would reduce potential impacts to ESH, T&E, and EFH compared to the Action Alternatives. The Preferred Alternative would also result in lower ESH aquatic and terrestrial acreages affected and fewer T&E and federally managed fish species occurrences. Furthermore, the Preferred Alternative would minimize impacts to the three refuges identified within the project corridor—the Patuxent Research Refuge, John Heinz National Wildlife Refuge, and Stewart B. McKinney National Wildlife Refuge—by keeping improvements within or very close to the existing rail right-of-way.

In response to public and agency comments and concerns on the Action Alternatives, the FRA identified a Preferred Alternative that considers ecological resource impacts without compromising the transportation goals of the project. Additionally, the FRA made adjustments to the Preferred Alternative to minimize and/or avoid impacts to identified sensitive habitats and species.

Public comments tended to focus on the potential impacts of the Action Alternatives on the aforementioned wildlife refuges and other sensitive areas, including the Connecticut River watershed, as well as the T&E species potentially affected throughout the project corridor. The FRA identified a number of parties interested in the protection of the sensitive habitat in Connecticut, including the Old Lyme community and the Connecticut River Gateway Commission. The FRA responded to these public concerns with a concerted effort to minimize and/or reduce impacts to ecological resources along the project corridor. The FRA reassessed elements of the Preferred Alternative routing and representative construction types to limit potential impacts on the refuges and other ecologically sensitive areas, such as the Connecticut River. Additionally, the FRA selected a Preferred Alternative that would significantly decrease the number of T&E species within the Affected Environment/Representative Route, with many species identified as affected by the Action Alternatives in the Tier 1 Draft EIS either now avoided by the Preferred Alternative, present only in the Context Area, or removed from further evaluation as a result of updated federal databases.

The U.S. Department of the Interior (USDOI) USFWS division provided input regarding the Tier 1 Draft EIS ecological resource assessment. The agency expressed their concerns regarding the three National Wildlife Refuges located within the project corridor: the Patuxent Research Refuge in Laurel, MD; the John Heinz National Wildlife Refuge in Philadelphia, PA; and the Salt Marsh Meadow Unit of the Stewart B. McKinney National Wildlife Refuge in Middlesex, CT. In particular, the agency focused on the proposed new, expanded, or improved rail infrastructure associated with the Action Alternatives. Considering these concerns, the FRA eliminated new or expanded rail options in the Preferred Alternative to avoid substantial crossings of National Wildlife Refuges (such

as the crossing shown in Alternative 3 in the area of Patuxent Research Refuge) and minimizing impacts to National Wildlife Refuges.[1] It is expected that during Tier 2 project studies, the routing in this area will continue to be refined and measures to minimize harm will be evaluated.

The USFWS also identified the Susquehanna National Wildlife Refuge and Garrett Island—satellite refuges located along the Susquehanna River in Harford County, MD. The agency expressed concern for impacts to the refuges if the Action Alternatives migrated from their proposed route. The Preferred Alternative would not affect the satellite refuges located near the project corridor, which are managed by the Chesapeake Marshlands National Wildlife Refuge Complex. Coordination with the Chesapeake Marshlands National Wildlife Refuge Complex will occur during Tier 2 project studies.

The USFWS recommended that the FRA determine a project "action area" and implement a number of broad-based commitments and specific actions to occur at the Tier 2 phase. The FRA acknowledges that impacts on ecological resource would not be confined to the footprint of the rail line. In identifying the Preferred Alternative, the FRA developed the 5-mile-wide Context Area, the 3,000-foot-wide Affected Environment, and Representative Route footprints to capture impacts to ecological resources within the Study Area, whether direct or indirect. These analyses are discussed in the previous headings of this section. For all Tier 2 project studies, the lead federal agency will continue to coordinate with the USFWS to determine its fulfillments and obligations under Section 7 of the ESA at each stage of the Tier 2 project studies, including development of a biological assessment and programmatic agreement as necessary, and conducting in-depth surveys on sensitive species, spanning from bald and golden eagles and migratory birds, to protected plants, mammals, and reptiles, per federal and state regulations.

The EPA also provided input regarding the Tier 1 Draft EIS ecological resource assessment. The agency stated concerns with the adequacy of the 3,000-foot-wide Affected Environment for assessing the extent of indirect impacts on ecological resources, resulting from construction and operation of the Action Alternatives, and the effectiveness of the 10 percent ESH impact methodology and assessment for ecologically sensitive habitats within the project corridor.

As stated in the Ecological Resources methodology (Volume 2, Appendix E.06), the FRA structured the Tier 1 Draft and Final EIS's to focus on assessing the Affected Environment and Representative Route, to identify ecological resource impacts in the Tier 1 Draft EIS that formed part of the selection criteria for the Preferred Alternative, with the intention of minimizing and/or avoiding impacts to the listed ecological resources. Calculating ESH impacts and identifying wildlife refuges and other sensitive habitat areas represent a quantitative and qualitative assessment of the project corridor. The 10 percent ESH impacts is a separate assessment, representing an additional layer of analysis that more clearly identifies where there are disproportionate effects to ESH, through habitat fragmentation, along the project corridor. The FRA realizes that all ESH cannot be adequately accounted for within the Tier 1 phase, and therefore more-detailed site-specific analysis at local project-level scales will be conducted at the Tier 2 phase.

[1] The Representative Route for Alternative 3 in the area of Patuxent Wildlife Refuge is shown in Volume 2, Chapter 4.

7.6.9 Potential Mitigation Strategies

7.6.9.1 Ecologically Sensitive Habitats

Potential mitigation strategies will include restricting ESH area disturbance to the perimeter of the habitat area, minimizing habitat fragmentation, implementing a forest conservation/ management plan, implementing best management practices with regard to wildlife crossings, native vegetation stabilization, and tree replacement. Furthermore, where and when feasible, mitigation strategies will also consider removal of obsolete impervious surfaces from riparian and shoreline areas and the improvement of ESH areas outside the Study Area, including wetlands and forested land.

7.6.9.2 Threatened and Endangered Species

Potential mitigation strategies will include continued coordination with the USFWS for specific mitigation measures for any affected T&E species, adherence to habitat conservation plans and permitting requirements, restricting disturbance of T&E habitat, and implementation of best management practices and invasive species control. Program-wide or habitat-specific mitigation strategies could be developed with the agencies, as appropriate, through the permit process.

7.6.9.3 Essential Fish Habitat

Potential mitigation strategies will include establishing monitoring and adaptive management practices for affected federally managed fish species, establishing a stocking program, improving EFH areas not related to the Study Area, and treating elevated levels of chemicals, metals, and other contaminants in the waterbodies near the Study Area.

7.6.10 Subsequent Tier 2 Analysis

In the NEC FUTURE Tier 1 EIS process, the FRA has examined environmental effects at a broad scale, based on conceptual and representative information only. The goal of the effects-assessment in the Tier 1 Draft EIS was to assist decision-makers in identifying the Preferred Alternative, and in this Tier 1 Final EIS, to identify ecological resources to be considered more thoroughly during the Tier 2 project studies.

For the Tier 1 Draft EIS, the FRA consulted with the USFWS and NMFS in developing and applying the ecological effects-assessment methodology to identify, at a programmatic level, potential effects to ecological resources. The USFWS and NMFS also provided technical assistance in identifying protected species within the Affected Environment of the Action Alternatives. In addition, the FRA coordinated with the USFWS and NMFS in determining how to comply with Section 7 of the Endangered Species Act (ESA) in a manner appropriate for the broad programmatic analysis the FRA has performed as part of the NEC FUTURE Tier 1 National Environmental Policy Act process.

In this Tier 1 Final EIS, the FRA has identified a Preferred Alternative and examined environmental effects along this alignment, applying the same methodology as used for the Tier 1 Draft EIS to identify potential effects to ecological resources. Additionally, this Tier 1 Final EIS also includes the FRA's responses to Tier 1 Draft EIS agency and public comments on the ecological resource assessment in the Tier 1 Draft EIS. The FRA did not conduct compliance with Section 7 of the ESA as

part of the Tier 1 EIS process, after discussion with the USFWS and NMFS indicated that identification and conclusive determination of effects to resources protected under the ESA would not be meaningful based on the programmatic assessment conducted as part of the Tier 1 process (see correspondence in Appendix II) and the nature of the Tier 1 decision.

The implementation of a Tier 2 project study will be accompanied by its own environmental compliance process and may be led by agencies other than the FRA. In addition to analyzing potential impacts to protected resources, for the Tier 2 project analyses, studies will also include an analysis of impacts to common ecological resources will be required if impacts are anticipated. Mitigation measures to offset these site-specific impacts will also be developed.

Based on coordination with the USFWS and NMFS, the FRA has determined that Section 7 consultation requirements can be appropriately addressed during the Tier 2 process, when the lead federal agency and scopes for Tier 2-specific projects are more well defined and when it has become clear which federal agencies will actually be involved in funding and approving those projects (see correspondence in Appendix II). As specific projects are identified, the FRA or other federal agencies, as appropriate, will work with the USFWS and NMFS to determine the scope and timing of Section 7 consultation for those projects. Section 7 consultation during Tier 2 may occur for Tier 2 projects independently (i.e., on a project-by-project basis) or through a more inclusive "batching" or programmatic review process, as determined by the applicable federal lead agencies in coordination with the USFWS and NMFS. As part of Tier 2, Tier 2 project sponsors will conduct compliance with Section 7 of the ESA as necessary as part of implementation of Tier 2 projects; during that compliance, the federal lead agency project sponsor could will prepare a biological assessments, engage in formal consultation, and obtain biological opinions (including incidental take statements), request an incidental take statement or non-jeopardy determination from the USFWS and NMFS, as necessary to comply with Section 7 requirements.

In addition to federal comments received, state governments and local organizations requested coordination and mapping to determine potential effects from the NEC FUTURE program. For example, the New Jersey Department of Environmental Protection requested GIS shapefiles and a pre-application meeting. During Tier 2 project studies—when more information and design related to a specific project is available—detailed maps will be available and pre-application meetings will be scheduled by the local project sponsor.