

Table 3.5-1
Waters of the U.S. within the Waters of the U.S. Study Area

Summary of Waters of the U.S.	
Wetlands	Area¹
Freshwater Wetland	25.06 AC
Tidal Salt Marsh	109.51 AC
Total Wetlands	134.57 AC
Waters	Length/Area¹
Freshwater Creek	3,402.72 LF
Tidal Open Water	22.41 AC
Total Creeks and Tidal Waters	3,402.72 LF/22.41 AC
Other	Area¹
Open Water	0.82 AC
Total Waters of the U.S.	3,402.72 LF/157.80 AC²

Source: Atkins 2018.

¹AC – acres; LF – Linear feet.

² Palmetto Railways 401/404 Permit Application was used to quantify Waters of the U.S. for Alternative 1: Applicant's Proposed Project and similar areas of other alternatives. Acreages for Waters of the U.S. outside of Alternative 1 were identified through GIS desktop analysis of National Hydrography Dataset (NHD) streams and a predicted wetlands layer that was created using a combination of elevation data, Charleston Harbor buoy data, and aerial photo interpretation. The predicted features were verified during field visits to the waters of the U.S. in the waters of the U.S. study area for the Proposed Project which took place in June 2014 and January 2016.

3.6 PROTECTED SPECIES

3.6.1 Introduction


The affected environment analysis for Protected Species considers all federal⁵⁷ and state-protected threatened, endangered, at-risk, and candidate species with the potential to occur in the Protected Species study area for the Proposed Project. The Protected Species study area includes the physical footprints of Alternative 1 (Proposed Project) and its alternatives, including the River Center project site, as well as the Cooper River to the east, Shipyard Creek to the south, and adjacent areas of North Charleston to the north of Noisette Creek (Figure 3.6-1). The evaluation area for terrestrial resources encompasses the entire Protected Species study area above an elevation of 5 feet above Mean Sea Level (MSL), while the evaluation area for aquatic and marine resources encompasses all areas at an elevation below 5 feet MSL, including tidal wetlands, tributaries, and rivers.

⁵⁷Species listed as threatened, endangered, or candidate by the USFWS pursuant to the ESA of 1973, as amended (16 U.S.C. 1536).

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

 Protected Species Study Area and EFH Study Area

Source: Atkins 2016



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Protected Species Study Area
Figure 3.6-1



This section describes the range and habitat requirements of each species included on the federal or state lists of threatened or endangered species, as well as any federal at-risk species and those designated as High Priority and Highest Priority by the SCDNR. There is also a discussion on the presence or absence of critical habitat for these Protected Species. Additional information about available habitats and potential wildlife occurrences is presented in Section 3.4 (Vegetation and Wildlife) and Section 3.7 (Essential Fish Habitat).

3.6.2 Federally Protected Species

The USFWS and NMFS have identified 21 federally listed species that could be present within the Protected Species study area (Table 3.6-1). To ensure that the list of species is comprehensive and up to date, the official species list was reviewed on October 11, 2017 (USFWS 2017a). All species' Latin and common names mirror the official species list. The actual occurrence of a species in the terrestrial or aquatic portions of the Protected Species study area would depend upon the availability of suitable habitat, which is listed in Table 3.6-2, as well as the season of the year relative to a species' temperature tolerance, migratory habits, and other factors. No federally Protected Species were observed during field visits within the Protected Species study area in July 2014 and January 2016.

3.6.2.1 Reptiles

There are four federally protected threatened or endangered reptiles known to potentially occur in the Protected Species study area. These sea turtles all have the following life stages: egg, hatchling, juvenile, and adult.

Green sea turtle (*Chelonia mydas*)

The green sea turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30° north latitude and 30° south latitude. In the U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico (NOAA 2014b). Green sea turtles primarily use three habitat types: beaches, open ocean convergence zones, and coastal areas for benthic feeding. Adult females migrate from foraging areas to mainland or island nesting beaches and may travel hundreds or thousands of miles each way. After emerging from the nest, hatchlings swim to offshore areas, where they are believed to live for several years, feeding close to the surface on a variety of pelagic plants and animals (NOAA 2014b). When juveniles reach a certain age/size range, they leave the pelagic habitats and travel to nearshore foraging grounds. After they move to these nearshore benthic habitats, adult green sea turtles are almost exclusively herbivores, feeding on sea grasses and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. Green sea turtles apparently have strong nesting site fidelity and often make long distance migrations between feeding grounds and nesting beaches (Parsons Brinckerhoff 2015). No suitable

Table 3.6-1
Federally Protected Species with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Federal Status ¹	State Status
Reptiles			
Green sea turtle	<i>Chelonia mydas</i>	Threatened ²	–
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	–
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	–
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened ² Critical Habitat ³	Threatened
Mammals			
Fin whale	<i>Balaenoptera physalus</i>	Endangered	–
Humpback whale	<i>Megaptera novaengliae</i>	Endangered	–
Right whale	<i>Balaena glacialis</i>	Endangered	–
West Indian manatee	<i>Trichechus manatus</i>	Threatened	–
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Threatened	–
Fish			
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Endangered	–
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Endangered
Amphibians			
Flatwoods salamander	<i>Ambystoma cingulatum</i>	Threatened Critical Habitat ³	Endangered
Birds			
Bachman's warbler	<i>Vermivora bachmanii</i>	Endangered	Endangered
Piping plover	<i>Charadrius melodus</i>	Threatened Critical Habitat ³	–
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	Endangered
Red knot	<i>Calidris canutus rufa</i>	Threatened	–
Wood stork	<i>Mycteria americana</i>	Threatened	Endangered
Plants			
American chaffseed	<i>Schwalbea americana</i>	Endangered	–
Canby's dropwort	<i>Oxypolis canbyi</i>	Endangered	–
Pondberry	<i>Lindera melissifolia</i>	Endangered	–

Table 3.6-1, cont'd

Species Common Name	Species Scientific Name	Federal Status ¹	State Status
Seabeach amaranth	<i>Amaranthus pumilus</i>	Threatened	–

Source: USFWS South Carolina List of At-Risk Candidate, Endangered, and Threatened Species for Charleston County, downloaded from USFWS, October 11, 2017. SCDNR Rare, Threatened, and Endangered Species of South Carolina - by County, downloaded from SCDNR, October 11, 2017.

¹ *Endangered* refers to a taxon "in danger of extinction throughout all or a significant portion of its range."

Threatened refers to a taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

² Green and loggerhead turtles have distinct population segments, with the federal listing reflecting the unique threats to recovery of that segment. The listing provided in this table is for the distinct population segment with range that includes Charleston County, South Carolina.

³ Critical habitat refers to a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species, and that may require special management and protection (a more complete definition can be found in the Endangered Species Act of 1973).

nesting habitat, such as open beaches, was observed within the Protected Species study area. Additionally, nesting by green sea turtles in South Carolina is infrequent and rare.

Juvenile green sea turtles are the primary sea turtle species that could potentially occur in the Project vicinity from April to November (Parsons Brinckerhoff 2015). The tidal open waters of the Protected Species study area may provide marginally suitable foraging habitat for green sea turtles. Nesting and pelagic habitats are not present within the Protected Species study area.

No critical habitat rules have been published for the green sea turtle in South Carolina.

Kemp's ridley sea turtle (*Lepidochelys kempii*)

Kemp's ridley sea turtles are distributed throughout the Gulf of Mexico and U.S. Atlantic seaboard, from Florida to New England. Kemp's ridley sea turtles are often found in salt marsh habitats. There is only one confirmed Kemp's ridley arribada (a mass nesting behavior unique to Kemp's ridley sea turtle and the Olive ridley sea turtle) in the state of Tamaulipas, Mexico, where nearly 95 percent of Kemp's ridley nesting occurs worldwide. Nesting also occurs in Veracruz, Mexico, and Texas, but on a much smaller scale. Occasional nesting has been documented in North Carolina, South Carolina, and Florida. Adult Kemp's ridleys primarily occupy the neritic zone waters of the continental shelf along the Atlantic Coast. Neritic zones typically contain a muddy or sandy bottom where prey can be found. Their diet consists mainly of crabs, but may also include fish, jellyfish, and an array of mollusks. Depending on their breeding strategy, male Kemp's ridleys appear to occupy many different areas within the Gulf of Mexico. Some males migrate annually between feeding and breeding grounds, yet others may not migrate at all, mating with females as they are encountered. Female Kemp's ridleys nest from May to July, laying two to three clutches of approximately 100 eggs, which incubate for 50-60 days (NOAA 2014c). Female Kemp's ridleys have been tracked migrating to and from nesting

Table 3.6-2
Habitat for Federally Protected Species Within the Study Area

Species Common Name	Species Scientific Name	Federal Status	Potential Habitat Within the Study Area
Reptiles			
Green sea turtle	<i>Chelonia mydas</i>	Threatened	Yes
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	Yes
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	No
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened Critical Habitat ¹	Yes
Mammals			
Fin whale	<i>Balaenoptera physalus</i>	Endangered	No
Humpback whale	<i>Megaptera novaengliae</i>	Endangered	No
Right whale	<i>Balaena glacialis</i>	Endangered	No
West Indian manatee	<i>Trichechus manatus</i>	Threatened	Yes
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	Threatened	Yes
Fish			
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Endangered	Yes
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Yes
Amphibians			
Flatwoods salamander	<i>Ambystoma cingulatum</i>	Threatened Critical Habitat ¹	No
Birds			
Bachman's warbler	<i>Vermivora bachmanii</i>	Endangered	No
Piping plover	<i>Charadrius melodus</i>	Threatened Critical Habitat ¹	No
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	No
Red knot	<i>Calidris canutus rufa</i>	Threatened	Yes
Wood stork	<i>Mycteria americana</i>	Threatened	Yes
Plants			
American chaffseed	<i>Schwalbea americana</i>	Endangered	No
Canby's dropwort	<i>Oxypolis canbyi</i>	Endangered	No
Pondberry	<i>Lindera melissifolia</i>	Endangered	No
Seabeach amaranth	<i>Amaranthus pumilus</i>	Threatened	No

Source: USFWS South Carolina List of At-Risk Candidate, Endangered, and Threatened Species for Charleston County, downloaded from USFWS, October 11, 2017.

¹ Critical habitat refers to a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species, and that may require special management and protection (a more-complete definition can be found in the Endangered Species Act of 1973).

beaches in Mexico. Females leave breeding and nesting areas and continue on to foraging zones ranging from the Yucatan Peninsula to southern Florida. Kemp's ridleys rarely venture into waters deeper than 160 feet (NOAA 2014c). The preferred sections of nesting beach are backed up by extensive swamps or large bodies of open water having seasonal narrow ocean connections (Parsons Brinckerhoff 2015). No suitable nesting habitat, such as beaches backed up by swamps or open water, was observed within the Protected Species study area.

Hatchlings, after emerging from the nest, enter the water and must swim quickly to escape predators. Hatchlings remain in currents within the Gulf of Mexico while others may be swept out of the Gulf of Mexico, around Florida, and into the Atlantic Ocean. Juveniles have been known to associate with floating sargassum seaweed, utilizing it as an area of refuge, rest, and/or food. The sub-adult turtles return to neritic zones of the Gulf of Mexico or the Atlantic Ocean to feed and develop until they reach adulthood. The tidal open waters of the Protected Species study area may provide marginally suitable foraging habitat for Kemp's ridley sea turtles; however, nesting and pelagic habitats are not present within the Protected Species study area.

No critical habitat rules have been published for the Kemp's ridley sea turtle in South Carolina.

Leatherback sea turtle (*Dermochelys coriacea*)

The leatherback sea turtle is the most pelagic of the sea turtles. Leatherback turtle nesting grounds are located within tropical regions around the world. Adult leatherbacks are capable of tolerating a wide range of water temperatures and have been sighted along the entire continental East Coast of the United States, as far north as the Gulf of Maine and south to Puerto Rico and the U.S. Virgin Islands, and into the Gulf of Mexico (NOAA 2014d). Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the crawl to dry sand is not too far. The preferred beaches have proximity to deep water and generally rough seas (Parsons Brinckerhoff 2015). No suitable nesting habitat, such as beaches backed with vegetation, was observed within the Protected Species study area.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated. Sightings of leatherback turtles in South Carolina began increasing in the late 1980s. Juveniles are hypothesized to actively swim to warmer latitudes before winter and to higher latitudes during spring (NMFS 2013). From 1980 to 2003, 141 leatherback carcasses were stranded in South Carolina. Sea turtle nesting season is May 1 through October 1, which is when the majority of sea turtles are in South Carolina waters (Parsons Brinckerhoff 2015). After approximately 2 months, leatherback hatchlings emerge from the nest and have white striping along the ridges of their backs and on the margins of the flippers. Although there is no known documentation of sea turtle occurrences in the vicinity of the Project, the Protected Species study area may contain marginal foraging habitat for the leatherback sea turtle.

No critical habitat rules have been published for the leatherback sea turtle in South Carolina.

Loggerhead turtle (*Caretta caretta*)

Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters. In the Atlantic, the loggerhead turtles range extends from Newfoundland to as far south as Argentina. During the summer, nesting occurs primarily in the subtropics; although the major nesting concentrations in the United States are found from North Carolina through southwest Florida. Adult loggerheads make extensive migrations between foraging areas and nesting beaches. During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles and Yucatan (NOAA 2014e).

Loggerheads occupy three different ecosystems during their life cycle: beaches (terrestrial zone), water (oceanic zone), and inshore/nearshore coastal areas. In the southeastern U.S., mating occurs in late March to early June and females lay eggs between late April and early September. Loggerheads nest on ocean beaches, generally preferring high energy, relatively narrow, steeply sloped, coarse-grained beaches. Post-hatchling loggerheads take up residence in areas where surface waters converge to form local downwellings. As post-hatchlings, loggerheads may linger for months in waters just off the nesting beach or become transported by ocean currents within the Gulf of Mexico and North Atlantic. Oceanic juveniles migrate between 7 and 12 years of age to nearshore coastal areas and continue maturing until adulthood. The neritic zone provides crucial foraging habitat, inter-nesting habitat, and migratory habitat for adult loggerheads. Bays, sounds, and estuaries along the Atlantic and Gulf coasts of the U.S. are infrequently used by adults. Predominate foraging areas for adult loggerheads are found throughout the relatively shallow continental shelf in waters of the U.S., Bahamas, Cuba, and the Yucatan Peninsula (NOAA 2014e).

In South Carolina, the primary nesting beaches are between North Inlet and Prides Inlet (north of Capers Island), but other beaches between Kiawah Island and Hilton Head have moderate nesting densities. Within the Charleston Harbor, primarily only loggerheads nest regularly on the adjacent beaches. The majority of loggerhead sea turtle sightings in South Carolina waters has been from May 1 through October 1 (Parsons Brinckerhoff 2015).

The Protected Species study area may contain suitable foraging habitat for the sub-adult and adult loggerhead sea turtle. In July 2014, the NMFS and the USFWS designated critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) for loggerhead sea turtles in waters and beach habitat of the Gulf of Mexico and along the coast of the U.S. Atlantic Ocean.⁵⁸ The critical habitat designation of nearshore reproductive habitat can be found in Figure 3.6-2. Nearshore reproductive habitat is located 9 miles south of the Protected Species study area.

⁵⁸ *Federal Register* – <https://www.federalregister.gov/articles/2014/07/10/2014-15725/endangered-and-threatened-wildlife-and-plants-designation-of-critical-habitat-for-the-northwest>.

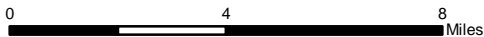
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Protected Species Study Area
- Critical Habitat Designations

Sources: USFWS 2015, Atkins 2016



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Critical Habitat Designations
Figure 3.6-2



3.6.2.2 Mammals

Four federally listed endangered marine mammals have ranges with the potential to occur in the Protected Species study area.

Fin Whale (Balaenoptera physalus)

Fin whales are migratory, moving seasonally into and out of high-latitude feeding areas; however, the overall migration pattern for the species is complex. Specific migration routes have not yet been documented. Fin whales are the second-largest species of whale, with a maximum length of about 75 feet in the Northern Hemisphere. Adults can weigh between 40 and 80 tons. Fin whales have a sleek, streamlined body with a V-shaped head. Fin whales can be found in social groups of two to seven whales and in the North Atlantic are often seen feeding in large groups (NOAA 2016a). Fin whales are large, fast swimmers and the killer whale is their only non-human predator. During the summer, fin whales feed on krill, small schooling fish, and squid by lunging into schools of prey with their mouth open. Fin whales fast in the winter while they migrate to warmer waters. Physical maturity is attained at approximately 25 years for both sexes. Fin whales can live from 80 to 90 years (NOAA 2016a).

Fin whales are found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics. They occur year-round in a wide range of latitudes and longitudes, but the density of individuals in any one area changes seasonally (NOAA 2016a). The Protected Species study area does not contain suitable habitat for the fin whale due to the lack of foraging or calving habitat.

No critical habitat rules have been published for the fin whale in South Carolina.

Humpback Whale (Megaptera novaengliae)

Humpback whales live in all major oceans from the equator to sub-polar latitudes. In the western North Atlantic Ocean, humpback whales feed during spring, summer, and inhabit a wide range that encompasses the eastern coast of the United States and other regions. Humpback whales travel great distances during their seasonal migration (NOAA 2016b). In the summer, humpbacks are found in high latitude feeding grounds. In the winter, they migrate to calving grounds in subtropical or tropical waters of the Caribbean. During migration, humpbacks stay near the surface of the ocean. While feeding and calving, humpbacks prefer shallow waters. During calving, humpbacks are usually found in the warmest waters available at that latitude. Calving grounds are commonly near offshore reefs, islands or continental shores. Humpbacks feeding grounds are in cold, productive coastal waters (NOAA 2016b). The Protected Species study area does not contain suitable habitat for the humpback whale due to the lack of foraging or calving habitat.

No critical habitat rules have been published for the humpback whale in South Carolina.

Right Whale (*Balaena glacialis*)

Right whales inhabit the Atlantic Ocean, particularly between 20 and 60 degrees latitude. The range of a majority of the western North Atlantic distinct population extends from wintering and calving areas in the coastal waters off the southeastern United States to summer feeding and nursery grounds in New England waters. NMFS has identified coastal oceanic waters extending from central Florida to southeastern North Carolina as critical habitat for the right whale, known specifically as the Southeastern U.S. Calving Area (NMFS 2016). Figure 3.6-2 provides the limits of the Southeastern U.S. Calving Area and depicts its proximity to the Protected Species study area. In the coastal waters off Georgia and northern Florida, calving occurs from December through March.

Most known right whale nursery areas are in shallow, coastal waters that make up the neritic zone. Four habitat categories are described for right whale: feeding areas, calving areas, nursery aggregation areas, and breeding locations. Feeding areas can be found in the north Atlantic around the Gulf of Maine and Newfoundland. Calving areas are found within the Southeastern U.S. Calving Area. This area is routinely used for calving, neonatal nursing and nursery aggregation. Breeding locations are where mating behavior occurs, and are not currently described for any population of the right whale. The Protected Species study area does not contain the presence of suitable habitat for the right whale due to the lack of oceanic foraging or calving habitat.

West Indian manatee (*Trichechus manatus*)

The West Indian manatee is found along the coast of Florida and in the Caribbean. Manatees move between freshwater, brackish, and saltwater environments. They prefer large, slow-moving rivers, river mouths, and shallow coastal areas such as coves and bays. The animals may travel great distances as they migrate between winter and summer grounds. During the winter, manatees congregate around warm springs and around power plants that discharge warm water. During the summer months, manatees appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water. Between October and April, Florida manatees migrate to areas of warmer water. For this reason, manatees are only seen in South Carolina in the summer months. According to SCDNR data, there are 32 reported manatee sightings within the Cooper River, Noisette Creek, and Shipyard Creek between 2005 and 2015. Sightings were last reported for Shipyard Creek in 2005 (1) and 2006 (1). In 2014, there were two reported manatee sightings near the Navy Base within the Cooper River, and one reported sighting in Noisette Creek. The most sightings were reported in 2014, with a total of 11, and three sightings were reported in 2015 all within the Cooper River (Parsons Brinckerhoff 2015).

Female manatees reach sexual maturity between the ages of 3 and 5 years, compared to males at 3 and 4 years of age. Seagrass beds, deep-water access, and minimal boat traffic is an important combination of successful mating, calving, and nursing grounds for manatees. Most manatee calves are born in the spring or early summer, although reproduction can occur at any time of the year

(USFWS 2017b). The tidal open waters of the Protected Species study area provide suitable foraging habitat for the West Indian manatee in the Cooper River, Shipyard Creek, and Noisette Creek, but it is unlikely that the area is used for mating, calving, and nursing grounds due to the lack of seagrass beds and frequent boat traffic.

No critical habitat rules have been published for the West Indian manatee in South Carolina.

Northern Long-Eared Bat (*Myotis septentrionalis*)

Northern long-eared bats' range in South Carolina, according to SCDNR, includes the following counties: Abbeville, Anderson, Beaufort, Berkeley, Charleston, Cherokee, Greenville, Laurens, Oconee, Pickens, Spartanburg, Union, and York. General habitat requirements include mature forests (old-growth, mature second growth) with sparse understory vegetation. Roosting habitat may include tree cavities, under bark of trees, in buildings, storm sewers, caves, mines, snags and crevices in rock outcrops (SCDNR 2017a). According to the USFWS (2015a), "potential suitable summer habitat for northern long-eared bats may include live trees and/or snags with a diameter-at-breast-height greater than or equal to 3 inches (7.62 cm) that have cavities, crevices, exfoliating bark, and/or cracks, and are within 1,000 feet (305 m) of forested habitat. In addition, wooded corridors and human-made structures should also be considered potential suitable summer habitat." In June and July 2017, northern long-eared bats were found in Charleston and Berkeley counties, South Carolina. Habitat for maternity colonies, reproductive habits, winter roosting habits, and foraging habits are unknown in South Carolina. (SCDNR 2017a). White-nose syndrome is a disease affecting hibernating bats. The syndrome is named for the white fungus that appears on the muzzle and other parts of hibernating and is associated with extensive mortality of bats in eastern North America. The Protected Species study area is wholly outside of the white-nose syndrome zone (USFWS 2017c). There are no known hibernacula or maternity roost trees in Charleston County (personal communication, Mark Caldwell, USFWS, November 15, 2017). Forested habitat and human-made structures of the Protected Species study area may provide marginally suitable habitat for the northern long-eared bat; however, 91 percent of the area is categorized as urban development (Table 3.4-1), therefore the potential for occurrence is very low.

This species is listed as threatened under the ESA, however in April 2016, the USFWS determined that designating critical habitat for northern long-eared bats was not prudent (USFWS 2016).

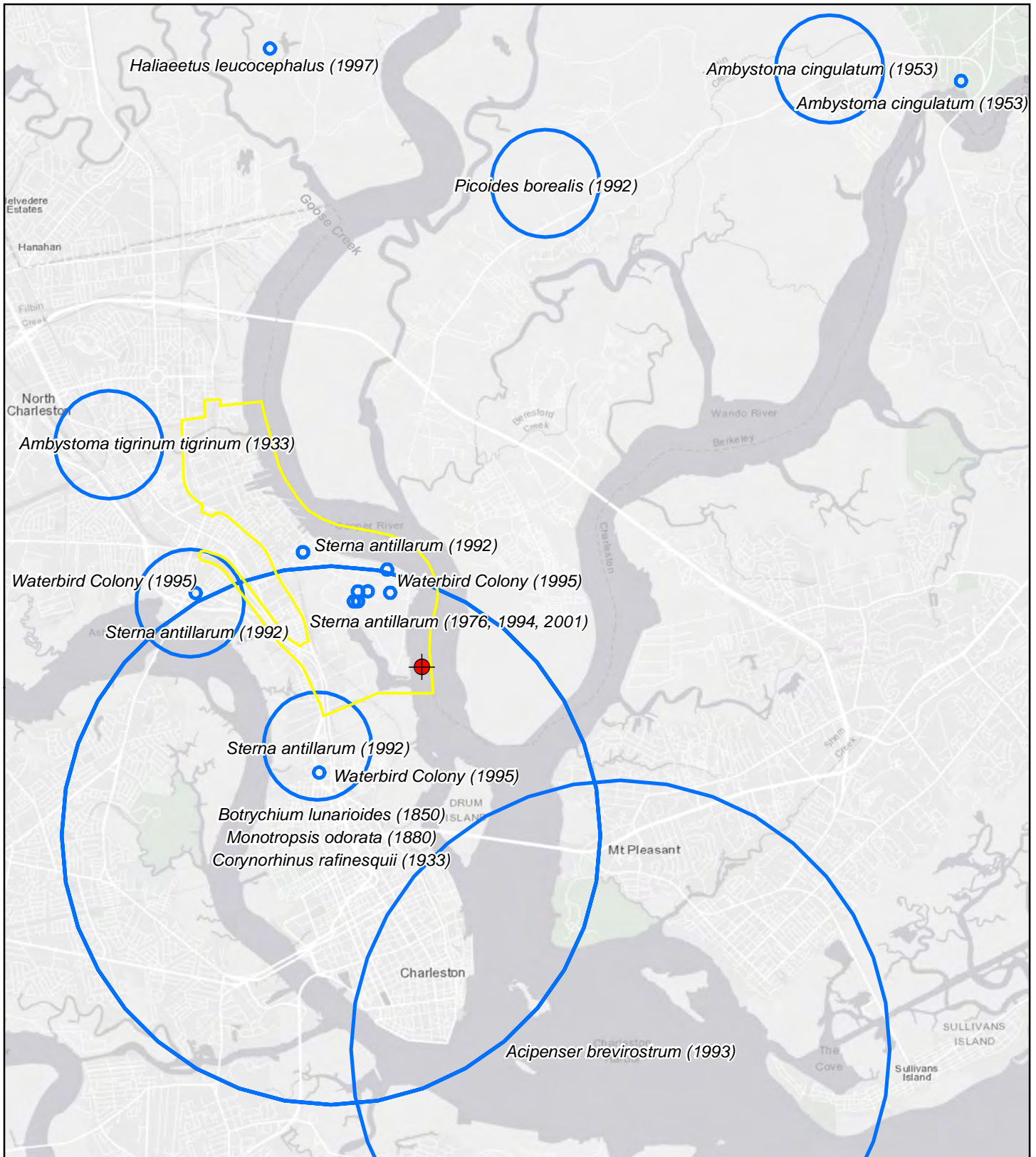
3.6.2.3 Fish

There are two federally listed endangered fish species, one of which is also state listed as endangered, and known to potentially occur in the Protected Species study area.

Atlantic sturgeon (*Acipenser oxyrinchus*)

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, Maine, to the Saint Johns River, Florida, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them. Atlantic sturgeon adults spawn in freshwater in the spring and early summer and then migrate into estuarine and marine waters where they spend most of their lives. In some southern rivers, a fall spawning migration may also occur. Atlantic sturgeon spawning is believed to occur in flowing water between the fresh/salt water interface and fall line of large rivers, where optimal flows are 46–76 centimeters per second (cm/s) and depths of 11–27 meters (Parsons Brinckerhoff 2015). Sturgeon eggs are highly adhesive and are deposited on bottom substrate, usually on hard surfaces. It is likely that cold, clean water is important for proper larval development. Once larvae begin migrating downstream, they use benthic structure as refuges. Juveniles usually reside in estuarine waters for months to years.

Sub-adults and adults live in coastal waters and estuaries when not spawning, generally in shallow nearshore areas dominated by gravel and sand substrates. Long distance migrations away from spawning rivers are common. Historically, Atlantic sturgeon were likely present in many South Carolina river/estuary systems, including the Cooper River, but it is not known where spawning occurred. According to the Status Review Team (SRT) for Atlantic sturgeon, the Cooper and Ashley rivers have been used by Atlantic sturgeon (Parsons Brinckerhoff 2015). The Cooper River is identified by the SRT as currently and historically being used for spawning and as a nursery. SCDNR have been conducting telemetry studies of shortnose and Atlantic sturgeon since 2010, whereby sonic transmitters are inserted into individuals to monitor migration patterns, seasonal habitats, and spawning locations in several coastal systems including the Cooper River. There are approximately 30 monitoring locations within the Cooper River, Charleston Harbor, and Wando River. Based on the telemetry data provided by SCDNR from April 2011 to November 2014 for all 30 monitoring locations, approximately 70 percent of the detections occurred in the Cooper River (Parsons Brinckerhoff 2015). Updated data provided by SCDNR (Bill Post, unpublished data) from the receiver closest to the study area (Figure 3.6-3) at the mouth of Shipyard Creek spans a period of November 2011 to February 2017. There has been a total of 17 Atlantic sturgeon detected at the marina. The receiver is located roughly 2 miles downstream from the project area. SCDNR does not have any receivers located further upstream in Shipyard creek, nor has sturgeon ever been manually tracked in the creek. However, as stated previously, adult sturgeon tend to stay in mainstem rivers with increased flows, so it is very unlikely sturgeon would be found in Shipyard Creek near the Protected Species study area.



Legend

- Protected Species Study Area
- Element Occurrences (Last Year Observed)
- Sturgeon Receiver

Source: SCDNR Heritage Trust Program 2016


0 1 2 3 Miles

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▲

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Element Occurrences of
Protected Species and
Sturgeon Receiver

Figure 3.6-3



**US Army Corps
Of Engineers**
Charleston District

The tidal open waters of the Cooper River within the Protected Species study area may provide suitable spawning habitat for adult Atlantic sturgeon due to the presence of flow, salinity, and certain substrates, and may contain feeding and foraging habitat for juveniles, sub-adults, and adults.

No critical habitat rules have been published for the Atlantic sturgeon in South Carolina.

Shortnose sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is anadromous, living mainly in the slower moving riverine waters or nearshore marine waters, and migrating periodically into faster moving fresh water areas to spawn. Shortnose sturgeon inhabit rivers and estuaries. They spawn in the coastal rivers along the east coast of North America. They prefer the nearshore marine, estuarine, and riverine habitat of large river systems. Shortnose sturgeon do not appear to make long-distance, offshore migrations, spending most of their adult life in fresh and brackish water; however, they do venture into the lower coastal reaches and ocean on rare occasions. Shortnose sturgeons are benthic feeders. In South Carolina, shortnose sturgeon are known from the river systems that empty into Winyah Bay and the Santee/Cooper River complex that forms Lake Marion, as well as the Great and Little Pee Dee, Congaree, Wateree, Ashepoo, Edisto, Black, and Waccamaw River systems in South Carolina. One landlocked group may exist in Lake Marion on the Santee River in South Carolina.

In early February to late March, shortnose sturgeon spawn far upstream in freshwater. In most population segments, sturgeon spawn at the uppermost river reaches accessible in channels and curves in gravel, sand, and log substrate. Other suitable substrates include riffles near limestone bluffs with gravel to boulder-sized substrate (Parsons Brinckerhoff 2015). Spawning lasts for about 3 weeks, beginning when water temperatures are at about 8 to 9 °C, and ending when it reaches approximately 12 to 15 °C. Optimal flows are between 30 and 76 cm/s. The spent fish migrate downriver from March to May, and spend the summer from June to December in the lower river (Parsons Brinckerhoff 2015).

Adult shortnose sturgeon migrate throughout an individual river system and may also migrate between different river systems, including regional/interstate movement (Parsons Brinckerhoff 2015). In 1999 and 2000, Palmer (2001) monitored adult and juvenile sturgeon in the Savannah River and identified distinct summer and winter habitats in terms of location and water quality. Observations indicate that they seek deep holes upriver for sanctuary where temperatures are warmer and in the winter, they migrate downstream to the estuary during periods of cold (Parsons Brinckerhoff 2015).

The tidal open (estuarine) waters of the Protected Species study area may provide overwintering habitat for adult and juvenile shortnose sturgeon. Since the shortnose sturgeon prefers to spawn in freshwater rivers, the Cooper River is too brackish within the Protected Species study area to provide appropriate spawning habitat. Adult spawning populations of shortnose sturgeon in the Cooper River

was 281 fish in the late 1990s, according to Bill Post with SCDNR (Parsons Brinckerhoff 2015). Updated data provided by SCDNR (Bill Post, unpublished data) from the receiver closest to the study area (Figure 3.6-3) at the mouth of Shipyard Creek spans a period of November 2011 to February 2017. There has been a total of seven shortnose sturgeon detected at the marina. The receiver is located roughly 2 miles downstream from the Protected Species study area. SCDNR does not have any receivers located further upstream in Shipyard creek, nor has sturgeon ever been manually tracked in the creek. However, as stated previously, adult sturgeon tends to stay in mainstem rivers with increased flows.

No critical habitat rules have been published for the shortnose sturgeon in South Carolina.

3.6.2.4 Amphibians

One federally listed threatened amphibian, which is also state listed as endangered, has the potential to occur in the Protected Species study area.

Flatwoods salamander (*Ambystoma cingulatum*)

The flatwoods salamander occurs throughout the Southern Coastal Plain of southern Alabama, Georgia, South Carolina, and northern Florida but is widely scattered in its distribution. It prefers open longleaf pine (*Pinus palustris*) or slash pine (*Pinus elliotti*) flatwoods or savannas with wiregrass (*Aristida stricta*). Typically, the preferred wetland habitats have scattered forest canopies of pond cypress, swamp black gum, and slash pine and an abundance of emergent herbaceous vegetation (Jensen et al. 2008). Temporary fishless wetland depressions also are critical to larvae of this species. Historically, the flatwoods salamander has been found at several sites in the Francis Marion National Forest near the community of Wando (USFS 2017, SCDNR 2017e). See Figure 3.6-3 for flatwoods salamander occurrence locations. The Protected Species study area does not contain potentially suitable habitat for flatwoods salamanders due to the lack of flatwoods and savannas with a current fire regime.

The closest critical habitat designation is 9.5 miles northeast of the Protected Species study area in Berkeley County (see Figure 3.6-2). The final rule was published in the *Federal Register*⁵⁹ on February 10, 2009. As such, critical habitat was established in Berkeley, Charleston, and Jasper counties in South Carolina.

3.6.2.5 Birds

There are five federally listed threatened or endangered birds, three of which are also state listed as endangered, known to potentially occur in the Protected Species study area.

⁵⁹ *Federal Register* on February 10, 2009—<http://www.gpo.gov/fdsys/pkg/FR-2009-02-10/pdf/E9-2403.pdf#page=1>

Bachman's warbler (*Vermivora bachmanii*)

Bachman's warbler breeds in the southeastern U.S. and winters in the Caribbean. Historical records indicate the Bachman's warbler may be potentially extirpated. Most authorities agree that if the Bachman's warbler still exists, it is most likely in the I'on Swamp area in Charleston and Berkeley counties, South Carolina. The only confirmed nest observations were recorded during the period from 1897 to 1937. Of these, 26 were from the I'on Swamp area in Francis Marion National Forest. The last confirmed sighting anywhere in the United States was in 1988 (USFWS 1999).

No confirmed breeding records have been reported from the United States since the mid-1960s. Bachman's warbler typically nests in low, wet, forested areas containing variable amounts of water, but usually with some permanent water. Openings in the forest canopy with a ground cover consisting of dense thickets of cane (*Arundinaria gigantea*), palmetto (*Serenoa minor*), blackberry (*Rubus cuneifolius*), gallberry (*Ilex glabra*), and other shrubs and vines also are characteristic of nesting habitats. The nests are located near the ground. Migratory habitat preference is unclear; however, they have been known to use a wide range of habitat types during migration, including forest canopy. The Protected Species study area does not contain suitable migratory, winter, or breeding habitat for the Bachman's warbler.

No critical habitat rules have been published for the Bachman's warbler in South Carolina.

Piping plover (*Charadrius melodus*)

The piping plover breeds on the northern Great Plains, in the Great Lakes, and along the Atlantic Coast (Newfoundland to North Carolina); and winters on the Atlantic Coast and Gulf of Mexico Coast from North Carolina to the Caribbean. Piping plovers nest along the sandy beaches of the Atlantic Coast, the gravelly shorelines of the Great Lakes, and on river sandbars and alkali wetlands throughout the Great Plains region. They prefer to nest in sparsely vegetated areas that are slightly raised in elevation (like a beach berm). Piping plover breeding territories generally include a feeding area such as a dune pond or slough or near the lakeshore or ocean edge. These birds are primarily coastal during the winter, preferring areas with expansive sand or mudflats (feeding) in close proximity to a sandy beach (roosting). The Protected Species study area does not contain the presence of suitable habitat for the piping plover due to the lack of feeding, niche, nesting, or other preferred habitat.

No critical habitat has been proposed or designated for the Atlantic Coast breeding population, but the needs of the breeding population were considered in the 2001 critical habitat designation for wintering piping plovers (USFWS 2001) and in subsequent redesignations (USFWS 2009). Critical habitat for the piping plover is not located in the Protected Species study area, and the closest critical habitat designation is 13 miles southwest of the Protected Species study area near Kiawah Island in Charleston County (see Figure 3.6-2).

Red knot (*Calidris canutus*)

Red knots winter in the coastal United States from Cape Cod to Mexico and South America and spend the summer on islands in the High Arctic. Birds form bonds on breeding grounds soon after they arrive in late May or early June. Nests are constructed near water on shallow depressions lined with leaves and lichens. They remain together until soon after the eggs hatch (USFWS 2014a). They overwinter all along the South Carolina coast, primarily on sandy beaches and mud flats. This species feeds on mollusks, marine worms, and horseshoe crab eggs. During migration, red knots gather in huge flocks, stopping along coastal areas to recharge their energy reserves for their flight to wintering grounds in Central and South America. The abundance of horseshoe crab eggs provides ample protein for the migrating knots. The Protected Species study area contains the presence of suitable foraging habitat for overwintering or migrating red knots due to the presence of mud flats within the tidal salt marsh and tidal open water vegetation communities.

No critical habitat rules have been published for the red knot in South Carolina, though it is possible that future evaluations may identify critical habitat in the state. Even with additional evaluation, it would be unlikely that critical habitat would be identified within the Protected Species study area.

Red-cockaded woodpecker (*Picoides borealis*)

Red-cockaded woodpeckers were once considered common residents of the longleaf pine (*Pinus palustris*) ecosystem. The birds inhabited the open pine forests of the southeast from New Jersey, Maryland, and Virginia to Florida, west to Texas and north to portions of Oklahoma, Missouri, Tennessee, and Kentucky.

The red-cockaded woodpecker's habitat includes forests with trees old enough for roosting, generally at least 60 years old and older. They need live, large older pines in which to excavate their cavities; usually preferring longleaf pines. Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches or larger in diameter (USFWS 1985). Roosting cavities are excavated in living pines, and usually in those infected with a fungus known as red-heart disease. The Protected Species study area does not contain the presence of suitable habitat for red-cockaded woodpeckers due to the lack of mature pine trees and a routine fire regime to control the midstory hardwoods. Several clusters of birds are known to exist in the Francis Marion National Forest. The closest occurrence of the red-cockaded woodpecker is approximately 3 miles northeast of the Protected Species study area in Cainhoy Plantation (see Figure 3.6-3). One colony was discovered with two active cavity trees in 1992 (SCDNR 2017e).

No critical habitat rules have been published for the RCW in South Carolina.

Wood stork (*Mycteria americana*)

Now restricted to Florida, Georgia, and South Carolina, the wood stork may have formerly bred in most of the southeastern United States and Texas. The wood stork breeding population is now estimated at around 8,000 nesting pairs (16,000 breeding adults). Wood storks move northward after breeding, with birds from the southeastern United States moving as far north as North Carolina on the Atlantic Coast and into Alabama and eastern Mississippi along the Gulf Coast (USFWS 1997). Wood storks use freshwater and estuarine wetlands for nesting, feeding, and roosting. They feed in a wide variety of tidal and freshwater ecosystems: freshwater marshes, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands (i.e., seasonally flooded roadside and agricultural ditches, impoundments, and large reservoirs). Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels. They nest in patches of medium to tall trees, in standing water, or on islands surrounded by expanses of open water. Wood storks mate after highly ritualized displays of courtship at nesting sites. In South Carolina nesting occurs on a seasonal basis regardless of environmental conditions. A single clutch of eggs is generally laid from March to late May, with chicks fledging during July and August (USFWS 1997). In the 2016 nesting season in South Carolina, wood storks nested in nine counties: Beaufort (eight colonies), Charleston (four colonies), Colleton (three colonies), Horry (three colonies), Georgetown (two colonies), Bamberg (one colony), Berkeley (one colony), Hampton (one colony), and Jasper (one colony). During 2016, 2,512 wood stork nests were counted (SCDNR 2016).

Three historic wood stork rookeries are located near the Protected Species study area: 7.5 miles, 10 miles, and 14 miles (Figure 3.6-4). No wood stork nesting or roosting colonies are known to exist within the Protected Species study area. No wood storks were observed during field observations in July 2014 and January 2016.

The Protected Species study area is located within an Active Core Foraging Area (CFA) for wood storks (USFWS – North Florida Ecological Service Office [NFESO] undated). The CFAs for wood storks in South Carolina protect suitable foraging habitat within a 13-mile radius of known rookeries (Figure 3.6-4). The tidal salt marsh and tidal open water vegetation communities all provide suitable foraging habitat for the wood stork.

No critical habitat rules have been published for the wood stork in South Carolina.

3.6.2.6 Plants

There are four federally threatened or endangered plants known to potentially occur in the Protected Species study area.

American chaffseed (*Schwalbea americana*)

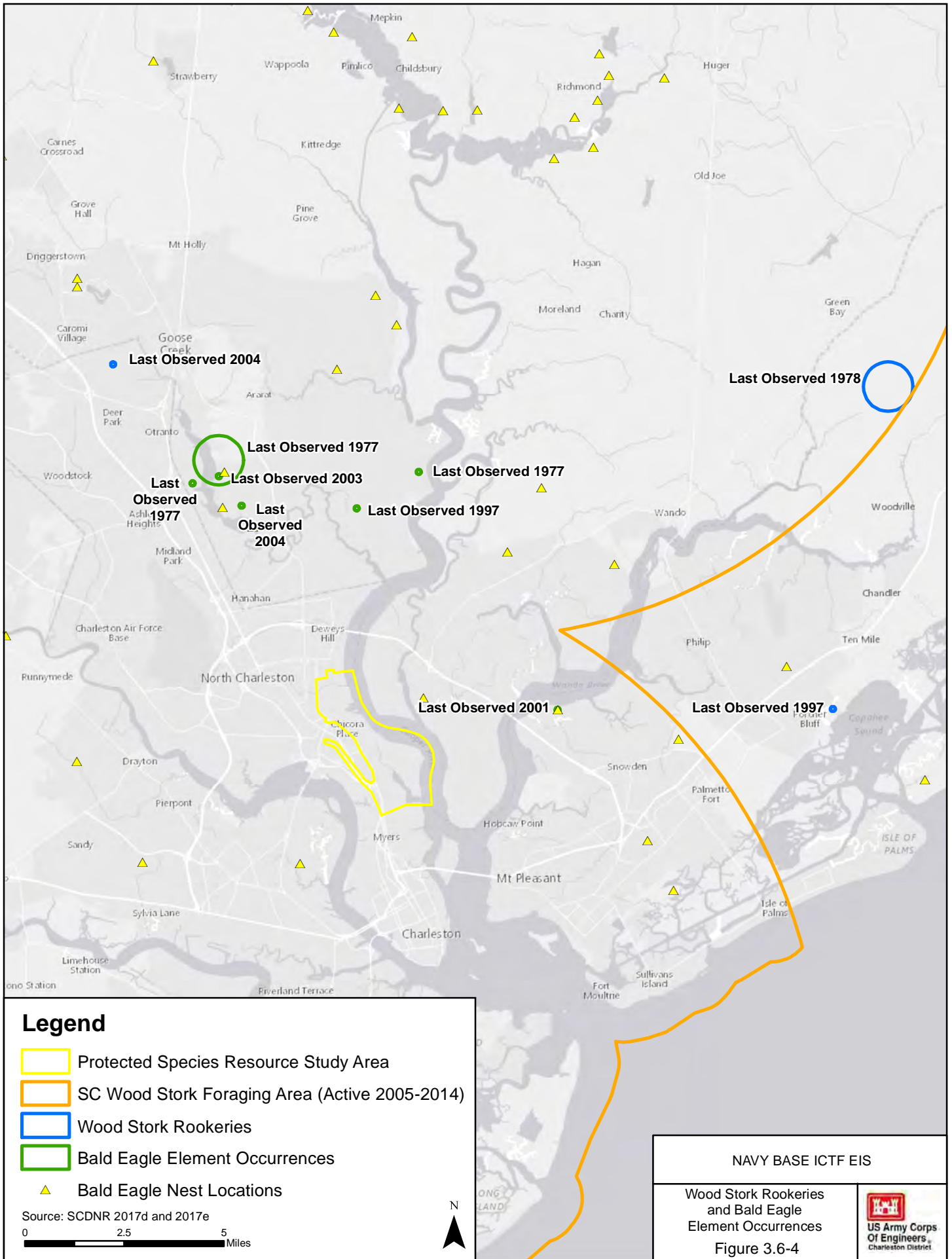
Currently, American chaffseed (a perennial herb) occurs in New Jersey, North Carolina, South Carolina, Georgia, and Florida. American chaffseed was never considered to be common, but populations have declined and the range has seriously contracted in recent decades. American chaffseed occurs in sandy (sandy peat, sandy loam), acidic, seasonally moist to dry soils. It is generally found in habitats described as open, moist pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems. Chaffseed is dependent on factors such as fire, mowing, or fluctuating water tables to maintain the crucial open to partly open conditions that it requires (USFWS 1994). Known populations of American chaffseed occur in Charleston County; most of which are within the Francis Marion National Forest. The Protected Species study area does not contain suitable habitat for American chaffseed due to the lack of frequently burned longleaf pine sandhills, savannas, or flatwoods that contain moist, grassy ecotones.

No critical habitat rules have been published for the American chaffseed in South Carolina.

Canby's dropwort (*Oxypholis canbyi*)

Canby's dropwort recently occurred in Delaware, Georgia, Maryland, North Carolina, and South Carolina. It is a perennial herb found in a variety of coastal plain habitats, including natural ponds dominated by pond cypress, grass-sedge dominated Carolina bays, wet pine savannas, shallow pineland ponds, and cypress-pine swamps or sloughs. The largest and most vigorous populations have been found in open bays or ponds that are wet throughout most of the year but have little or no canopy cover. Soils are sandy loams or acidic peat mucks underlain by clay layers that, along with the slight gradient of the areas, result in the retention of water (USFWS 2017d). The closest known population of Canby's dropwort occurs within the Ashepoo, Combahee and Edisto (ACE) Basin in wetlands within the Colleton County Cowbane Preserve located 80 miles west of the Protected Species study area. The nearest known suitable habitat for the species is in Frances Marion National Forest. Thus, the Protected Species study area does not contain the presence of suitable habitat for Canby's dropwort due to the lack of open wet plant communities as described above.

No critical habitat rules have been published for the Canby's dropwort in South Carolina.



Last Observed 2004

Last Observed 1978

Last Observed 1977

Last Observed 1977

Last Observed 2003

Last Observed 1977

Last Observed 2004

Last Observed 1997

Last Observed 2001

Last Observed 1997

Legend

- Protected Species Resource Study Area
- SC Wood Stork Foraging Area (Active 2005-2014)
- Wood Stork Rookeries
- Bald Eagle Element Occurrences
- Bald Eagle Nest Locations

Source: SCDNR 2017d and 2017e

0 2.5 5 Miles



NAVY BASE ICTF EIS

Wood Stork Rookeries and Bald Eagle Element Occurrences

Figure 3.6-4

Pondberry (*Lindera melissifolia*)

Pondberry is found in Arkansas, Missouri, Mississippi, and from North Carolina to Georgia. Pondberry is a deciduous shrub that grows to approximately 2 meters tall, and is spread vegetatively by stolons (USFWS 1993). Pondberry is associated with wetland habitats, such as bottomland and hardwoods in the interior areas, and the margins of sinks, ponds, and other depressions in the more coastal sites. In South Carolina, pondberry grows along the margins of limestone sinks and shallow depressions. The plant also inhabits pinelands and recently burned open areas. Several populations of pondberry occur in the Francis Marion National Forest in Berkeley County (USDA 2013; USFWS 2014). The Protected Species study area does not contain the presence of suitable habitat for Pondberry due to the lack of depressional wetlands and the suppression of a fire regime.

No critical habitat rules have been published for the Pondberry in South Carolina.

Seabeach amaranth (*Amaranthus pumilus*)

Historically, seabeach amaranth occurred in nine states from Massachusetts to South Carolina. Seabeach amaranth is an annual plant found on the dunes of Atlantic Ocean beaches. It occurs on barrier island beaches (USFWS 2007), where its primary habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of non-eroding beaches (USFWS 2007). It occasionally establishes small temporary populations in other habitats; including sound-side beaches, blowouts in foredunes, and sand and shell material placed as beach replenishment or dredge spoil (USFWS 2007). The Protected Species study area does not contain the presence of suitable habitat for seabeach amaranth due to the lack of barrier island beaches.

No critical habitat rules have been published for the seabeach amaranth in South Carolina.

3.6.3 Federally Protected and At-Risk Species

In 2011, the Southeast Region of the USFWS began working with states, federal agencies, and other partners (i.e., landowners and non-governmental organizations) to evaluate more than 400 fish, wildlife, and plant species for potential listing under the Federal ESA. The USFWS' Southeast Region has defined "at-risk species" as those that are:

- Proposed for listing under the ESA by USFWS;
- Candidates for listing under the ESA (species that warrant listing but have not been listed, due to higher listing priorities and limited resources);
- Petitioned for listing under the ESA (a citizen or citizen group has requested that the USFWS list them); or
- Species of Greatest Conservation Need (SGCN) as identified by the states.

Table 3.6-3 lists the federally protected and at-risk species that may be present within the Protected Species study area. The actual occurrence of a federally protected or at-risk species in the Protected Species study area would depend upon the availability of suitable habitat, which is listed in Table 3.6-4, as well as the season of the year relative to a species' temperature tolerance, migratory habits, and other factors. Descriptions of these species are included below. During field visits to the Protected Species study area in July 2014 and January 2016, no federally protected or at-risk species were observed.

Eastern diamondback rattlesnake (*Crotalus adamanteus*)

Diamondback rattlesnakes are restricted to the lower coastal plain of the Southeast, from southern North Carolina to eastern Louisiana, with strongholds centered in Florida and southern Georgia. This species usually inhabits dry sandy areas, palmetto or wiregrass flatwoods, pinewoods, coastal dune habitats, or hardwood hammocks. They generally avoid wet areas, but sometimes live along the edges of swamps. They are accomplished swimmers and even travel through saltwater to and from barrier islands. In many locations, this species relies heavily on gopher tortoise (*Gopherus polyphemus*) burrows during winter months. Diamondbacks spend the winter in stump holes or tortoise burrows but may emerge on warm winter days to bask. Due to the lack of dense vegetation, gopher tortoise burrows, and other upland natural communities, the Protected Species study area does not contain potentially suitable habitat for the eastern diamondback rattlesnake (SREL 2018a).

Southern hognose snake (*Heterdon simus*)

Southern hognose snakes are currently only found in scattered locations in South Carolina, North Carolina, Georgia, and Florida. Southern hognose snakes are found almost exclusively in sandhill, pine flatwood, coastal dune habitats, and in sand ridges. Southern hognose snakes are active strictly by day and are often seen on warm mornings in the spring and fall. They are highly fossorial and are most often encountered crossing roads that pass through sandy habitats. Hognose snakes feed almost exclusively on toads, although they will occasionally consume other prey (SREL 2018b). The Protected Species study area does not contain suitable habitat due to the lack of pine flatwoods and coastal dunes.

Spotted turtle (*Clemmys guttata*)

Spotted turtles are found throughout the coastal plain, including several barrier islands, but are found in spotty populations and are generally uncommon. Favored habitats include shallow aquatic habitats, often with abundant vegetation, including ditches, Carolina bays, bogs, and cypress swamps. These turtles appear to be most common in the early spring, when they can be seen basking on logs in wetlands. Data suggest that spotted turtles spend much of the warmer months buried on land (Jensen et al. 2008). The Protected Species study area may contain marginal habitat in freshwater wetland and ditches and nearby terrestrial habitats.

Table 3.6-3
 Federally Protected and At-Risk Species
 with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Federal Status	State Status
Reptiles			
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	ARS	–
Southern hognose snake	<i>Heterodon simus</i>	ARS	–
Spotted turtle	<i>Clemmys guttata</i>	ARS	Threatened
Mammals			
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	ARS	Endangered
Tri-colored bat	<i>Perimyotis subflavus</i>	ARS	–
Fish			
American eel	<i>Anguilla rostrata</i>	ARS	–
Blueback herring	<i>Alosa aestivalis</i>	ARS	–
Amphibians			
Gopher frog	<i>Rana capito</i>	ARS	Endangered
Insects			
Monarch butterfly	<i>Danaus plexippus</i>	ARS	–
Rare skipper	<i>Problema bulenta</i>	ARS	–
Birds			
Bald eagle	<i>Haliaeetus leucocephalus</i>	Protected	Threatened
Black rail	<i>Laterallus jamaicensis</i>	ARS	–
Black-capped petrel	<i>Pterodroma hasitata</i>	ARS	–
MacGillivray's seaside sparrow	<i>Ammodramus maritimus macgillivraii</i>	ARS	–
Plants			
Boykin's lobelia	<i>Lobelia boykinii</i>	ARS	–
Carolina bishopweed	<i>Ptilimnium ahlesii</i>	ARS	–
Ciliate-leaf tickseed	<i>Coreopsis integrifolia</i>	ARS	–
Godfrey's privet	<i>Forestiera godfreyi</i>	ARS	–
Hedge nettle	<i>Stachys caroliniana</i>	–	–

Source: USFWS 2017a.

Table 3.6-4
Potential Habitat for Federally Protected and At-Risk Species
with the Potential to Occur in the Study Area

Species Common Name	Species Scientific Name	Potential Habitat Within the Study Area
Reptiles		
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	No
Southern hognose snake	<i>Heterodon simus</i>	No
Spotted turtle	<i>Clemmys guttata</i>	Marginal
Mammals		
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	Yes
Tri-colored bat	<i>Perimyotis subflavus</i>	Yes
Fish		
American eel	<i>Anguilla rostrata</i>	Yes
Blueback herring	<i>Alosa aestivalis</i>	Yes
Amphibians		
Gopher frog	<i>Rana capito</i>	No
Insects		
Monarch butterfly	<i>Danaus plexippus</i>	Yes
Rare skipper	<i>Problema bulenta</i>	Yes
Birds		
Bald eagle	<i>Haliaeetus leucocephalus</i>	Yes
Black rail	<i>Laterallus jamaicensis</i>	Yes
Black-capped petrel	<i>Pterodroma hasitata</i>	No
MacGillivray's seaside sparrow	<i>Ammodramus maritimus macgillivraii</i>	Yes
Plants		
Boykin's lobelia	<i>Lobelia boykinii</i>	No
Carolina bishopweed	<i>Ptilimnium ahlesii</i>	No
Ciliate-leaf tickseed	<i>Coreopsis integrifolia</i>	No
Godfrey's privet	<i>Forestiera godfreyi</i>	No
Hedge-nettle	<i>Stachys caroliniana</i>	Yes

Source: Atkins 2016.

American eel (*Anguilla rostrata*)

American eels occur in rivers of the coastal plain, but rarely can be found in the piedmont. In freshwater, female American eels prefer coastal rivers and reservoirs, where the males congregate close to tidal areas. American eels are diadromous fishes, migrating between fresh and salt waters. Spawning begins when adults leave freshwater and brackish habitats and then migrate to an area in the Atlantic Ocean east of the Bahamas and southwest of Bermuda in the region referred to as the Sargasso Sea. After spawning, eels begin their life as planktonic larva that metamorphose into a glass eel. The glass eel then metamorphoses into the elver stage, where they appear at the mouth of creeks and rivers as they migrate upstream to grow. An elver is a young eel, especially when undergoing mass migration upriver from the sea. Once they are sexually mature, both sexes of eels appear silver and head to the ocean to reproduce (SCDNR 2018a). The Protected Species study area may contain the presence of suitable foraging habitat for the American eel.

Blueback herring (*Alosa aestivalis*)

The blueback herring range consists of coastal rivers and streams in the Pee Dee, Santee, and Savannah River drainages and are present in several reservoirs; including lakes Murray, Thurmond, Hartwell, Russell, Jocassee, Marion, and Moultrie. The preferred habitat for blueback herring is the Atlantic Ocean, but migrates up freshwater rivers to spawn in the coastal plain. Blueback herring move into coastal rivers during March and April, when the water temperatures reach the mid-50s. Spawning sites can be from the tidal zone to more than 100 miles upstream (SCDNR 2018b). The Protected Species study area may contain suitable foraging habitat for the blueback herring.

Gopher frog (*Rana capito*)

The gopher frog occurs throughout the coastal plain and inhabits longleaf pine-wiregrass flatwoods and longleaf pine-turkey oak sandhills. Gopher frogs spend much of their nonbreeding time in gopher tortoise burrows. Of central importance to these frogs is the presence of suitable habitat in the form of temporary wetlands. Most are either treeless or support a scattered canopy of pond cypress and swamp black gum; open-canopy areas with emergent herbaceous vegetation are an important component (Jensen et al. 2008).

Gopher frogs typically migrate to breeding ponds in the fall, winter, and early spring in association with heavy rains. Adults feed on invertebrates and on other anurans, especially toads. The Protected Species study area does not contain potentially suitable nesting and foraging habitat for the gopher frog.

Rare skipper (*Problema bulenta*)

The rare skipper inhabits brackish river marshes and abandoned rice paddies. Isolated populations range along the Atlantic Coast from southern New Jersey and Maryland south to coastal Georgia. The

rare skipper has two broods in May and July–September. Adults feed on the nectar from flowers of pickerelweed and swamp milkweed (Covell 2005). The Protected Species study area contains suitable foraging habitat for the rare skipper due to the presence of tidal salt marsh.

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was formerly protected under the ESA until June 2007, when it was determined to have recovered and was then delisted. It is, however, still federally protected under the Bald and Golden Eagle Protection Act⁶⁰ (BGEPA), which prohibits any form of taking of both bald and golden eagles except as provided by an incidental take permit. The BGEPA makes it illegal to possess or sell an eagle or any part of an eagle (e.g., feathers, talons, eggs, or nests) or any “taking” of an eagle that includes killing, harassing, disturbing, or poisoning. The bald eagle is the only species within the Protected Species study area that is protected under a federal act of this kind.

The bald eagle forages in open fresh, salt or brackish water bodies, including marshes and rivers. Prime habitats have shallow, slow moving water with abundant fish and bird prey. Large manmade reservoirs in South Carolina have provided many acres of new inland eagle foraging habitat, and concentrations of eagles may be found below hydroelectric dams where they forage on injured fish. Impounded marshes managed for waterfowl is also preferred foraging and nesting habitat for the bald eagle (SCDNR 2018c).

Potential suitable foraging habitat for the bald eagle occurs within and adjacent to the Protected Species study area along the tidal open waters of the Cooper River, Noisette Creek, and Shipyard Creek (see Table 3.6-4); however, the Protected Species study area does not contain any extensive areas of forest needed for nesting and perching near the river or creeks or any other open water areas near the Protected Species study area. According to the SCDNR databases (SCDNR 2017d, SCDNR 2017e), there are no documented bald eagle nest sites in the immediate vicinity of the Protected Species study area. The closest documented occurrence is located approximately 0.9 mile east of the Protected Species study area on Daniel Island north of the confluence of Clouter Creek and Beresford Creek (Figure 3.6-4).

Black rail (*Laterallus jamaicensis*)

Black rails breed from New York to Florida along the Atlantic Coast and in Florida and Texas along the Gulf Coast. Black rails spend the winter along the Atlantic Coast from New Jersey to Florida and along the Gulf Coast from Florida to Texas. Winter populations of the eastern United States may also winter in Cuba and the West Indies. Black rails occupy the upper zone of tidal salt marshes known as the high marsh. The high marsh is only inundated during extreme high tide events and dominated over most of the Atlantic Coast by plants such as salt meadow hay, saltgrass, and often interspersed with shrubs such as marsh elder or saltbush. The high marsh generally forms as isolated hummocks

⁶⁰ 16 U.S.C. 668–668c.

in elevated portions within the marshes or more frequently along the upland-marsh edge. The ecotone between the upland and marsh can sometimes include stunted pine trees and eastern red cedar. Additional features of black rail habitats can be the presence of salt pannes and patches of needlerush. Black rails feed primarily on small invertebrates and seeds found within wet areas. Nests are usually found on the ground (CCB 2018). The Protected Species study area contains potentially suitable habitat for the black rail due to the presence of salt marshes and shallow freshwater marshes.

Black-capped petrel (*Pterodroma hasitata*)

This crow-sized seabird nests only in the Caribbean and feeds as far away as Gulf Stream waters off the Mid-Atlantic United States. Black-capped petrels were first reported from South Carolina offshore waters in 1966 and from North Carolina offshore waters in 1972. Although this Caribbean species is generally considered rare off the Atlantic Coast of the United States, it is present off Cape Hatteras during all seasons of the year, being most numerous there during summer and fall. It is usually found along the western edge of the Gulf Stream. The black-capped petrel is rarely reported south of Cape Lookout, because the western edge of the Gulf Stream is generally 70 to 80 miles or more off southeastern South Carolina. As such, the Protected Species study area does not contain potentially suitable habitat for the black-capped petrel due to the distance from the western edge of the Gulf Stream (Potter et al. 2006).

MacGillivray's seaside sparrow (*Ammodramus maritimus macgillivraii*)

MacGillivray's seaside sparrow occupies a very narrow strip of salt and brackish marsh along the Outer Coastal Plain tidewater region. Its range consists of coastal wetlands north of St. Johns River in Duval and Nassau counties in Florida to northern North Carolina. This species has also been found nesting in coastal marshes as far inland as the town of Hanahan near Goose Creek, South Carolina. MacGillivray's seaside sparrow is a nonmigratory bird. Nesting occurs from spring through early summer with the time and length of the nesting period dependent on flooding; nesting activities decrease abruptly when marshes flood. MacGillivray's seaside sparrows spend the fall and winter in high-salinity marshes near coastal islands, but move inshore to freshwater or brackish marshes for the nesting season. The seaside sparrow is found exclusively in salt and brackish marshes consisting of cord grasses (*Spartina* spp.), true rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.). In order to avoid extreme tidal fluctuations, seaside sparrows move up the estuaries to nest. Significant populations occur in black needle-rush marshes at the Tom Yawkey Wildlife Center, Cape Romain National Wildlife Refuge, and other areas featuring extensive coastal marsh. MacGillivray's seaside sparrows are omnivorous but prefer tiny marsh crabs and crustaceans (SCDNR 2015b). The Protected Species study area contains potentially suitable habitat for the MacGillivray's seaside sparrow.

Boykin's lobelia (*Lobelia boykinii*)

Boykin's lobelia is a rhizomatous perennial herb that is scattered throughout the southern coastal plain, primarily from North Carolina south into the Florida panhandle, southern Alabama, and southern Mississippi. There are also disjunct occurrences within southern New Jersey and Sussex County, Delaware. Boykin's lobelia's habitats include cypress-gum depression ponds, wet pine savannas and flatwoods, and wet ditches. Boykin's lobelia grows to 3 feet in swamps and cypress ponds from the southern coastal plain of Delaware to Florida. The stem is hollow, 1.5 to 2.5 feet tall, with inconspicuous bract-like leaves. It produces blue to white flowers from May into August with flowering dependent on fluctuating water levels (NatureServe 2017a). The Protected Species study area does not contain suitable habitat for Boykin's lobelia due to the lack of critical plant community habitat.

Carolina bishopweed (*Ptilimnium ahlesii*)

Carolina bishopweed ranges from the outer coastal plain of southeastern North Carolina through South Carolina to eastern Georgia. This species can be found in herbaceous wetlands in tidal freshwater marshes throughout its range. Three occurrences of Carolina bishopweed are currently known. One occurrence is found in North Carolina in the Cape Fear River marshes, one in Georgia in the Savannah River, and one in South Carolina at the mouth of the Ashley-Cooper rivers near Charleston, South Carolina. The Carolina bishopweed is an erect, branched annual herb with leaves divided into filiform divisions, sometimes appearing undivided and quill-like towards the base of the plant due to loss of leaflets. This species contains fruits, flowers early (May to early June), and contains few mid-stem leaf segments (15-30). Threats to Carolina bishopweed include invasion by Phragmites, dredge spoil deposition, pollution from nearby industries, and saltwater intrusion from river dredging and sea level rise. The Protected Species study area does not contain suitable habitat for Carolina bishopweed due to the lack of freshwater tidal marsh (NatureServe 2017b).

Ciliate-leaf tickseed (*Coreopsis integrifolia*)

Ciliate-leaf tickseed ranges from the coastal plain of Florida, Georgia, and South Carolina. Habitat for the ciliate-leaf tickseed includes streambanks and floodplains of blackwater streams. Ciliate-leaf tickseed is a perennial herb, sometimes forming large colonies. Stems grow 16-28 inches tall, can be hairy or smooth, and contain few branches in which each branch is topped by a flower head. Ciliate-leaf tickseed reproduces vegetatively — by sprouting from rhizomes, or sexually — by attracting bees and other pollinators to its brightly colored flower heads (GADNR 2017). The Protected Species study area does not contain suitable habitat for ciliate-leaf tickseed due to the lack of backwater streams.

Godfrey's wild privet (*Forestiera godfreyi*)

Godfrey's wild privet occurs in northern Florida, Georgia, and South Carolina. Habitat for this species includes coastal maritime forests over shell mounds on barrier islands. It can also be found in upland

hardwood forests with limestone at or near the surface, often on slopes above lakes and rivers. Godfrey's wild privet is a deciduous shrub or small tree 8-16 feet tall, with main stems arching and leaning. Flowering occurs in late January to late February, fruits are present through May (GADNR 2008). The Protected Species study area does not contain suitable habitat for Godfrey's wild privet due to the lack of shell mounds and limestone at or near the surface.

3.6.4 State-Protected Species

SCDNR lists 14 species as occurring in Charleston County that are state endangered or threatened (SCDNR 2017b), as shown in Table 3.6-5. Descriptions for species not previously described in Sections 3.6.2 or 3.6.3 follow in subsequent paragraphs.

While several state endangered or threatened species have been recorded by the SCDNR Heritage Trust Database as occurring in Charleston County, seven species from Table 3.6-5 are known to occur or have suitable foraging and nesting habitat within the Protected Species study area: loggerhead sea turtle, spotted turtle, shortnose sturgeon, broad-striped dwarf siren, bald eagle, least tern, and Wilson's plover. Potential habitat for state-listed species within the Protected Species study area is documented in Table 3.6-6.

Dwarf siren (*Pseudobranchus striatus*)

The dwarf siren is an eel-like salamander that lacks hind limbs and has external gills. It is found throughout Florida and the coastal plain of southern Georgia and South Carolina. Currently, the dwarf siren only occurs in Jasper, Hampton, Orangeburg, and Charleston counties in South Carolina. Extensive surveys for this species have not been conducted throughout its general range. The dwarf siren is a totally aquatic species that retains larval characteristics into adulthood. The dwarf siren has been documented from small coastal plain streams that exhibit little or no flow and have muck bottoms. Such streams are typically too small to have established populations of predatory fish. This species is often associated with water hyacinth and found in shallow, weedy waters of ponds, swamps, and ditches (SREL 2018c). The Protected Species study area does not contain suitable habitat for the dwarf siren due to the lack of headwater coastal plain streams or weedy ditches that connect to abundant freshwater resources.

Table 3.6-5
State-Protected Species Potentially Occurring in Charleston County, South Carolina.

Species Common Name	Species Scientific Name	State Status ¹	Federal Status ²
Reptiles			
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	Threatened
Spotted turtle	<i>Clemmys guttata</i>	Threatened	ARS
Fish			
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Endangered
Amphibians			
Frosted Flatwoods salamander	<i>Ambystoma cingulatum</i>	Endangered	Threatened
Gopher frog	<i>Rano capito</i>	Endangered	–
Dwarf siren	<i>Pseudobranchius striatus</i>	Threatened	–
Birds			
American swallow-tailed kite	<i>Elanoides forticatus</i>	Endangered	Species of Concern
Bachman’s warbler	<i>Vermivora bachmanii</i>	Endangered	Endangered
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Protected
Least tern	<i>Sterna antillarum</i>	Threatened	–
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	Endangered
Wilson’s plover	<i>Charadrius wilsonia</i>	Threatened	–
Wood stork	<i>Mycteria americana</i>	Endangered	Threatened
Mammals			
Rafinesque’s big-eared bat	<i>Corynorhinus rafinesquii</i>	Endangered	ARS

Source: SCDNR 2017b.

¹*Endangered* refers to “any species or subspecies of wildlife whose prospects of survival or recruitment within the state are in jeopardy or are likely within the foreseeable future to become so.”

Threatened refers to “a species that is likely to become endangered and in need of management.”

² *Endangered* refers to a taxon “in danger of extinction throughout all or a significant portion of its range.” *Threatened* refers to a taxon “likely to become endangered within the foreseeable future throughout all or a significant portion of its range.”

At-Risk Species (ARS) refers to species that the U.S. Fish and Wildlife Service has been petitioned to list and for which a positive 90-day finding has been issued (listing may be warranted); information is provided only for conservation actions as no federal protections currently exist.

Table 3.6-6
Potential Habitat for State-Listed Species Within the Study Area

Species Common Name	Species Scientific Name	State Status	Potential Habitat Within the Study Area
Reptiles			
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	Yes
Spotted turtle	<i>Clemmys guttata</i>	Threatened	Marginal
Fish			
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Yes
Amphibians			
Flatwoods salamander	<i>Ambystoma cingulatum</i>	Endangered	No
Gopher frog	<i>Rana capito</i>	Endangered	No
Dwarf siren	<i>Pseudobranchius striatus</i>	Threatened	No
Birds			
American swallow-tailed kite	<i>Elanoides forficatus</i>	Endangered	No
Bachman's warbler	<i>Vermivora bachmanii</i>	Endangered	No
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Yes
Least tern	<i>Sterna antillarum</i>	Threatened	Yes
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	No
Wilson's plover	<i>Charadrius wilsonia</i>	Threatened	Yes
Wood stork	<i>Mycteria americana</i>	Endangered	Yes
Mammals			
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	Endangered	Yes

Source: SCDNR 2017b and Atkins 2016.

American swallow-tailed kite (*Elanoides forficatus*)

In North America, the swallow-tailed kite breeds at a few scattered locations in the southeastern coastal plain, from East Texas to South Carolina. The swallow-tailed kite occupies a fraction of its breeding range of 7, possibly 8, southern states that historically included at least 21 states as far north as Minnesota. The greatest densities of these birds occur in Florida — an estimated 60 to 65 percent of the U.S. population. The American swallow-tailed kite can be found in floodplain forests and large tracts of forested wetlands/mixed pine forested communities of the southeastern United States. In North America, nesting kites show a strong preference for forest stands dominated or co-dominated by loblolly pine within or on the edges of wetlands. However, kites are known to regularly occupy bald cypress when pines are not available. River bottom, floodplain forests of the outer

coastal plain, such as those found in the Great Pee Dee, Santee, Edisto, and Savannah rivers as well as the Francis Marion National Forest, represent the most significant habitat in South Carolina. Most of the population migrates and winters in southern Brazil. Due to declining populations, the swallow-tailed kite is listed as endangered by the state of South Carolina and is considered a highest priority species of concern by Partners in Flight (SCDNR 2005). This species is known to nest within the Francis Marion National Forest, outside of the Protected Species study area. Thus, the Protected Species study area does not contain suitable roosting and foraging habitat for the American swallow-tailed kite due to the absence of large trees and lack of diverse wetland habitats.

Least tern (*Sterna antillarum*)

The least tern is the smallest of the North American terns and is currently listed as threatened in South Carolina. The least tern's breeding range includes coastal areas in California and along the eastern seaboard from Maine to Florida, as well as the Mississippi River area. Least terns tend to construct their nests on beaches and low-lying sandbars that are sometimes flooded by very high tides and contain abundant shells and pebbles, with sparse vegetation. Due to habitat loss, least terns and other species with similar nesting requirements, like the black skimmer, are known to nest on graveled rooftops in coastal areas where appropriate natural nesting habitat is not available.

The Protected Species study area contains suitable habitat for the least tern due to the presence of graveled rooftops. Three least tern nesting sites have been previously recorded within the Project site as of 1994 (SCDNR 2014c); however, nest surveys in 2014 showed no active nests within the Protected Species study area.

Wilson's plover (*Charadrius wilsonia*)

The Wilson's plover breeds on the Atlantic Coast from Virginia to Florida and on the Gulf Coast from Florida to Texas. It also occurs in coastal areas of the Caribbean Islands, Mexico, eastern and western Central America, and South America. During winter, most birds are found along the Atlantic Coast and Gulf Coast from Florida to Brazil, and along the Pacific Coast from the Gulf of California to Peru. The Wilson's plover is seldom found away from saltwater environments, where it forages for marine invertebrates, nests and roosts in small groups, and defends its territory with ground and aerial chases. Wilson's plovers are typically found on beaches and tidal mudflats, as well as in sparsely vegetated coastal areas, along dry sandy beaches, sandbars, salt flats, lagoons and barrier islands with some limited occupancy and nesting on dredge spoil islands. Nesting birds face disturbance from both natural predators and recreation on heavily populated beaches (GADNR 2010). The Protected Species study area contains suitable foraging habitat for the Wilson's plover due to presence of mud flats.

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)

Rafinesque's big-eared bats inhabit the southeastern United States, west to Louisiana, and north to Kentucky and North Carolina. Although widespread in the southeastern United States, Rafinesque's big-eared bat is not abundant, and populations appear to have declined in the past century. In South Carolina, they are permanent residents of the coastal plain and hibernate rather than move south during the winter months. The breeding season for this species extends from late fall to early winter. During this time, both males and females occupy the same roost. For the remainder of the winter and on to early spring, the bats hibernate. In some portions of their range, hibernating bats are found in caves, wells, and other similar habitats. Males are solitary or gather in small groups during summer months, whereas females congregate in maternity colonies of up to 100 individuals. In May to June, females give birth to one hairless young, which can fly at three weeks of age and attains adult size by August or early September.

The bat's range in the southeast most closely approximates the historical range of great cypress swamps, indicating that they may have formed a traditional reliance on these areas as roosting and/or foraging sites. Rafinesque's big-eared bat seem to prefer to roost in tall, live trees with large diameters that are often situated in areas with higher densities of potential tree roosts and surrounded by closed canopies (Trousdale 2011). It has been suggested that the species began using manmade structures in the coastal plain region only after large old hollow trees became scarce. The Protected Species study area contains one historic element occurrence of this species from August 1933 (SCDNR 2017e). The Protected Species study area contains vacant buildings and bridges that could support bat colonies. However, this species is very intolerant of disturbance (natural or human) and may abandon roost or hibernation sites if disturbed (Harvey 1992, as cited in Arroyo-Cabrales and Álvarez-Castañeda 2008). The Protected Species study area may contain potential roosting sites; however, it is unlikely that Rafinesque's big-eared bats would be present due to the disturbance history in the area and the lack of natural habitat such as hollowed-out trees.

3.6.5 State Rare Species

South Carolina DNR lists 88 species as occurring in Charleston County (October 11, 2017) that are state-listed rare species (excluding federally and state-listed threatened and endangered species) (SCDNR 2017b), as shown in Table 3.6-7. Two of these species, sweet pinesap and winter grape-fern, were previously found (Historical) near the Protected Species study area. Descriptions for these species follow Table 3.6-7.

Table 3.6-7
Protected Rare Species in Charleston County, South Carolina, and their Habitats

Common Name	Scientific Name	State Rank ¹	Habitat
Reptiles			
Island glass lizard	<i>Ophisaurus compressus</i>	S1S2	Sandy coastal areas and islands; pine flatwoods
Eastern coral snake	<i>Micrurus fulvius</i>	S2	Longleaf pine forest
Black swamp snake	<i>Seminatrix pygaea</i>	SNR	Wetlands
S. hognose snake	<i>Heterodon simus</i>	SNR	Open sandy woods, fields, floodplains, longleaf pine forest
Timber rattlesnake	<i>Crotalus horridus</i>	SNR	Forest
Marine Mammals			
Harbor seal	<i>Phoca vitulina</i>	SNA	Coastal waters
Mammals			
Southeastern bat	<i>Myotis austroriparius</i>	S1	Caves and hollow trees near water
Star-nosed mole	<i>Condylura cristata</i>	S3?	Moist meadows, woods, swamps
Black bear	<i>Ursus americanus</i>	S3?	Forests
Eastern woodrat	<i>Neotoma floridana</i>	S3S4	Woodlands
Eastern fox squirrel	<i>Sciurus niger</i>	S4	Longleaf pine and bottomlands
Meadow vole	<i>Microtus pennsylvanicus</i>	SNR	Fields, grassy marshes
Hoary bat	<i>Lasiurus cinereus</i>	SNR	Forest with dead hollow trees
Amphibians			
Eastern tiger salamander	<i>Ambystoma tigrinum tigrinum</i>	S2S3	Pine woodlands
Northern cricket frog	<i>Acris crepitans</i>	S5	Wetlands and small streams
Birds			
Brown pelican	<i>Pelecanus occidentalis</i>	S1S2	Coastal areas
Bachman's sparrow	<i>Aimophila aestivalis</i>	S3	Open pine or oak woods, brushy areas
Cooper's hawk	<i>Accipiter cooperii</i>	S3?	Woods with water nearby
Barn-owl	<i>Tyto alba</i>	S4	Fields, fresh and saltwater marshes
Black-throated green warbler	<i>Dendroica virens</i>	S4	Non-alluvial forested wetlands
Mississippi kite	<i>Ictinia mississippiensis</i>	S4	Mature bottomland forests
Swainson's warbler	<i>Limnothlypis swainsonii</i>	S4	Forest with dense understory
Glossy ibis	<i>Plegadis falcinellus</i>	SHB, SNRN	Freshwater marshes, salt marshes, flooded fields
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	SNR	Forest
Plants			

Common Name	Scientific Name	State Rank ¹	Habitat
Flax leaf false-foxglove	<i>Agalinis linifolia</i>	SNR	Moist to wet prairies, savannas, wet pinelands, upper edges or marshes
Incised groovebur	<i>Agrimonia incisa</i>	S2	Sandy, dry-mesic upland of CP
Blue maiden-cane	<i>Amphicarpum muehlenbergianum</i>	S2S3	Wetlands and floodplains of streams and rivers
Purple silkyscale	<i>Anthaenantia rufa</i>	S2	Wet pine flatwoods, wet pine savannas, adjacent roadsides
Savannah milkweed	<i>Asclepias pedicellata</i>	S2	Pine flatwoods and prairie
Winter grape-fern	<i>Botrychium lunarioides</i>	S1	Altered habitats
Bearded grass-pink	<i>Calopogon barbatus</i>	S2	Open pinelands, wet prairies, wet roadsides and ditches
Bandana-of-the-everglades	<i>Canna flaccida</i>	S2	Swamps and marshes
Cypress-knee sedge	<i>Carex decomposita</i>	S2	Sinkhole ponds, forested wetlands and swamps
Elliott's sedge	<i>Carex elliotii</i>	S1	Depressions in wet pine savannas, borrow pits, ditches
Shiny spikegrass	<i>Chasmanthium nitidum</i>	S1	Stream and river banks, wet woodlands, wet hammocks
Southeastern tickseed	<i>Coreopsis gladiata</i>	SNR	Moist to wet, open pinelands
Ciliate-leaf tickseed	<i>Coreopsis integrifolia</i>	S1	Streambank and floodplains or blackwater streams
Stiff dogwood	<i>Cornus racemosa</i>	S1?	Open woodlands, savannas, and prairies
Piedmont flatsedge	<i>Cyperus tetragonus</i>	S2	Open woods, thickets, barrier islands
Three-angle spikerush	<i>Eleocharis tricostata</i>	S2?	Flatwood, pine barrens, cypress gum swamps, shores, marshes
Viviparous spike-rush	<i>Eleocharis vivipara</i>	S1	Ditches, pond margins, near pine-flatwoods
Ravenel's eryngo	<i>Eryngium aquaticum</i> var. <i>ravenelii</i>	S1	Pine savannas
Florida thorough-wort	<i>Eupatorium anomalum</i>	S1?	Moist savannas
Hollow Joe-pye weed	<i>Eupatorium fistulosum</i>	SNR	Wooded slopes of lakes and river bluffs, high hammocks with limestone
Godfrey's privet	<i>Forestiera godfreyi</i>	S1	Wooded slopes of lakes and river bluffs, high hammocks with limestone
Elliott's milkpea	<i>Galactia elliotii</i>	S1	Dry flatwoods and hammocks
Southeastern sneezeweed	<i>Helenium pinnatifidum</i>	S2	Pine savannas and adjacent ditches
Carolina St. John's-wort	<i>Hypericum nitidum</i>	S1	Flatwoods, pond margins, stream banks
Large-stem morning-glory	<i>Ipomoea macrorhiza</i>	S1	Disturbed land

Common Name	Scientific Name	State Rank ¹	Habitat
Beach morning-glory	<i>Ipomoea stolonifera</i>	SNR	Beaches and sand dunes
Walter's iris	<i>Iris hexagona</i>	S1	Swamps, ditches, marshes and wet prairies
Southern lepuropetalon	<i>Lepuropetalon spathulatum</i>	S2	Sandy soil at sinks and on wet soil
Carolina lilaeopsis	<i>Lilaeopsis carolinensis</i>	S2	Marsh, seep stream, tidal marsh, ditches and muddy shores
Southern twayblade	<i>Listera australis</i>	S2	Moist woods, marshes and bogs
Pondspice	<i>Litsea aestivalis</i>	S3	Margins of swamps, limestone sinks, bay heads, small ponds
Boykin's lobelia	<i>Lobelia boykinii</i>	S3	Depressions, wet pine savannas and flatwoods
Lance-leaf seedbox	<i>Ludwigia lanceolata</i>	S1	Swamps and brackish marshes
Lance-leaf loosestrife	<i>Lysimachia hybrida</i>	S1	Marshes, swamps, wet meadows and stream banks
Sweet pinesap	<i>Monotropis odorata</i>	S2	Moist shaded hardwood forest
Bentgrass	<i>Muhlenbergia filipes</i>	S3S4	Sand dunes, freshwater and brackish marshes
One-flowered broomrape	<i>Orobanche uniflora</i>	S2	Upland woodlands and
Bead-grass	<i>Paspalum bifidum</i>	S2	Dry, open pine-oak forests
Spoon-flower	<i>Peltandra sagittifolia</i>	S2	Bogs and pocosins
Slender-leaved dragon-head	<i>Physostegia leptophylla</i>	SNR	Wooded river swamps, fresh and brackish marshes, edges of streams and rivers
Climbing fetter-bush	<i>Pieris phillyreifolia</i>	S1	Ponds and depressions in flatwoods
Pineland plantain	<i>Plantago sparsiflora</i>	S2	Pine savannas, roadsides
Yellow fringeless orchid	<i>Platanthera integra</i>	S1	Wet pine savannas
Whisk fern	<i>Psilotum nudum</i>	S1	Rock crevices, trees, on ground
Crestless plume orchid	<i>Pteroglossaspis ecristata</i>	S2	Coastal plain habitats
Bluff oak	<i>Quercus austrina</i>	S1	River bottoms, wet forest, flatwoods
Awnead meadowbeauty	<i>Rhexia aristosa</i>	S3	Carolina bays, vernal ponds, wet pinelands, bog, savannas
Short-bristle baldrush	<i>Rhynchospora breviseta</i>	S1	Wet sands, bogs, depressions in savannas, open pinelands
Horned beakrush	<i>Rhynchospora careyana</i>	S3	Shallow edges of ponds, ditches, marshes, swamps, streams and flatwoods depressions
Beakrush	<i>Rhynchospora globularis</i> var. <i>pinetorum</i>	S1	Wet pine savannas
Harper beakrush	<i>Rhynchospora harperi</i>	S1	Bogs, steam banks, edges of pineland savanna ponds

Common Name	Scientific Name	State Rank ¹	Habitat
Drowned hornedrush	<i>Rhynchospora inundata</i>	S2?	Peaty-mucky shores, bottoms of small ponds
Tracy beakrush	<i>Rhynchospora tracyi</i>	S3	Cypress domes, marshes and swales, ditches and ponds
Tiny-leaved buckthorn	<i>Sageretia minutiflora</i>	S3	Shell heaps, limestone outcrops, calcareous sands
Sweet pitcher-plant	<i>Sarracenia rubra</i>	S3S4	Marshlands, bogs and wet forest
Baldwin nutrush	<i>Scleria baldwinii</i>	S2	Wet pine savannas and pinelands
Lace-lip ladies'-tresses	<i>Spiranthes laciniata</i>	S1S2	Pine savannas, swamps, marshes, wet meadows, ditches, wet fields
Carolina fluff grass	<i>Tridens carolinianus</i>	S1	Sandy fields and woods
Chapman's redtop	<i>Tridens chapmanii</i>	S1	Sandy fields and woods
Nodding pogonia	<i>Triphora trianthophora</i>	S2	Mixed deciduous forest
Short-leaved yellow-eyed grass	<i>Xyris brevifolia</i>	S1	Wet pine savannas and cleared areas
Florida yellow-eyed grass	<i>Xyris difformis</i> var. <i>floridana</i>	S2	Wet pine flatwoods, sandy peat bogs, pine savannas, shores
Elliott yellow-eyed grass	<i>Xyris elliotii</i>	S2	Sandy flatwoods, sandy shores, swales in pinelands, bog edges, coastal plain
Pineland yellow-eyed grass	<i>Xyris stricta</i>	S1	Depression ponds, wet meadows, ditches, pine savannas, clearings

Source: SCDNR 2017b.

¹SH refers to *Possibly Extirpated* (Historical) – Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered.

S1 refers to *Critically Imperiled* – Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 refers to *Imperiled* – Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factor(s) making it very vulnerable to extirpation from the nation or state/province.

S3 refers to *Vulnerable* – Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 refers to *Apparently Secure* – Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 refers to *Secure* – Common, widespread, and abundant in the nation or state/province.

SNR refers to *Unranked* – Nation or state/province conservation status not yet assessed.

B refers to *Breeding* – Conservation status refers to the breeding population of the species in the nation or state/province.

N refers to *Nonbreeding* – Conservation status refers to the non-breeding population of the species in the nation or state/province.

? refers to *Inexact* or *Uncertain* – Denotes inexact or uncertain numeric rank.

Sweet pinesap (*Monotropis odorata*)

Sweet pinesap is a monotypic endemic plant species centered in the Appalachian Mountains. The species is found more frequently in North Carolina and Virginia and becomes rare as it reaches the limits of its range, which is from Maryland and West Virginia south to Alabama, Georgia, and possibly Florida. The species has a limited distribution and is rare throughout its range. Habitat destruction is a threat to this species' survival. Sweet pinesap inhabits pine-dominated or mixed-pine hardwood or chestnut oak-dominated forests with dry, acidic soil, often with mountain laurel, rhododendron, and blueberry. The Protected Species study area contains one historic element occurrence of this species, which occurred in 1880 (SCDNR 2017e); however, currently, the Protected Species study area does not contain suitable habitat for sweet pinesap due to the lack of required forest vegetation.

Winter grape-fern (*Botrychium lunarioides*)

Winter grape-fern occurs throughout the southeast from Arkansas to North Carolina. The winter grape fern is an unusual plant that begins growing in the fall, grows throughout the winter, and then dies in the spring. Habitat includes open grassy places in old fields, pastures, cemeteries, and weedy roadsides. Because of its small size and limited distribution, relatively little is known about its life cycle and natural history. The Protected Species study area contains one historic element occurrence of this species, which occurred in 1850 (SCDNR 2017e). Currently, the Protected Species study area contains potentially suitable habitat for winter grape-fern due to the presence of open grassy fields and weedy roadside ditches.

3.6.6 Underwater Noise

Fish are thought to use sound in a number of ways that are important to their survival. For example, sound can be used by fish to understand their surrounding environment, detect predators and prey, orient themselves during migration, and for acoustic communication (USFWS 2015). Potential direct effects could result from elevated underwater noise from Proposed Project construction activities (e.g., pile driving) resulting in instantaneous death, latent death soon after exposure, or death several days later. Indirect effects could potentially make fish susceptible to predation, disease, starvation, or affect an individual's ability to complete its life cycle (as described further in Section 4.6). Behavioral changes resulting from underwater noise could cause fish to alter their movement and foraging patterns. If foraging shifts from food-rich to food-poor habitat patches or energy expenditures for foraging increase, overall fitness of the fish may decline (USFWS 2015).

Underwater noise associated with Proposed Project construction activities may occur from pile installation. Underwater pile driving activities have the potential to produce high intensity sound pressure underwater, which could cause direct impacts to fish (Caltrans 2015; Hastings and Popper, 2005; Popper and Hastings, 2009). High pressure waves from underwater noise can pass through fish, causing the swim bladder to be rapidly squeezed and then rapidly expanded as the sound wave

passes through the fish. Other impacts may include the rupture of capillaries in internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2015).

When a pile driving hammer strikes a pile, a pulse is generated that moves through the pile and radiates sound into the water, the ground, and the air. Sound pressure pulse as a function of time is classified as the waveform. These sounds are described by the peak pressure, the root-mean-square pressure (RMS), and the sound exposure level (SEL). The Fisheries Hydroacoustic Working Group (FHWG), a multi-agency work group, developed criteria for the acoustic levels at which various physiological effects to fish could be expected (FHWG 2008). The criteria were developed primarily for species on the west coast of the United States; however, the NMFS and USFWS have relied on these criteria for assessing projects on the east coast and the Gulf of Mexico for sound effects analysis (USFWS 2015b). The FHWG determined that peak sound pressure waves should be within a single strike threshold of 206 decibel (dB), and the cumulative sound exposure level (cSEL) associated with a series of pile strike events should be less than 187 dB cSEL for protected fish species that are larger than 2 grams, and less than 183 dB cSEL for protected fish species that are smaller than 2 grams (FHWG 2008).

3.7 ESSENTIAL FISH HABITAT

Congress enacted amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA [PL 94-265]) in 1996 that established procedures for identifying EFH and required interagency coordination to further the conservation of federally managed fisheries. Rules published by NMFS (50 C.F.R. Sections 600.805–600.930) specify that any federal agency that authorizes, funds, or undertakes, or proposes to authorize, fund, or undertake, an activity that could adversely affect EFH is subject to the consultation provisions of the MSFCMA and identifies consultation requirements. The NMFS provided initial comments to the Corps in a letter dated April 23, 2014, which identified the study area for the Proposed Project as EFH for brown and white shrimp. This EIS serves to further consultation with NMFS.

EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The definition for EFH may include habitat for an individual species or a group of species, whichever is appropriate within each Fisheries Management Plan (FMP). EFH is separated into estuarine and marine components. The estuarine component is defined as “all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities); sub-tidal vegetation (seagrasses and algae); and adjacent intertidal vegetation (marshes and mangroves).” The marine component is defined as “all marine waters and substrates (mud, sand, shell, rock, and associated biological communities) from the shoreline to the seaward limit of the Exclusive Economic Zone” (GMFMC 2004).