



Appendix F: Natural Resource Survey Results



TECHNICAL MEMORANDUM: NATURAL RESOURCES SURVEY RESULTS

Prepared for:



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1.0 PROJECT DESCRIPTION

Three Oaks Engineering, Inc. (Three Oaks) performed wetland and stream delineations, as well as habitat surveys targeting federally protected species in Charleston and Berkeley Counties for the I-526 Lowcountry Corridor EAST (I-526 LCC EAST) project. Three Oaks performed this work on behalf of the South Carolina Department of Transportation (SCDOT) as a sub-contractor to CDM Smith. This memo presents the findings of habitat and species surveys conducted from August 13, 2018 to September 27, 2019.

The surveys were conducted throughout the approximately 1183-acre study area, which is 600 feet wide along the main corridor. The study area has varying widths around existing interchanges, connecting routes, and existing frontage roads. The study area extends from the west side of the Cooper River near Virginia Ave. to the terminus of I-526 in Mt. Pleasant for the I-526 LCC EAST (Appendix A).

2.0 HABITAT SURVEY METHODS

A study area was developed to provide a review of the existing I-526 EAST and existing interchanges from Virginia Ave. to the terminus of I-526 in Mt. Pleasant. A GIS based review of the corridor was conducted prior to field surveys. The GIS review consisted of compiling digital elevation models for Charleston and Berkeley Counties (SCDNR 2015), 2016 National Land Cover Data (Yang et al. 2018), and National Wetland Inventory features (USFWS 2019) to create a composite map of natural resources spatial data within the study area. This composite map was used to estimate the possible type and approximate location of various habitats prior to field verification surveys. Habitat types were confirmed or corrected during field surveys. Figures depicting the different recorded habitat types are in Appendix B.

The study area was physically investigated for the presence of wetlands, streams, and other potential Waters of the US between August 2018 and September 2019. All wetlands were delineated using the methods outlined by the US Army Corps of Engineers (USACE) Atlantic and Gulf Coastal Plain Regional Supplement to determine jurisdictional boundaries (USACE 2010). Wetland habitat types were classified using the Cowardin naming convention (USFWS 1979). Other habitat types were classified using the National Land Cover Data Legend (Yang et al. 2018), aerial imagery, and investigator survey notes.

Each federally protected species, hereinafter referred to as “species,” was researched by the investigators to determine their respective suitable habitat requirements. Suitable habitats are those habitats which meet the minimum needs of each species. Species utilization of the I-526 EAST corridor was analyzed by comparing current conditions to the suitable habitat requirements needed by each species. Suitable habitats for species were physically investigated over multiple field visits from August 2018 through September 2019. Species presence or evidence was recorded as observed. Anecdotal records from credible sources (Personal communications Archambault and West Rock staff) were also noted. The species location records were compiled with potential habitat areas to create a map to depict locations that have potential to be used by a federally protected species (Appendix C).

The areas of Essential Fish Habitat (EFH) were approximated using wetland delineations to determine the estuarine boundary and the most recent publicly available aerial imagery to determine habitat types (Appendix E). Additionally, maps of aquatic species that utilize these habitat types were generated using the NOAA-NMFS EFH mapper for the Habitat Areas of Particular Concern (HAPC), Atlantic Highly Migratory Species (HMS), and the South Atlantic EFH species (NOAA 2018).

3.0 RESULTS OF HABITAT SURVEYS

The descriptions for each habitat type below are specific to the conditions found within the I-526 EAST corridor between August 2018 and September 2019:

3.1 BRACKISH/SALINE HABITATS

Salt marsh habitats (Estuarine emergent wetlands [USFWS 1979]) are a single-species community of saltmarsh cordgrass (*Spartina alterniflora*) in the low marsh within the project area. The high marsh consists of black needle rush (*Juncus roemerianus*), glasswort (*Salicornia spp.*), salt grass (*Distichlis spp.*), and big cordgrass (*Spartina cynosuroides*). These emergent wetlands often have moderately salt-tolerant woody species above the tidal zone such as marsh elder (*Iva spp.*), groundsel bush (*Baccharis spp.*), Southern red cedar (*Juniperus virginiana*), and cabbage palms (*Sabal palmetto*). Intertidal zones may have exposed mud or sand at low tide.

Rivers and large tidal creek habitats (Estuarine sub-tidal unconsolidated bottom [USFWS 1979]) consist of the Cooper River, Wando River, and Clouter Creek. Mollusks such as Atlantic oysters, ribbed mussels, and barnacles grow on hard surfaces in the estuarine inter-tidal zone. Oyster beds typically form in the shallow sub-tidal areas, often growing on top of each other. Patches of sea lettuce and sea grass also grow in the shallow sub-tidal areas. Estuarine fishes, mammals, and sea turtles utilize these saline waters.

Maritime forests border brackish or saline areas above the high tide line. Plants in this habitat are tolerant of some saline soil and salt spray. These plants include live oak (*Quercus virginiana*), yaupon holly (*Ilex vomitoria*), palmettos (*Sabal spp.*), southern red cedar (*Juniperus virginiana*), Spanish moss (*Tillandsia usneoides*), and occasionally loblolly pine (*Pinus taeda*).

3.2 FRESHWATER HABITATS

Freshwater marshes (Palustrine emergent wetlands [USFWS 1979]) include non-woody species such as cattail (*Typha spp.*), lizard's tail (*Saururus cernuus*), spikerush (*Eleocharis palustris*), soft stem rush (*Schoenoplectus tabernaemontani*), and various sedges. They are often bordered by woody shrubs such as buttonbush (*Cephalanthus occidentalis*) and Carolina willow (*Salix caroliniana*). Freshwater emergent wetlands are semi-permanently to permanently flooded, may be tidally influenced, and salt encroachment areas are possible.

Bottomland hardwood forest habitats (Palustrine forested wetlands [USFWS 1979]) are seasonally flooded freshwater forests. Plants within these habitats include a variety of water-tolerant broadleaf trees, loblolly pines, palmettos, shrubs, and sparse herbaceous cover. Areas with long-term flooding are often sparsely vegetated or non-vegetated. The soils and hydrological indicators are used in conjunction with plant species to delineate these areas. Forested freshwater wetlands are found at various elevations.

They are frequently found within other habitats, such as uplands, or along the edge of riverine or estuarine habitats.

Freshwater streams (Riverine lower perennial [USFWS 1979]) are low-flowing streams lined with sand and mud. They flow through the uplands and palustrine forested wetlands. They are typically non-vegetated or minimally vegetated. Streams increase in flow with increased precipitation. They often provide connection between wetlands and major waterbodies within the watershed.

Ponds (Palustrine aquatic beds [USFWS 1979]) typically have maintained banks and are surrounded by sod and landscaping. Bald cypress (*Taxodium distichum*) and Carolina willow are frequently surrounding the edge. Ponds with shallow zones have emergent plants such as pickerelweed (*Pontederia cordata*), Carolina water hyssop (*Bacopa caroliniana*), and cattail. Submerged and floating vegetation are common as well.

3.3 NON-WETLAND HABITATS

Shrub/scrub upland habitats range from open field to young, dense sapling stands. Herbaceous ground cover is a diverse mix of grasses and broad leaf herbs. Saplings are typically sweetgum (*Liquidambar styraciflu*), red maple (*Acer rubrum*), and loblolly pine. Invasive shrubs are also a typical group of plants found in this habitat, such as Chinese privets (*Ligustrum sinense*) and blackberries (*Rubus spp.*).

Oak/pine upland habitats (Upland mixed forest) are dominated by loblolly pines with a broadleaf hardwood understory. These areas tend to have drier, sandy soils. Within the corridor, upland mixed forests frequently border areas of development. These forests have not reached maturity or the late forest succession stage due to frequent disturbances.

Urban development includes residences, commercial buildings, and roadways. These areas typically have very little natural habitat. They are frequently maintained and landscaped. The acreage for this habitat type was determined by subtracting the “natural” habitats from the entire study area and is not depicted in the habitat classifications figure legends (Appendix B).

Table 3.1. Habitat types identified within the I-526 LCC EAST corridor based on Cowardin and National Land Cover Data classifications

Habitat Type	Area (acres)	Habitat Percentage within I-526 LCC EAST
Bottomland hardwood forest	56.9	4.8%
Freshwater marsh	5.4	0.5%
Freshwater stream	0.8	0.1%
Maritime forest	47.3	4.0%
Oak/pine upland forest	148.6	12.6%
Pond	12.4	1.0%
River / Tidal creek	70.6	6.0%
Salt marsh	219.4	18.5%
Shrub/scrub upland	17.6	1.5%
Urban development	604	51.1%

4.0 FEDERALLY PROTECTED SPECIES ANALYSIS

The United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Association (NOAA) - National Marine Fisheries Service (NMFS) are responsible for the enforcement of federal wildlife laws, the protection of endangered species, and should be consulted before the proposed project begins. There are 25 federally protected species listed in Berkeley and Charleston Counties (Appendix C; USFWS 2019). Field reviews and observations determined that 12 species have suitable habitat present within the I-526 EAST LCC (Table 2).

Species habitat requirements were analyzed to determine if suitable habitat for each species was present within the corridor. The locations of the habitats that are likely to be utilized by a federally protected species and occurrence records were identified and are depicted in Appendix C. Occurrences for the manatee, red-cockaded woodpecker cavities, foraging wood storks, and the bald eagle near the eastern terminus of I-526 EAST LCC were documented during field review. The green sea turtle and bald eagle nest along the Wando River locations are records from the South Carolina Department of Natural Resources (SCDNR). Detailed descriptions of all federally protected species for Berkeley and Charleston Counties can be found in Appendix D.

Table 4.1. Federally protected species with suitable habitat in I-526 LCC EAST, their protected status, and general habitat.

Common Name	Scientific Name	Protected Status	Habitat
Amphibian			
Frosted Flatwoods Salamander	<i>Ambystoma cingulatum</i>	Threatened; Critical Habitat	Breed in seasonally flooded wetlands in pine flatwoods
Bird			
Red knot*	<i>Calidris canutus rufa</i>	Endangered	Feed on sandy beaches and mudflats while migrating
Piping plover*	<i>Charadrius melodus</i>	Endangered; Critical Habitat	Feed on sandy beaches and mudflats during winter migration
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	Open understory, living, old growth pine forests
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Bald and Golden Eagle Protection Act	Nests in tall trees less than 0.5 miles from large waterbody, forages in large waterbodies

Eastern black rail*	<i>Laterallus jamaicensis ssp. jamaicensis</i>	Proposed to be listed (Threatened)	Shallow emergent wetlands
Wood stork	<i>Mycteria americana</i>	Threatened	Shallow water for foraging; freshwater wetlands for nesting
Fish			
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Endangered; Critical Habitat	Cooper River is Critical Habitat; spawn upriver
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Spawn in freshwater, live in coastal waters
Mammal			
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Summer maternity roosts in trees, overwinter in caves and mines
West Indian manatee	<i>Trichechus manatus</i>	Threatened	Feeds on aquatic vegetation in coastal waters, migrates to Florida for winter
Reptile			
Green sea turtle*	<i>Chelonia mydas</i>	Threatened	Nests on oceanfront beaches, forages in coastal rivers

*Listed in Charleston County; not listed in Berkeley County.

4.1 FEDERAL PROTECTED SPECIES AND POTENTIAL IMPACTS

4.1.1 Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – Federally Threatened; Critical Habitat

Frosted flatwoods salamander adults are black or dark grey with white or silver reticulations, spots, or stripes covering their bodies, and a white-speckled dark underside. They are 3.5-5.3 inches long as adults. The adults migrate to breeding ponds from October to November. Larvae hatch and grow in inundated fire-dependent pine flatwood forest ponds from January until May. Larvae are dark brown, darker on top gradually turning lighter to the underside with a tan to gold lateral stripe down their side (SREL: Flatwoods Salamander). Larvae can take up to 2 years to reach adulthood (NatureServe: Frosted Flatwoods Salamander).



"Frosted Flatwoods salamander".
<https://www.fws.gov/athens/endangered/teherps.html>

Potential impacts: Frosted flatwoods salamander minimally suitable habitat (seasonal wetlands within the stands of loblolly pines) can be found within the I-526 LCC EAST. However, there are no known records of Frosted flatwoods salamanders within the corridor. No designated critical habitat for the Frosted Flatwoods salamander exists within or near the I-526 LCC EAST.

4.1.2 Red knot (*Calidris canutus rufa*) – Federally Threatened

Red knots are a medium-sized shorebird that winter on the beaches and tidal flats of South Carolina. Their nonbreeding/wintering plumage is gray above and whitish underneath. Their black bill is stout with a tapered tip that is slightly longer than the head length. They have a “small head, small eyes, and short neck” with short legs and dark gray feet (USFWS 2014). During breeding season, much of the face, breast, and upper belly are reddish. They feed on invertebrates in sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (USFWS 2014).



“Red Knot.” Breese, Gregory.
https://www.fws.gov/refuge/Ten_Thousand_Islands/wildlife_and_habitat/birds/red_knot.html

4.1.3 Piping plover (*Charadrius melodus*) – Federally Threatened

Piping plovers are small (7-inch-long) shorebirds that feed on small invertebrates in sparsely vegetated sandy beaches and muddy tidal creek banks (USFWS 2003a). They breed and nest on beaches on the northern Atlantic Coast and the Great Lakes and winter along the South Atlantic, Gulf Coast, and Caribbean beaches and islands (USFWS 2003a). Spring migration occurs between February and April; fall migration occurs between July and September (USFWS 2003a). While the birds are generally sandy-gray with a white underside and rump, the breeding plumage adds a black breast band, a black brow band, orange legs, and an orange bill with a black tip (USFWS 2003a). Wintering birds have orange to yellow legs, the bill is solid black, and the black breast and brow bands disappear (USFWS 2003a).

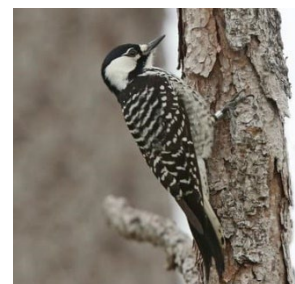


“Piping Plover.” US Fish and Wildlife.
<https://nhpbs.org/natureworks/pipingplover.htm>.

Potential impacts: Red knots and Piping plovers use mudflats and sandy beaches during winter migration along the coast of South Carolina. While beaches are not found within the I-526 LCC EAST, mudflats are present that could serve as foraging habitat, such as those found within the Naval Weapons Station spoil island in the Cooper River. No designated critical habitat for the Piping Plover exists within or near the I-526 LCC EAST (USFWS 2001).

4.1.4 Red-cockaded woodpecker (*Picoides borealis*) – Federally Endangered

Red-cockaded woodpeckers are small (7-inch-long) colonially nesting woodpeckers that are black with white horizontal stripes on the body, a large white cheek patch on the face, and a black cap and nape (USFWS 2003b). The males have a small patch of red feathers (the cockade) which can be found in the upper corner of the cheek patch but are only exposed when agitated (USFWS 2003b). They only nest in cavities of living, mature (at least 70-year-old) pine trees and prefer long-leaf pines (*Pinus palustris*) that have been maintained by a frequent (less than 5 year) fire regimen (USFWS 2003b). They nest colonially in clusters of 1-20 nests over 3-60 acres (USFWS 2003b). Maintained, in-use cavity trees are obvious due to sap drips around the cavity hole that turn white when



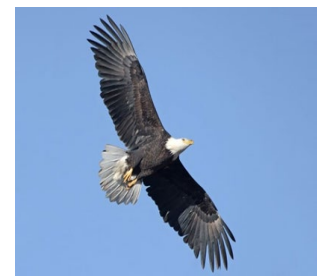
“Red-cockaded Woodpecker.”
www.allaboutbirds.org/guide/Red-cockaded_Woodpecker/id.

hardened (USFWS 2003b). They forage for insects in the bark of pine trees that are at least 30 years old and over 10 inches in diameter at breast height (USFWS 2003b).

Potential impacts: Red-cockaded woodpecker cavity “starts” were found near Clements Ferry Rd in living loblolly pine trees that are estimated to be over 70 years old (Appendix C). The understory growth is reduced by regular flooding and therefore minimally suitable. These sites were investigated multiple times during 2019 but did not seem to change in appearance over time, indicating these efforts were abandoned. No other pine stands within the I-526 LCC EAST were mature enough to support red-cockaded woodpecker foraging or nesting.

4.1.5 Bald Eagle (*Haliaeetus leucocephalus*) – Protected under the Bald and Golden Eagle Protection Act

Bald eagles are large raptors (6 foot wingspan) which are mottled brown and white until they reach maturity at 4-5 years old when they develop a brown body with a white head and tail (USFWS 2007). They primarily feed on fish, but also feed on waterfowl, and carrion; when prime food options are absent, they will also eat small terrestrial animals (USFWS 2007). They hunt by sight and are often seen soaring or perched high in a tree near water. The South Carolina Department of Natural Resources describes Bald eagle foraging habitats such as, “shallow, slow moving water with abundant fish and waterfowl” (SCDNR 2015). They nest in canopies of large trees usually within half of a mile from coastlines, rivers, and lakes (USFWS 2007). Nests are usually around 4-6 feet across and 3 feet deep. They typically return to the same areas each year and reuse the same nest (USFWS 2007). They can be found nesting and rearing young in South Carolina from November to March (SCDNR 2015). Eagle nest locations are required to have a buffer zone (660 feet) around nests (USFWS 2007).



“Bald Eagle.” Macaulay Library.
<https://ebird.org/species/baleag>.

Potential impacts: Bald eagle habitat for nesting and foraging is frequently encountered within the I-526 LCC EAST (Appendix C). Visual surveys of the tallest trees across all habitat types within the I-526 LCC EAST resulted in no bald eagle nest sightings during the survey period. Two eagle nests are present near the corridor. One is approximately 4000 feet upriver from the I-526 LCC EAST bridge over the Wando River. The other is approximately 2500 feet southeast of the easternmost I-526 LCC EAST terminus.

4.1.6 Eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*) – Proposed to be Threatened

Eastern black rails are 10-15 cm in total length, blackish-gray undersides, chestnut back with small white spots, pointed black bill, bright red eyes, and long dark gray legs and toes. According to the USFWS, “the birds occupy relatively high elevations along heavily vegetated wetland gradients, with soils that are moist or flooded to a shallow depth” and require a dense canopy and fine stemmed emergent plants to safely forage for small invertebrates and seeds. Coastal South Carolina was considered a historical stronghold for this subspecies. They nest from March to August in shallow water or moist soil for



“Eastern Black Rail.” Hand, Christy.
<https://www.birdwatchingdaily.com/news/conservation/feds-list-eastern-black-rail-threatened/>

its nesting sites. They are difficult to detect because of their preference to run or walk, rather than fly, through dense vegetation (USFWS 2019).

Potential impacts: Eastern black rails suitable dense wetland habitat is found within the I-526 LCC EAST (Appendix C). However, this species is difficult to detect without considerable effort.

4.1.7 Wood stork (*Mycteria americana*) – Federally Threatened

American wood storks are large wading birds standing about 45 inches tall with a large, decurved bill, a conspicuous unfeathered, dark gray head and neck and white plumage except on the black trailing edges of the wings. They soar on thermals with neck outstretched and a wingspan of 60-65 inches. Wood storks feed by moving the bill through shallow (6-10 inches deep) water slightly open until it touches a small fish when they snap the bill shut. They feed in both freshwater and estuarine waters including marshes, tidal creeks, and swamps especially during periods of falling water levels when the pools are more concentrated. They can be found nesting in South Carolina from mid-February until September building colonial nests primarily using cypress tree swamps (USFWS 1997).



"American wood stork." USFWS.

https://www.upi.com/Science_News/2014/06/27/The-Souths-wood-stork-to-be-taken-off-endangered-list/9631403907725/

Potential impacts: Wood storks nesting habitat was not found within the I-526 LCC EAST (Appendix C). Wood storks were observed foraging in wetland ponds and excavated ponds within the I-526 LCC EAST during surveys (Appendix C). The closest rookery is located approximately 5 miles away at Buzzard's Island Heritage preserve and was active in 1997 (SCDNR 2017).

4.1.8 Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) – Federally Endangered

Atlantic sturgeon are large (14 feet) fish with five rows of bony plates called scutes along the length of their body and have a blue-ish black to olive back with a pale belly, long snouts with 4 whisker-like barbels for detecting prey, and their tail fin is longer at the top than at the bottom. They are benthic foragers that suck food into their mouths from the bottom of the water column



"Atlantic Sturgeon." NOAA.

<https://www.fisheries.noaa.gov/species/atlantic-sturgeon>

at all stages of life. They spend much of their lives in the saltwater but spawn in flowing freshwater below the fall line of large freshwater rivers with a coastal estuary (NOAA: Atlantic Sturgeon webpage). Spawning sites must be well-oxygenated, between 13 and 26 degrees Celsius (C), more than 1.2 meters deep, and have rocky substrate. Juveniles grow in transitional salinity zones (salinities of 0.5-5 parts per thousand (ppt), 5-18 ppt, and 18-30 ppt) with soft substrate. Once the subadults enter marine waters (salinity greater than 30 ppt), they remain in oceanic and estuarine waters until spawning occurs. Adults mature between 5 and 19 years old. They spawn every 1-5 years. There are two cohorts within this species. One breeds in the spring; the other breeds in the fall (Atlantic Sturgeon Status Review Team 2007).

Potential impacts: Atlantic sturgeon has designated Critical Habitat in the Cooper River within the I-526 LCC EAST project area for this species (Appendix C).

4.1.9 Shortnose sturgeon (*Acipenser brevirostrum*) – Federally Endangered

Shortnose sturgeon are 4 feet long at maturity with rows of bony plates called scutes along the length of their body, a dark back with a pale belly, rounded snouts with 4 whisker-like barbels for detecting prey, and their tail fin is longer at the top than at the bottom. They feed on benthic insects, crustaceans, mollusks, and fish by crushing them with their mouth plates. Shortnose sturgeon spawn in freshwater and forage in mesohaline habitat (salinities of 5-18 ppt). They venture into the ocean to undergo coastal migrations but are otherwise typically estuarine. Males mature at 2-3 years and may spawn annually, while females mature by 6 years and spawn every 3-5 years. Spawning occurs in late winter, typically before Atlantic sturgeons, in water temperatures from 8 to 15 C and water velocities 25-130 centimeters per second (cm/s) on gravel substrate (NOAA 2015). They require similar foraging habitat and resources to the Atlantic sturgeon but can be found farther upriver (Shortnose Sturgeon Status Review Team 2010).



"Shortnose Sturgeon." NOAA Fisheries.
<https://www.fisheries.noaa.gov/species/shortnose-sturgeon>

Potential impacts: Shortnose sturgeon are likely to use the Cooper and Wando Rivers to migrate upriver to spawning grounds at the Pinopolis Dam tailrace (Ruddle 2018) (Appendix C).

4.1.10 Northern long-eared bat (*Myotis septentrionalis*) – Federally Threatened

The Northern long-eared bat has dark brown fur on their backs and lighter brown underneath, a body length of 3 to 3.7 inches long, and long ears with a pointed triangular tragus. In summer, they roost in a wide variety of dead trees, under bark, in caves, and will also roost in human structures. These bats forage for insects in a wide variety of forest types (USFWS 2015). They hibernate in caves, where white-nose syndrome (WNS) is prevalent. Since WNS is the primary cause of species decline, critical habitat is not protected under the ESA (USFWS 2016).



"Northern Long-Eared Bat." USFWS
<https://www.fws.gov/Midwest/endangered/mammals/nleb>

Potential impacts: No Northern long-eared bat maternity roosts or hibernation sites were known to exist within the I-526 corridor during the time of the surveys. Since northern long-eared bats roost in snags and pines, there is a considerable amount of summer roosting habitat available. There are no known wintering habitats nearby (SCDNR 2019).

4.1.11 West Indian manatee (*Trichechus manatus*) – Federally Threatened

West Indian manatees are greyish marine mammals with bulbous bodies and no dorsal fin. They reach lengths over 14 feet long. They reside in shallow marine, brackish, and freshwater systems eating vegetation (USFWS 2001). They cannot live in temperatures under 68 degrees Fahrenheit (F), so their range expands and contracts from warmer to cooler months (USFWS



"West Indian Manatee." USFWS
<https://www.fws.gov/southeast/wildlife/mammals/manatee/>

webpage 2019). In South Carolina, they will move far into the freshwater rivers until the river becomes too shallow or they encounter an obstruction (Murphy and Griffin 2005).

Potential impacts: Manatees are commonly found in the Cooper and Wando Rivers. A manatee rescue was ongoing near the West Rock facility in the Cooper River during the time of habitat surveys (West Rock staff and pers. comm. 2018; Appendix C).

4.1.12 Green sea turtle (*Chelonia mydas*) – Federally Threatened

Green sea turtles reach shell lengths of three to four feet long and are easily recognized by the two large scales located between their eyes. They primarily eat vegetation and reside nearshore to feed on seagrass beds (NOAA Green turtle webpage). They occasionally use South Carolina's beaches for nesting (SCDNR 2013). Green sea turtles often swim upriver and have been found in the lower reaches of the Wando River near the mouth of Horlbeck Creek (SCDNR and pers. comm. Jan. 2020).



"Green Turtle." NOAA.
<https://www.fisheries.noaa.gov/species/green-turtle>.

Potential impacts: All sea turtles nest on sandy, oceanfront beaches. They forage in coastal estuarine and marine environments (USFWS 2019). The I-526 corridor does not contain any potential sea turtle nesting sites, however Green sea turtles have been trapped by SCDNR in the Wando River upriver from the I-526 LCC EAST (SCDNR and pers. comm Jan 2020; Appendix C).

5.0 ESSENTIAL FISH HABITAT

Essential Fish Habitat (EFH) is the aquatic habitat required for marine species to spawn, breed, feed, and grow to maturity (NOAA 2019). EFH and managed marine species are under the jurisdiction of the NOAA - NMFS; they must be consulted before construction activities can begin. There are several EFH types found within the project corridor associated with the Cooper and Wando River systems. These include estuarine emergent wetland (described above), oyster reef and shell, unconsolidated bottom, sub/intertidal flat, and tidal creek (SAFMC 2009). The estimated area of each EFH type is listed in Table 3. The habitat descriptions that follow are descriptions of the site conditions during the surveys.

Oyster reef and shell consists of both live beds and non-live oyster washes and are considered a HAPC. Oysters establish live beds on hard surfaces and substrate (NOAA 2020). This habitat type is not common within the corridor, likely due to lack of hard surfaces. Oysters grow on most concrete or metal structures within the intertidal zone. Oysters were observed on existing bridge piles in saline habitats throughout the corridor.

Sub/intertidal flat consists of large expanses of flat or nearly flat areas of sediment. Subtidal flats are not exposed at low tide. Intertidal flats constitute areas of settled sediment, which are exposed between high and low tide. These habitats are not common within the corridor. The flats are frequently inhabited by polychaetes, mollusks, and flat fishes such as flounder.

Tidal creeks are made up of the water column and the sediment that has settled to the bottom of the column within the tributaries of the main channel. The water column allows for the movement of larger organisms and habitat for plankton. Tidal creeks allow for the upstream travel of spawning fish, protection for juvenile organisms, and provide habitat for shellfish, fish, and mollusks.

Unconsolidated bottom refers to the water column and settled sediment within the main channel. The sediment at the bottom of the channel is primarily inhabited by a variety of invertebrates that are important food for marine species. The Cooper River, Wando River, and Clouter Creek are unconsolidated bottom habitat and are considered HAPC coastal inlets.

Table 5.1. EFH types and approximate area of coverage in the I-526 LCC EAST

EFH Type	Area (acres)	Percentage of EFH in I-526 LCC EAST
Estuarine emergent wetland	214.3	73.4%
Oyster shell	0.5	0.2%
Sub/intertidal flat	1.3	0.4%
Tidal creek	6.8	2.3%
Unconsolidated bottom	69	23.6%

The species that use EFH were determined by using NOAA GIS data (Table 4; Appendix F). HAPC are subsets of EFH that provide important function or are vulnerable to degradation, but they are not provided additional protection (NOAA 2018). The South Atlantic EFH species includes hundreds of managed commercial and recreational marine species and Atlantic HMS (larger sport fish; NOAA 2018).

Table 5.2. Species within the EFH habitat types identified in the I-526 LCC EAST

EFH Species	
HAPC	
Penaeid Shrimp (Penaeidae)	Snapper (Lutjanidae) – Grouper (Epinephelinae) Complex
Atlantic HMS	
Blacktip Shark (<i>Carcharhinus limbatus</i>)	Scalloped Hammerhead Shark (<i>Sphyrna lewini</i>)
Spinner Shark (<i>Carcharhinus brevipinna</i>)	Tiger Shark (<i>Galeocerdo cuvier</i>)
Mid/South Atlantic EFH	
Snapper (Lutjanidae) – Grouper (Epinephelinae) Complex	Bluefish (<i>Pomatomus saltatrix</i>)
Summer Flounder (<i>Paralichthys dentatus</i>)	

5.1 HABITAT AREAS OF PARTICULAR CONCERN

The penaeid shrimp include white (*Litopenaeus setiferus*), pink (*Farfantepenaeus duorarum*), and brown (*Farfantepenaeus aztecus*) which use estuaries to grow before returning to the ocean as adults (SAFMC: Penaeid Shrimp Regulations webpage).

The Snapper-Grouper complex includes 55 species of “snappers, groupers, sea basses, porgies, grunts, jacks, tilefishes, triggerfishes, wrasse, wreckfish and spadefish” which are socio-economically important to the South Atlantic (SAFMC: Socio-economic profile 2018). Habitat Areas of Particular Concern (HAPC) for this group includes the Charleston Bump and oyster shell habitat (SAFMC 2011).

5.2 EFH SPECIES

The Snapper-Grouper complex is described above.

Bluefish (*Pomatomus saltatrix*) occurs multiple times a year in the offshore waters of the South Atlantic and Mid-Atlantic Bights. Juvenile bluefish are known to occur in estuarine environments where they feed on smaller fish and avoid predation by larger fish in the offshore waters (MAFMC: Bluefish webpage). No HAPC are designated for Bluefish.

Summer flounder (*Paralichthys dentatus*) spawning occurs several times during the fall and early winter in offshore waters of the continental shelf (NOAA: Summer flounder webpage). Summer flounder stay along the bottom of the water column where they hide against the substrate to hunt and ambush their prey. Larval Summer flounder feed on zooplankton and small invertebrates while juveniles and adults feed on invertebrates and fish. Intertidal non-vegetated flats, estuarine tidal creeks, and coastal inlets are designated as EFH for the larval, juvenile, and adult life stages of Summer flounder. Designated HAPC for Summer flounder involves submerged aquatic vegetation, which is not present within the project area.

5.3 HIGHLY MIGRATORY SPECIES

Blacktip shark (*Carcharhinus limbatus*) adults are commercially important sharks commonly found in estuaries and the pups use shallow nursery areas (Fishwatch: Atlantic Blacktip Shark 2019).

Scalloped hammerhead sharks (*Sphyrna lewini*) are an endangered species which pup in the coastal waters of South Carolina (Miller et al. 2014).

Spinner sharks (*Carcharhinus brevipinna*) migrate into inshore locations to pup and feed seasonally (Bester et al. 2018).

Tiger sharks (*Galeocerdo cuvier*) use coastal and deep-water habitats but exact use of each habitat is understudied (NMFS 2009).

6.0 HABITAT AND SPECIES ANALYSIS

CONCLUSIONS

The most abundant natural habitat types within the I-526 corridor are the estuarine habitats, which altogether total approximately 290 acres. The estuarine and marine habitats are considered “Critical Area” and therefore receive additional protection from the South Carolina Department of Health and Environmental Control (SCDHEC) division of Ocean and Coastal Resource Management (OCRM). All wetlands and waterways are under the jurisdiction of the USACE or SCDHEC OCRM. Consultation with the USACE and SCDHEC OCRM will be required to authorize construction in wetlands.

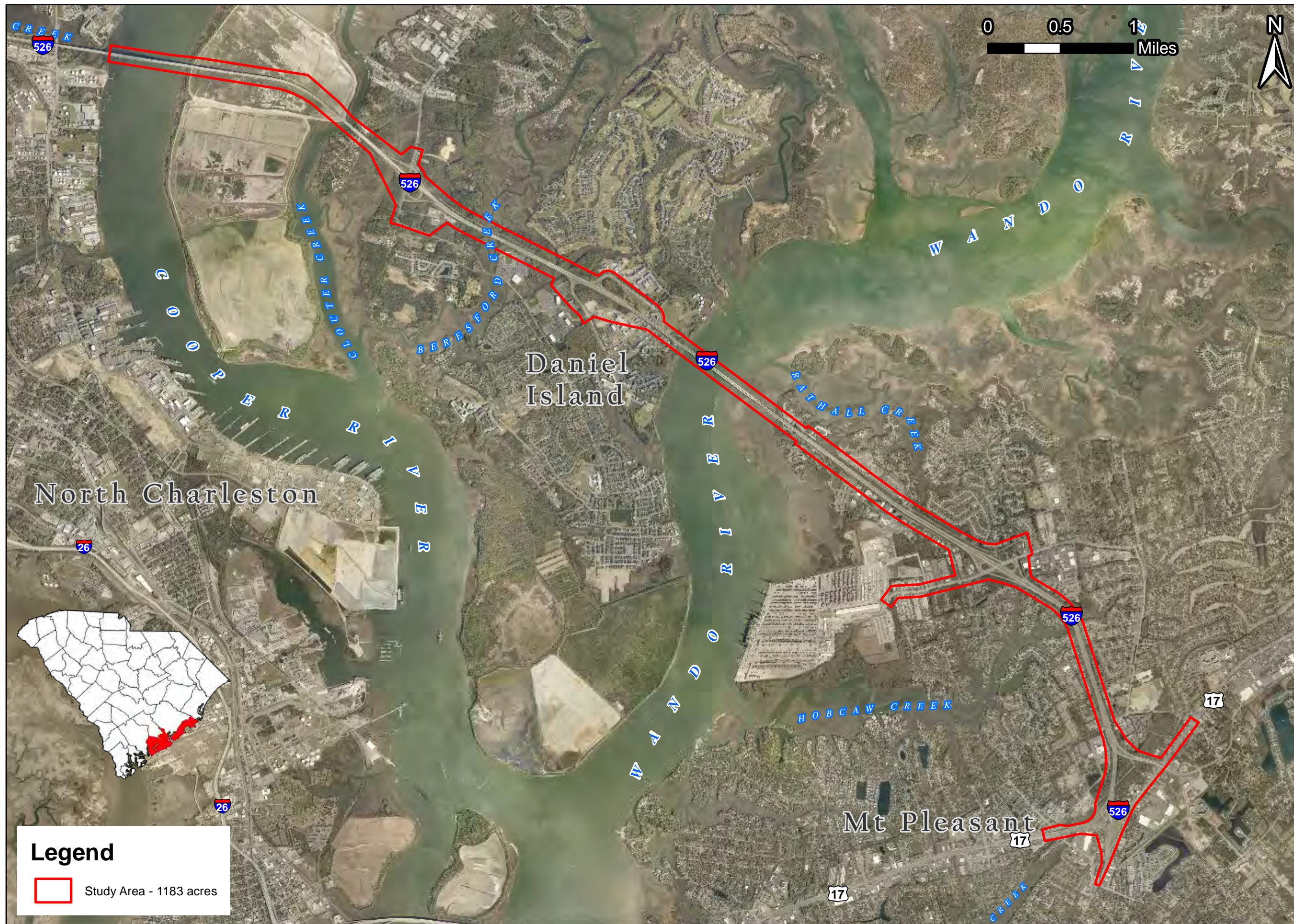
Coordination with the USFWS and NOAA-NMFS will need to occur to determine the proper steps to take to avoid, minimize, or mitigate any impacts to federally protected species.

The investigators found that the following protected marine species could be impacted by the proposed project: Atlantic sturgeon, Shortnose sturgeon, West Indian manatee, and Green sea turtle. These marine species will likely require precautionary measures to avoid and minimize impacts related to any required in-water construction.

American wood stork and Bald eagle foraging habitats are found throughout the study area corridor, but there were no nesting areas observed within the corridor. These species could be impacted by construction activities if foraging areas are disturbed. Avoidance and minimization of impacts to wetland habitats should be implemented to minimize possible impacts to American wood stork and Bald eagle.

The following species may be present in the corridor but are unlikely to be impacted by the project: Red-cockaded woodpecker, Eastern black rail, Frosted flatwoods salamander, Piping plover, Red knot, and Northern long-eared bat. Suitable habitat for these species occurs within the corridor, but individual species were not observed during the survey period. It is recommended these species be investigated further as alternatives are developed and evaluated.

Appendix A STUDY AREA MAP



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I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

Scale:
1 in = 1 miles

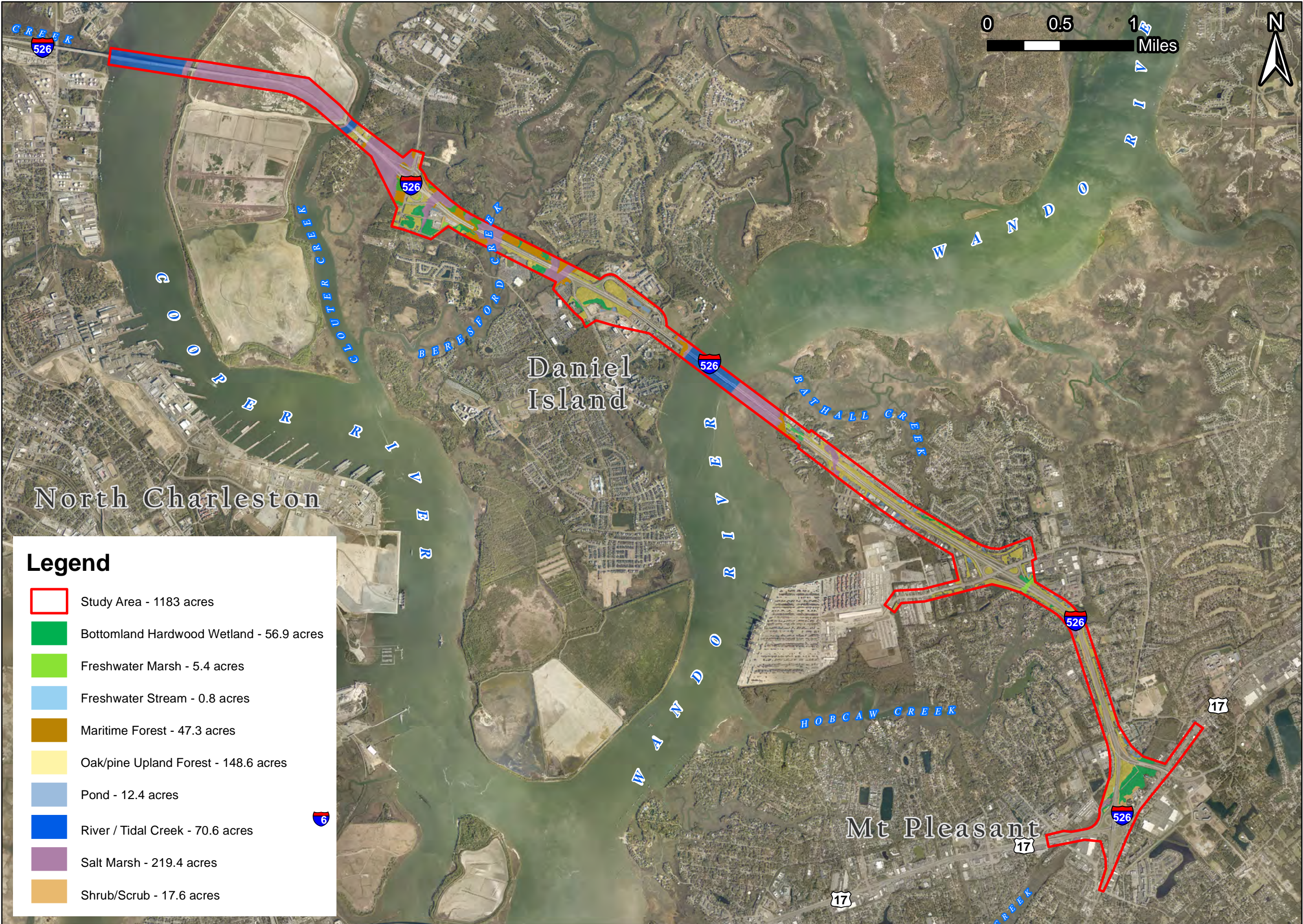
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TDM

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Study
Area
Overview
Figure 1 of 1

Appendix B HABITAT TYPE FIGURES



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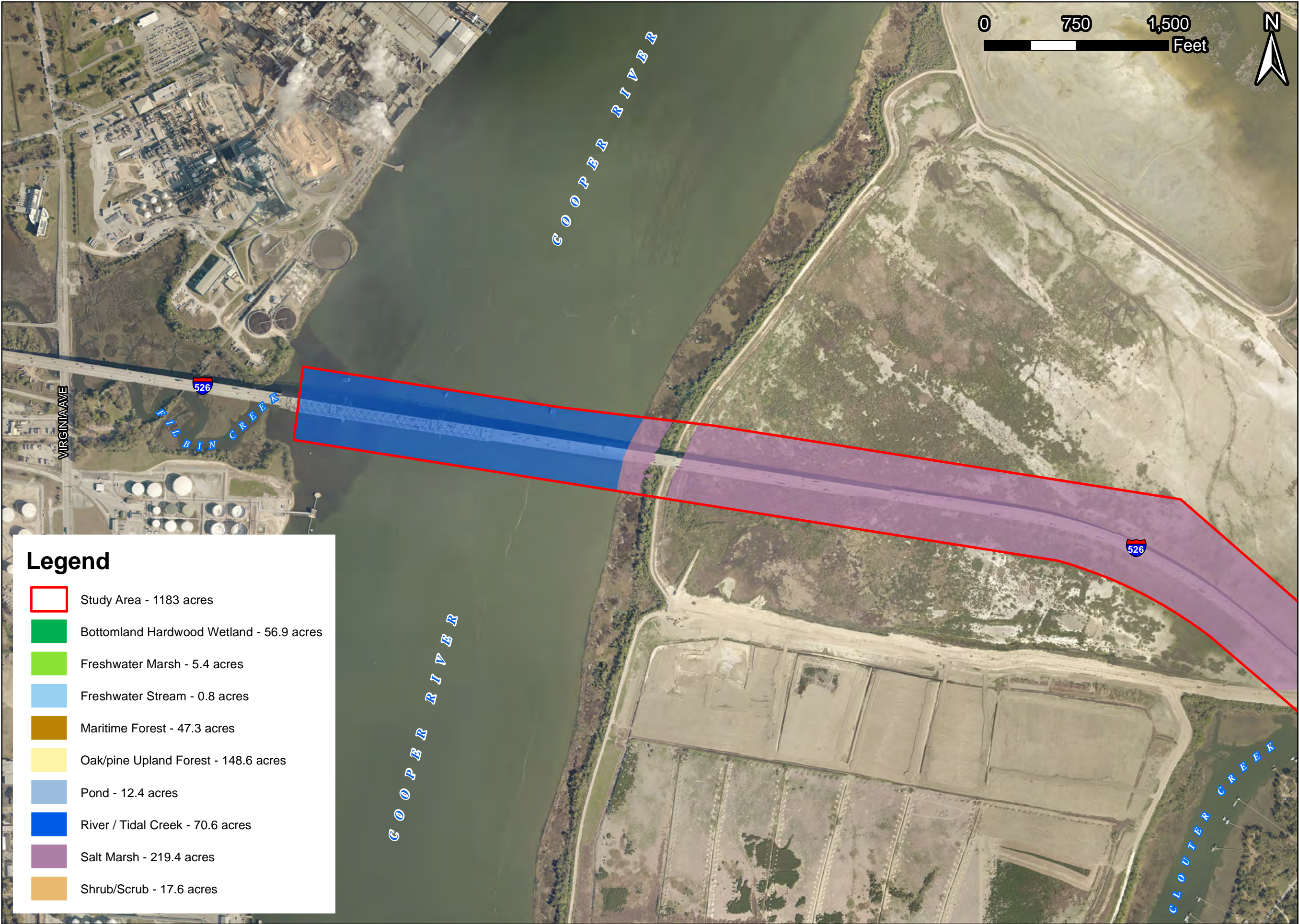
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Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC













Date: March 13, 2020	
Scale: 1 in = 1 miles	
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Habitat
Classifications



Legend

-  Study Area - 1183 acres
-  Bottomland Hardwood Wetland - 56.9 acres
-  Freshwater Marsh - 5.4 acres
-  Freshwater Stream - 0.8 acres
-  Maritime Forest - 47.3 acres
-  Oak/pine Upland Forest - 148.6 acres
-  Pond - 12.4 acres
-  River / Tidal Creek - 70.6 acres
-  Salt Marsh - 219.4 acres
-  Shrub/Scrub - 17.6 acres



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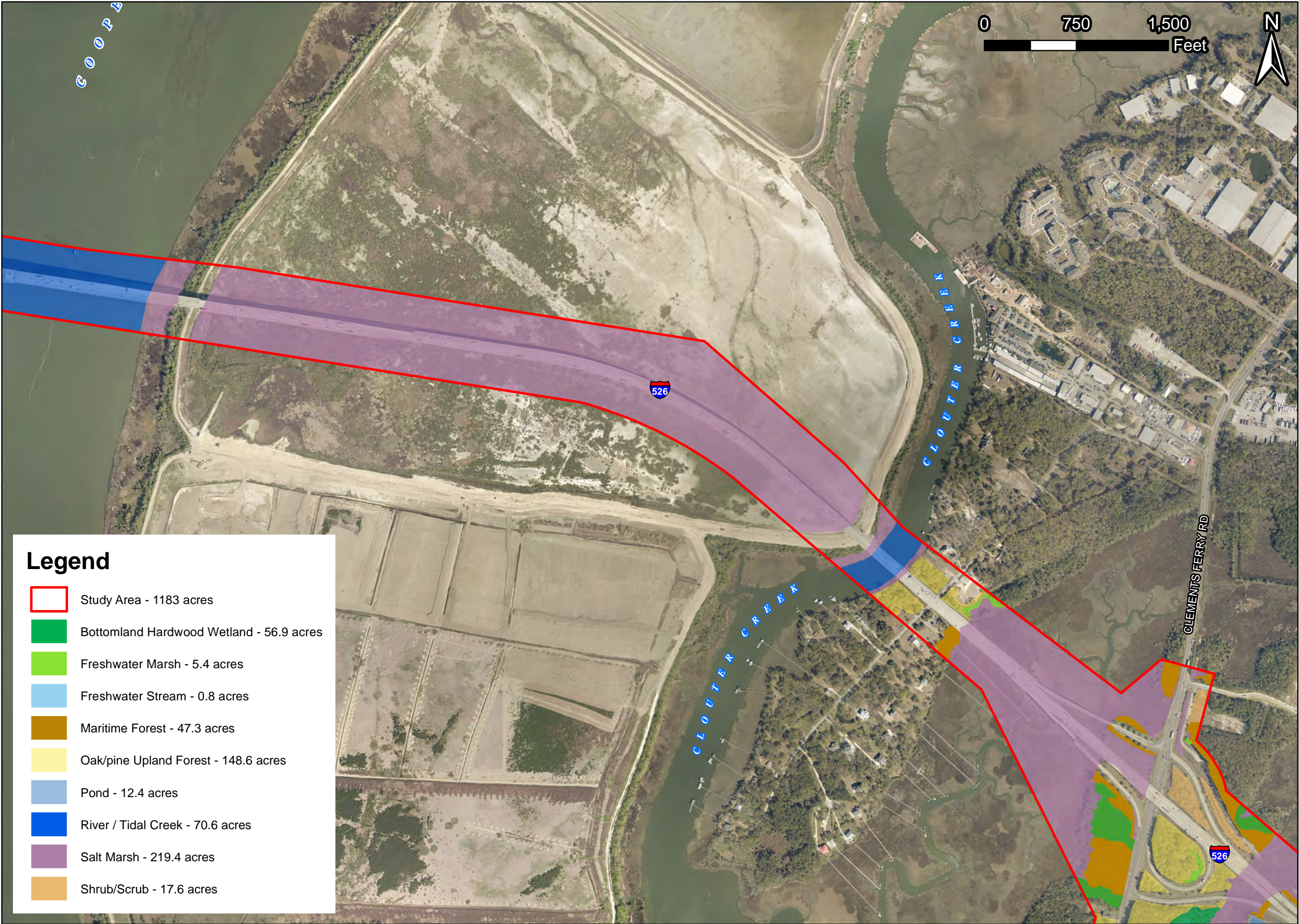
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TRC

**Habitat
Classifications**



Legend

-  Study Area - 1183 acres
-  Bottomland Hardwood Wetland - 56.9 acres
-  Freshwater Marsh - 5.4 acres
-  Freshwater Stream - 0.8 acres
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I-526 Lowcountry Corridor EAST

Berkley and Charleston
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Date:
March 13, 2020

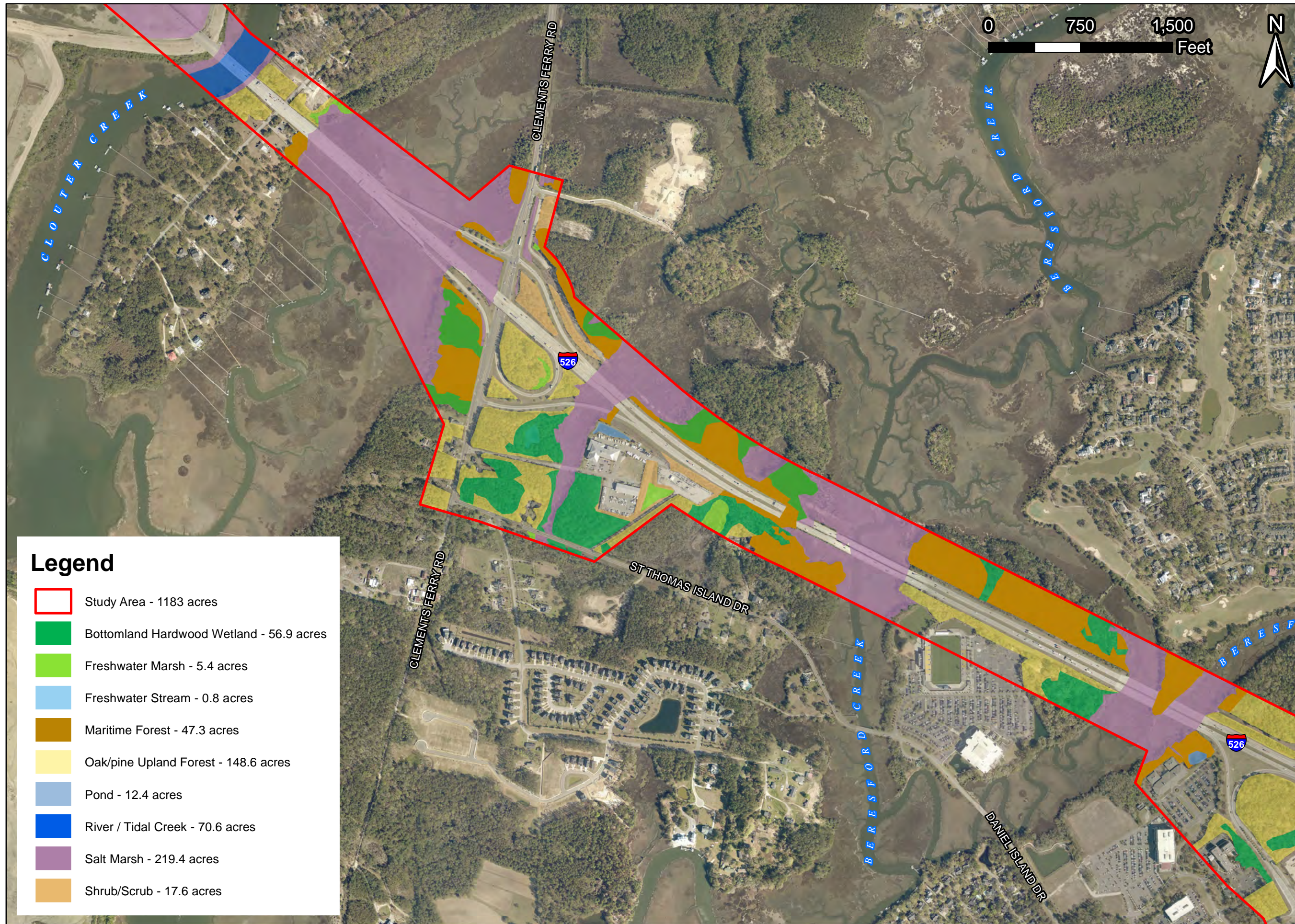
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Habitat
Classifications

Figure 3 of 10



Legend

	Study Area - 1183 acres
	Bottomland Hardwood Wetland - 56.9 acres
	Freshwater Marsh - 5.4 acres
	Freshwater Stream - 0.8 acres
	Maritime Forest - 47.3 acres
	Oak/pine Upland Forest - 148.6 acres
	Pond - 12.4 acres
	River / Tidal Creek - 70.6 acres
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	Shrub/Scrub - 17.6 acres

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I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 13, 2020

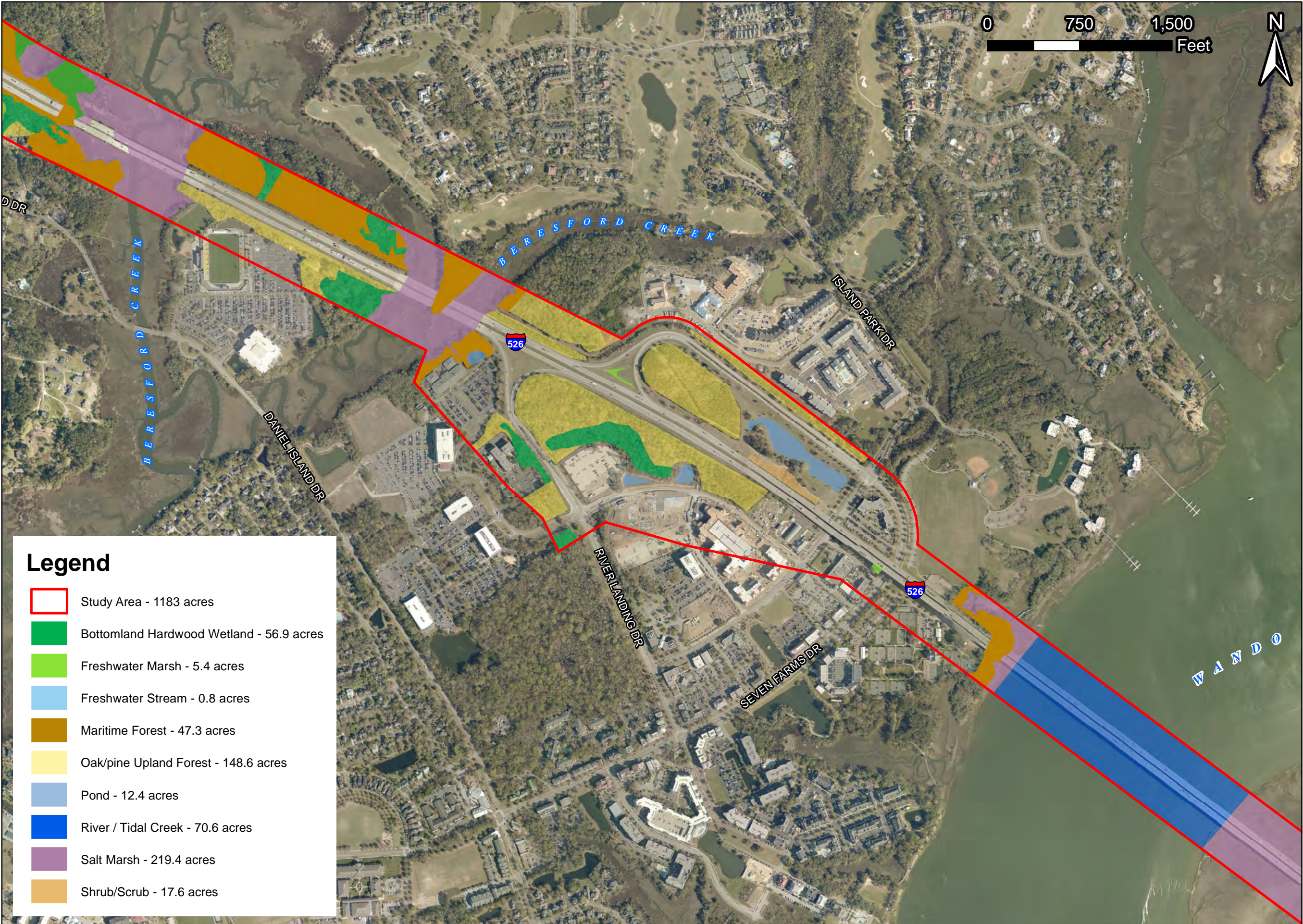
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Habitat
Classifications

Figure 4 of 10



Legend

- Study Area - 1183 acres
- Bottomland Hardwood Wetland - 56.9 acres
- Freshwater Marsh - 5.4 acres
- Freshwater Stream - 0.8 acres
- Maritime Forest - 47.3 acres
- Oak/pine Upland Forest - 148.6 acres
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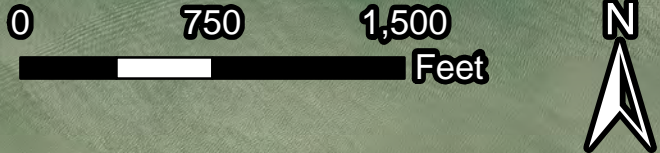
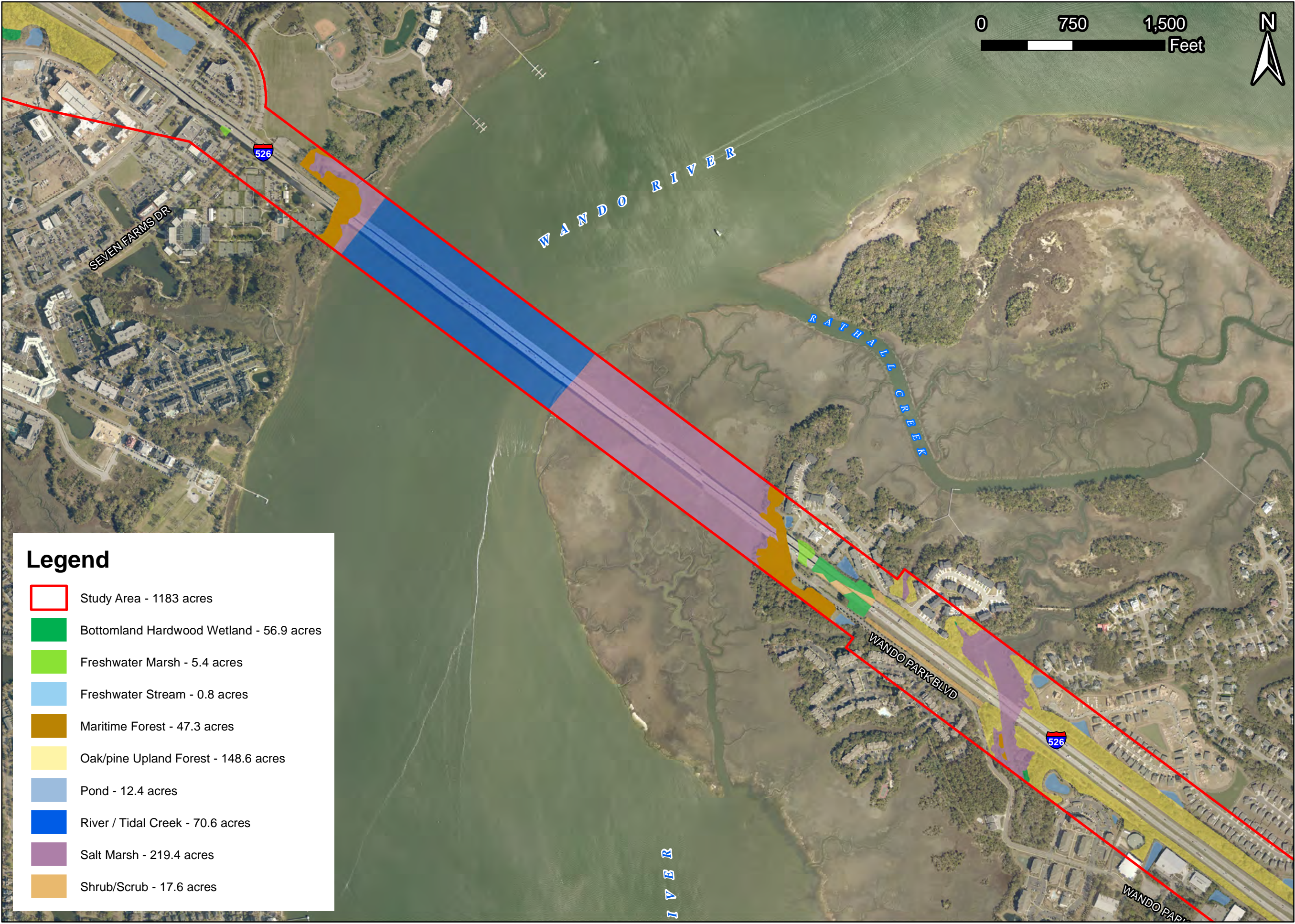
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Counties, SC













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Habitat Classifications



Legend

-  Study Area - 1183 acres
-  Bottomland Hardwood Wetland - 56.9 acres
-  Freshwater Marsh - 5.4 acres
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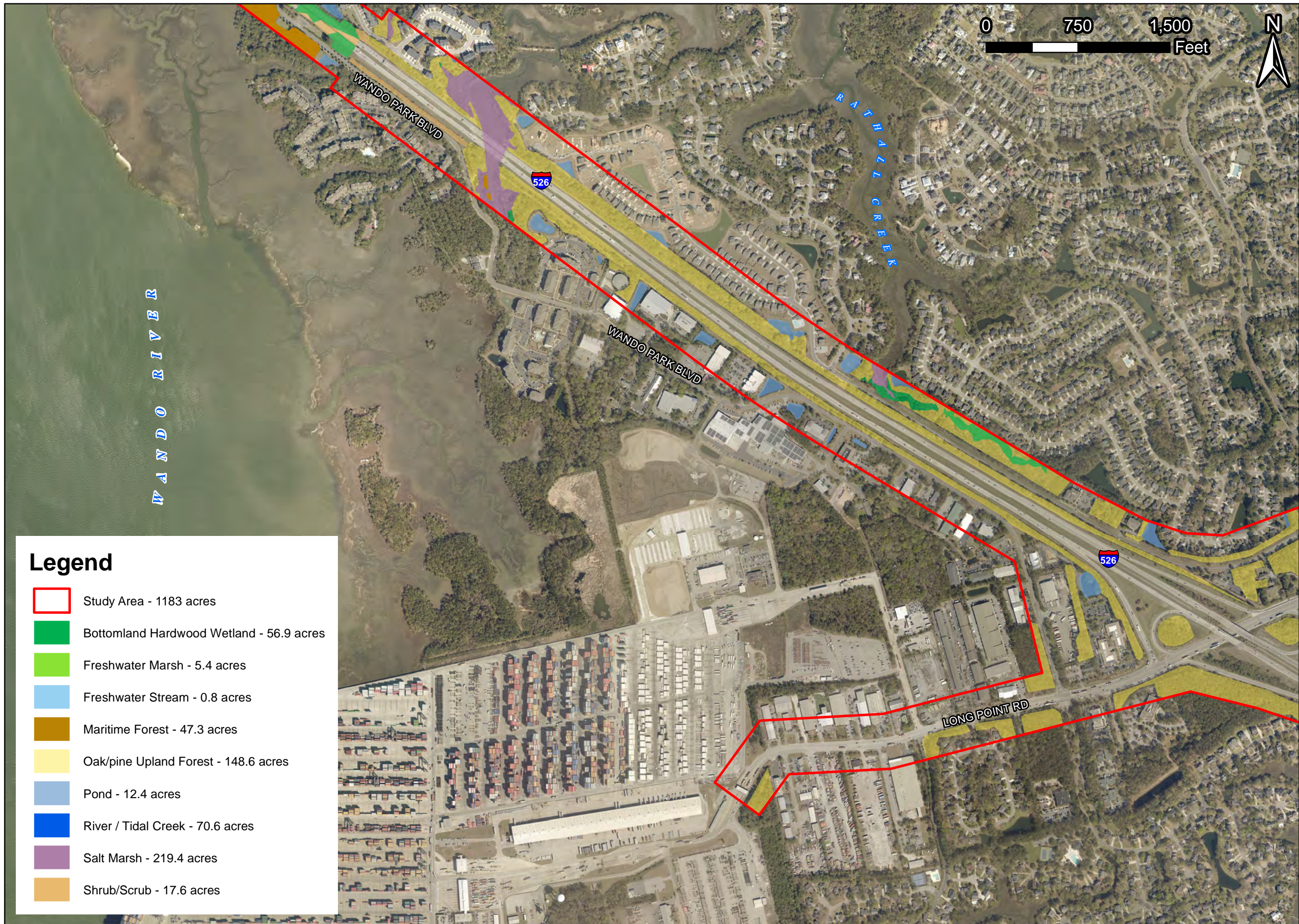
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**Habitat
Classifications**



Legend

-  Study Area - 1183 acres
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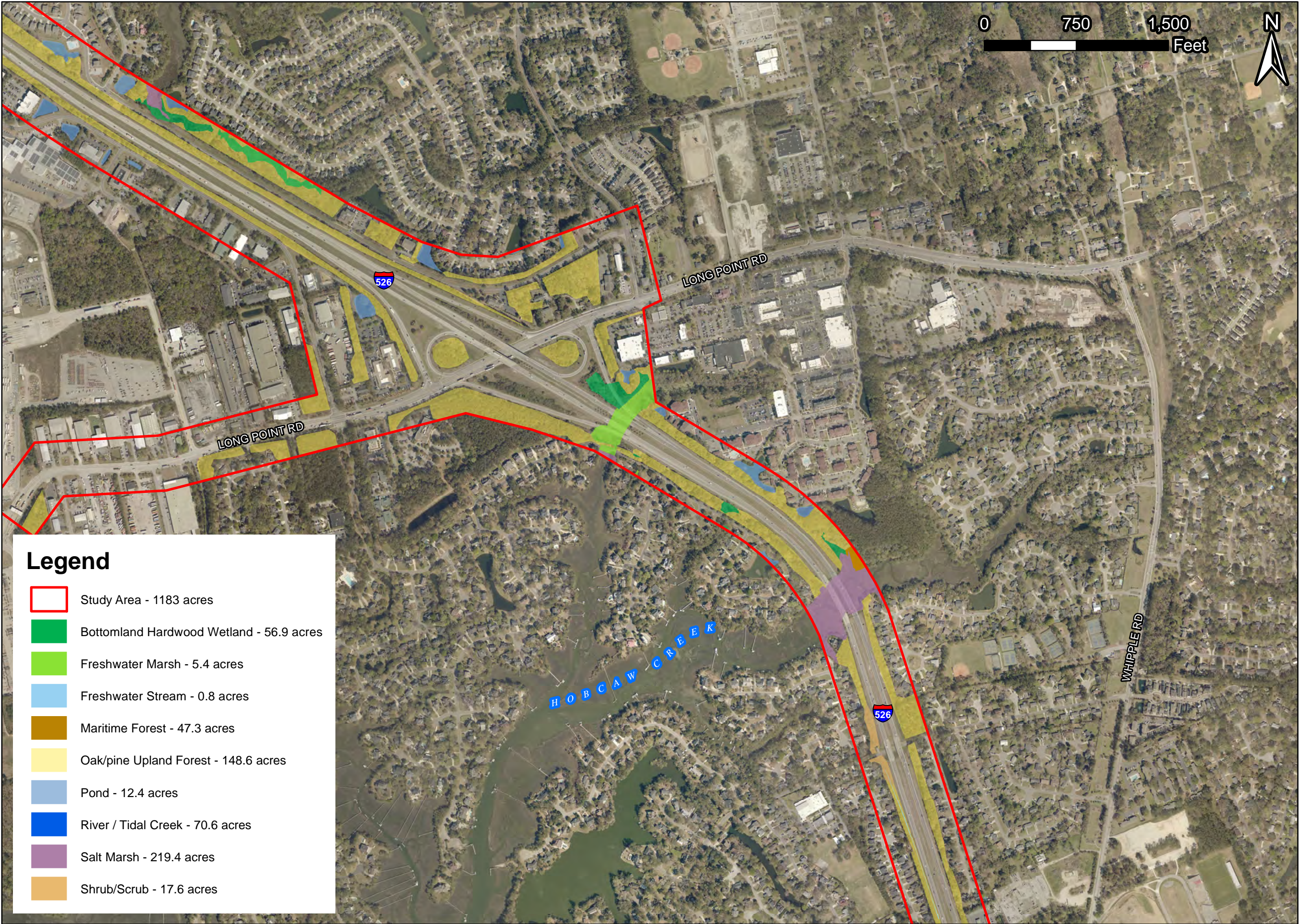
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Habitat
Classifications

Figure 7 of 10



Legend

-  Study Area - 1183 acres
-  Bottomland Hardwood Wetland - 56.9 acres
-  Freshwater Marsh - 5.4 acres
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-  Maritime Forest - 47.3 acres
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Prepared For:



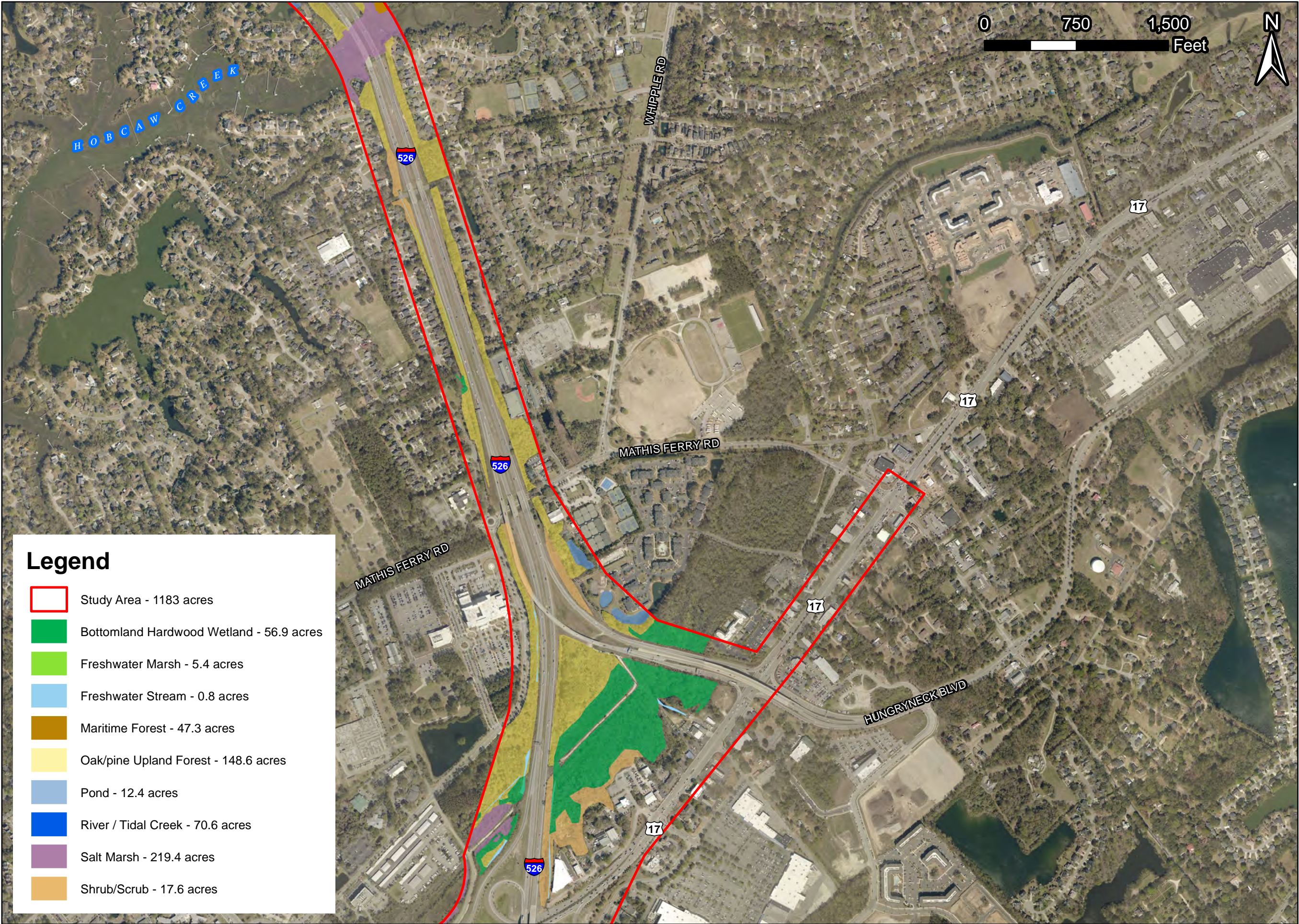
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**Habitat
Classifications**



Legend

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**Habitat
Classifications**



Legend

-  Study Area - 1183 acres
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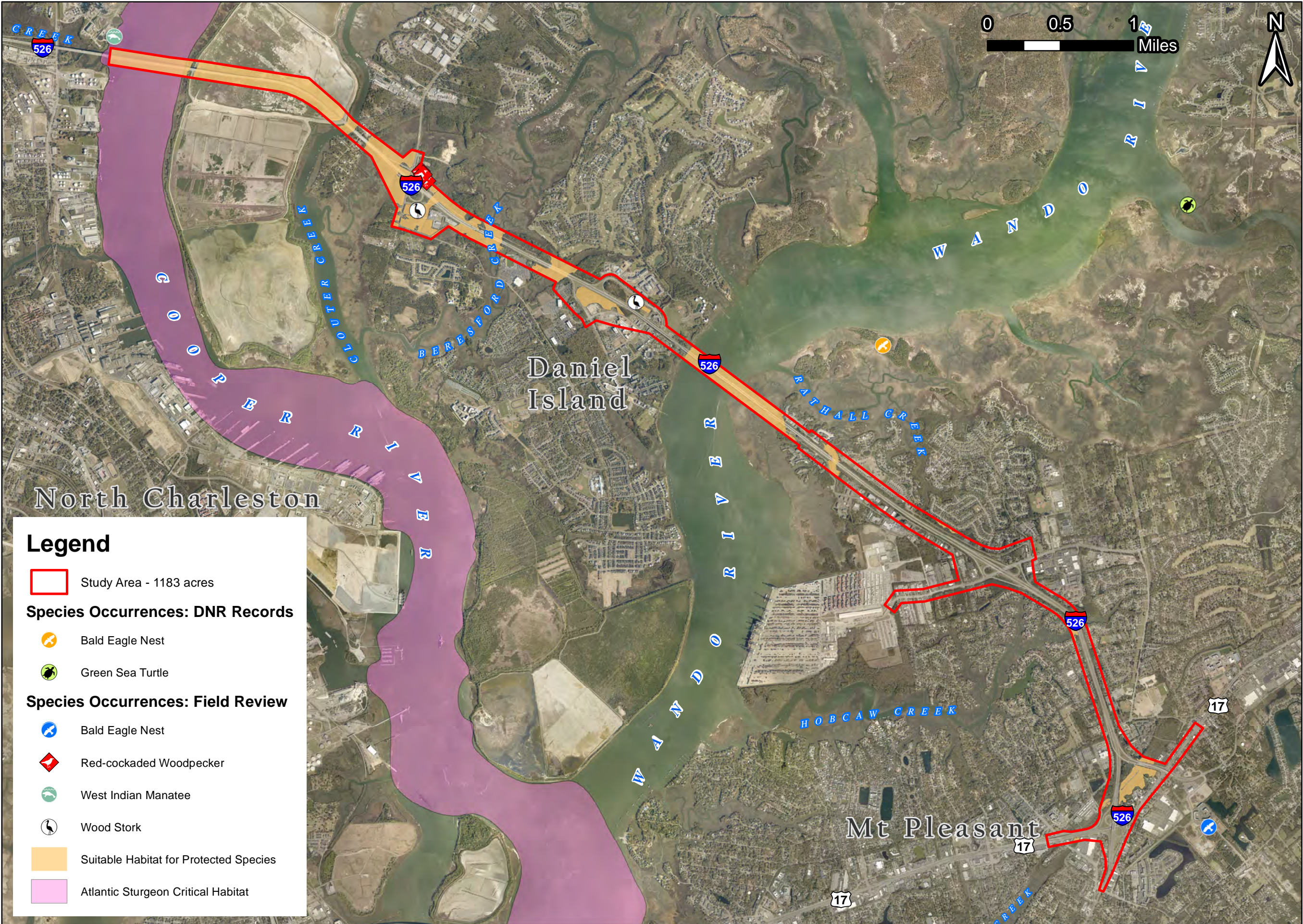
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**Habitat
Classifications**

Appendix C FEDERALLY PROTECTED SPECIES OCCURRENCES AND SUITABLE HABITATS FIGURES



Legend

Study Area - 1183 acres

Species Occurrences: DNR Records

- ⚡ Bald Eagle Nest
- 🐢 Green Sea Turtle

Species Occurrences: Field Review

- 🦅 Bald Eagle Nest
- ♦ Red-cockaded Woodpecker
- 🦛 West Indian Manatee
- 🦶 Wood Stork

Suitable Habitat for Protected Species

Atlantic Sturgeon Critical Habitat



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Counties, SC



Date:
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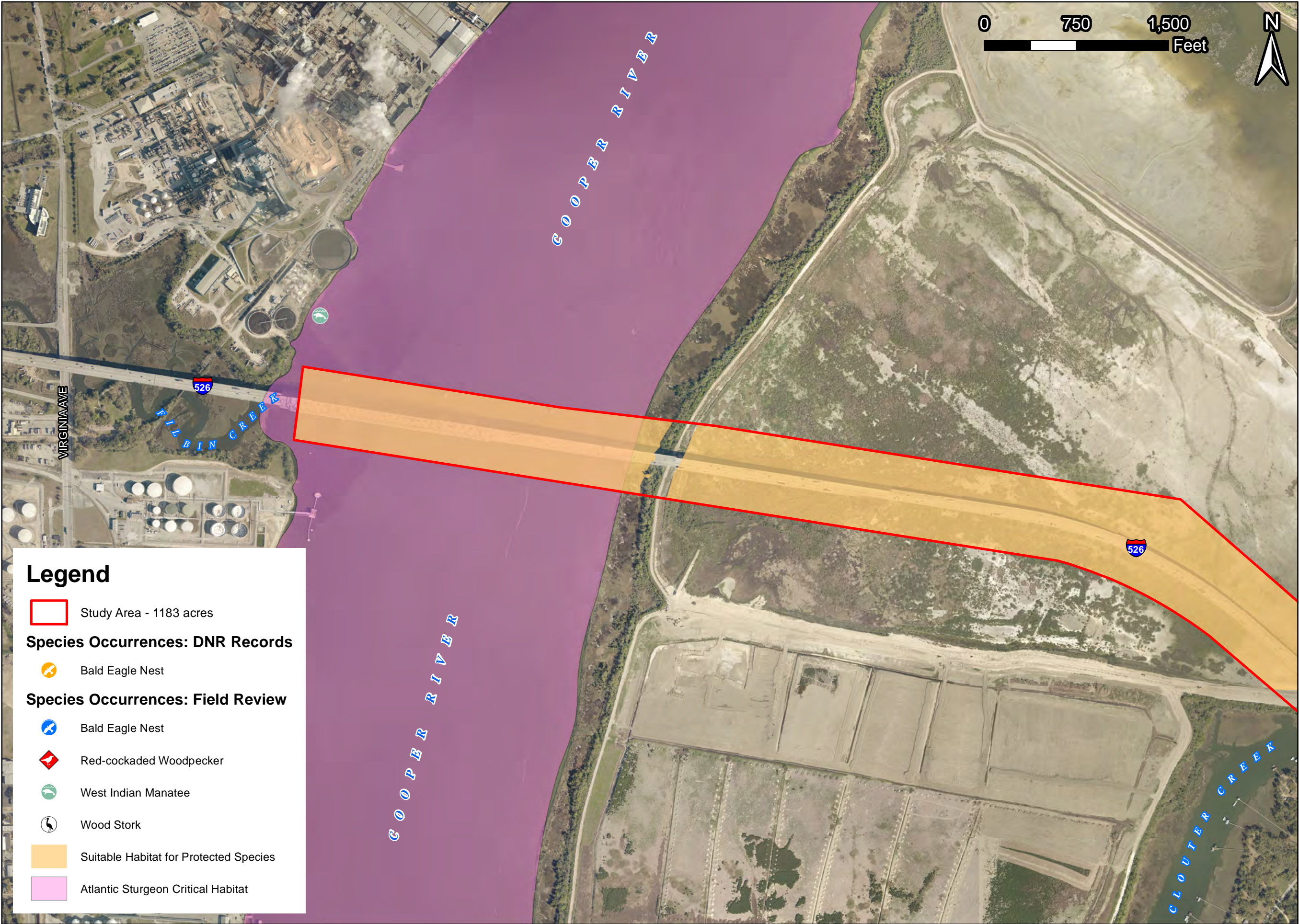
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Federally Protected
Species
Occurrences
and
Suitable Habitat




Legend

 Study Area - 1183 acres


Species Occurrences: DNR Records

 Bald Eagle Nest

Species Occurrences: Field Review


 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species

 Atlantic Sturgeon Critical Habitat

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SCDOT

I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC

526^{EAST}
LOWCOUNTRY
CORRIDOR

Date:
March 13, 2020

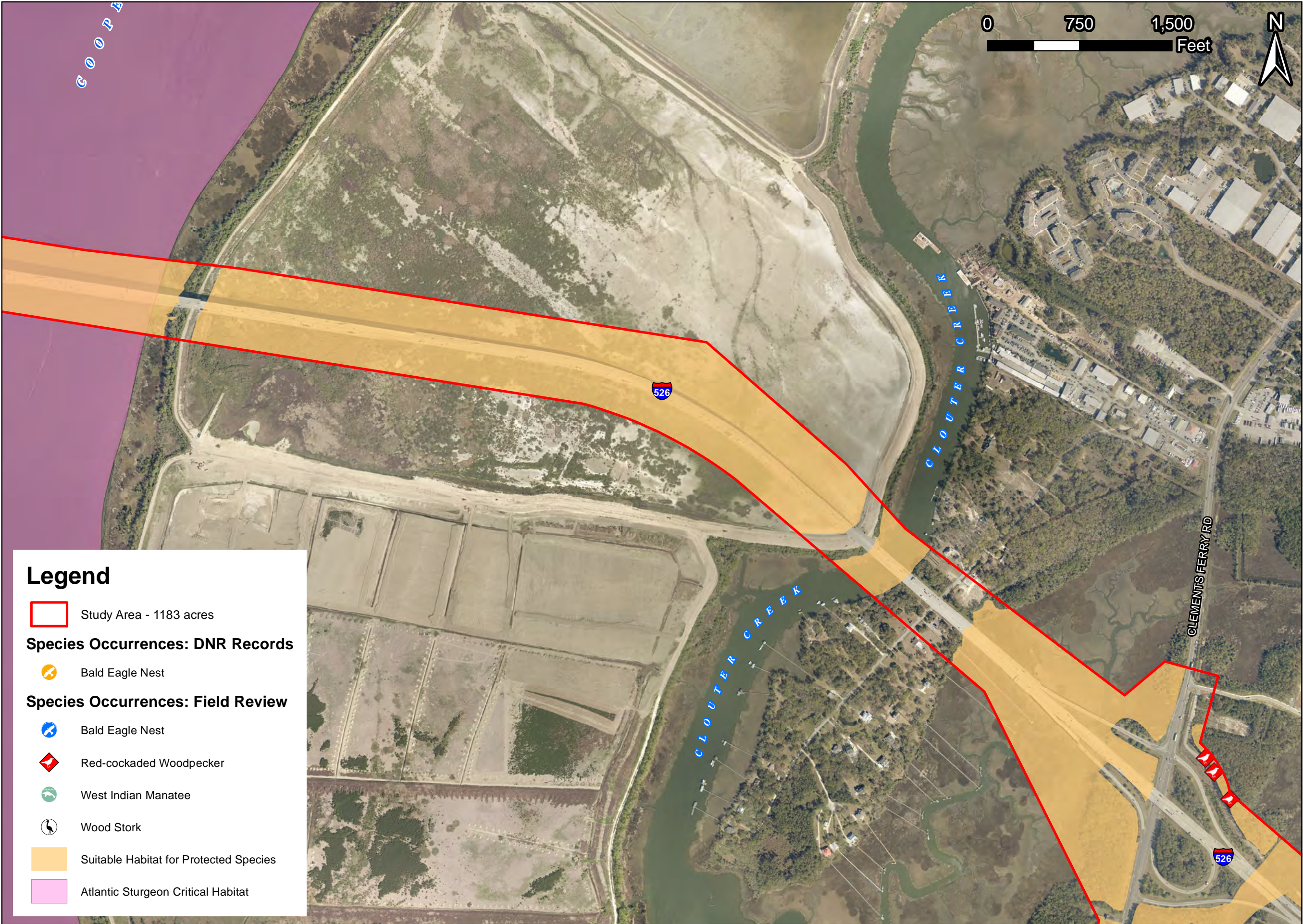
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 2 of 10




Legend


 Study Area - 1183 acres


Species Occurrences: DNR Records


 Bald Eagle Nest


Species Occurrences: Field Review


 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species

 Atlantic Sturgeon Critical Habitat



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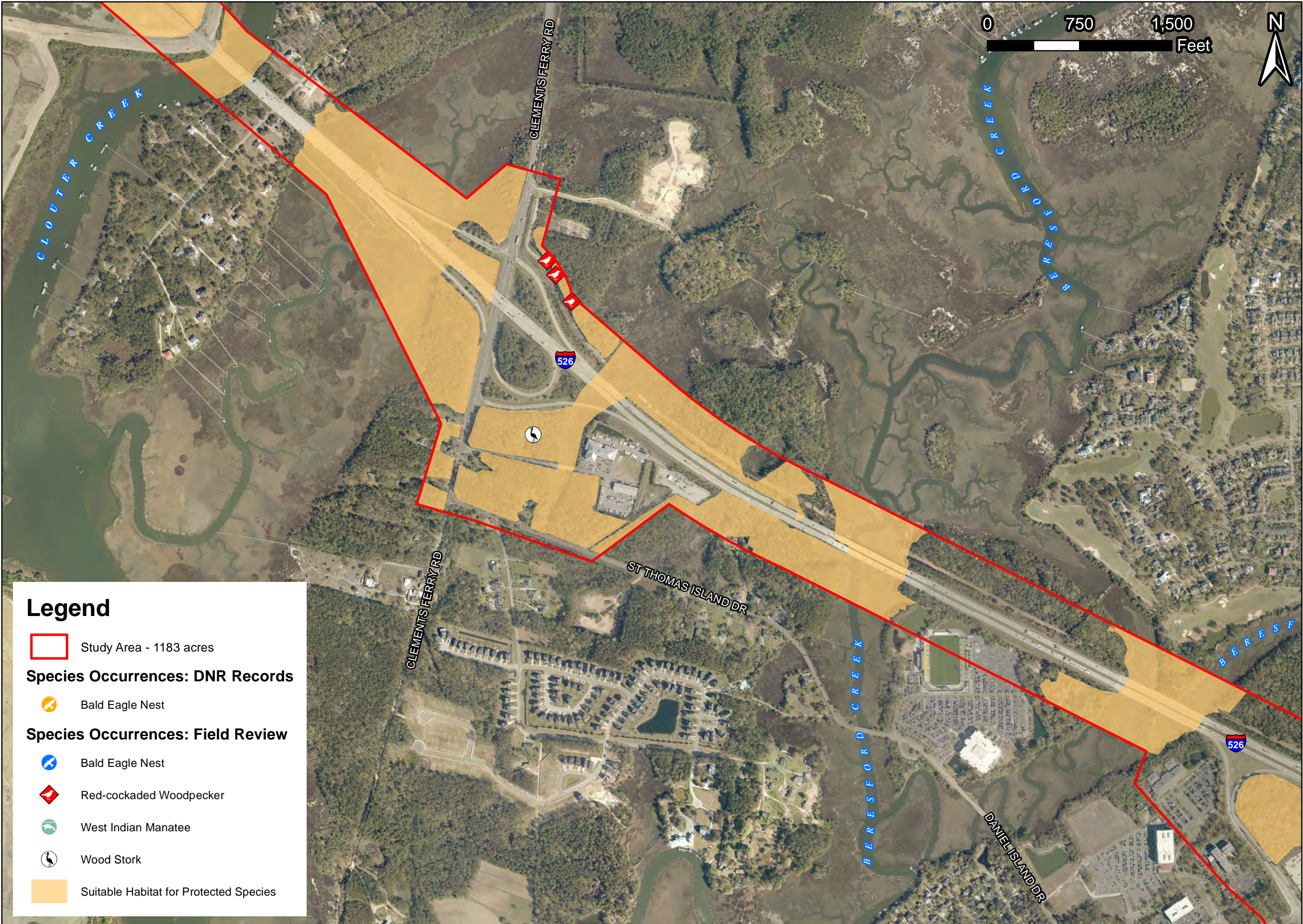
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Scale: 1 in = 750 feet	
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 3 of 10




Legend


 Study Area - 1183 acres


Species Occurrences: DNR Records


 Bald Eagle Nest

Species Occurrences: Field Review

 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species



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EAST**

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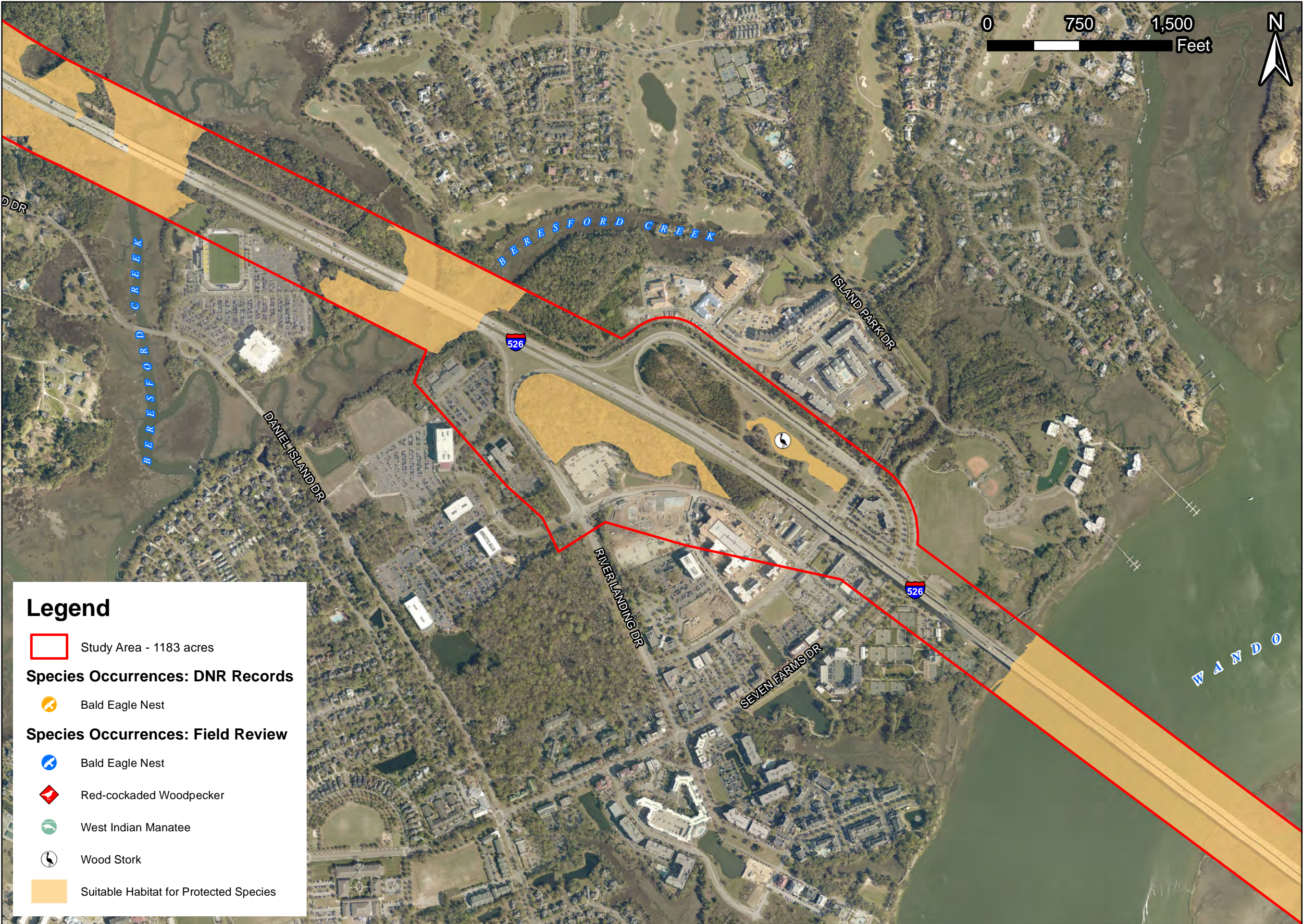
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 4 of 10



Legend

- Study Area - 1183 acres
- Species Occurrences: DNR Records**
 - Bald Eagle Nest
- Species Occurrences: Field Review**
 - Bald Eagle Nest
 - Red-cockaded Woodpecker
 - West Indian Manatee
 - Wood Stork
 - Suitable Habitat for Protected Species



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Corridor
EAST**

Berkley and Charleston
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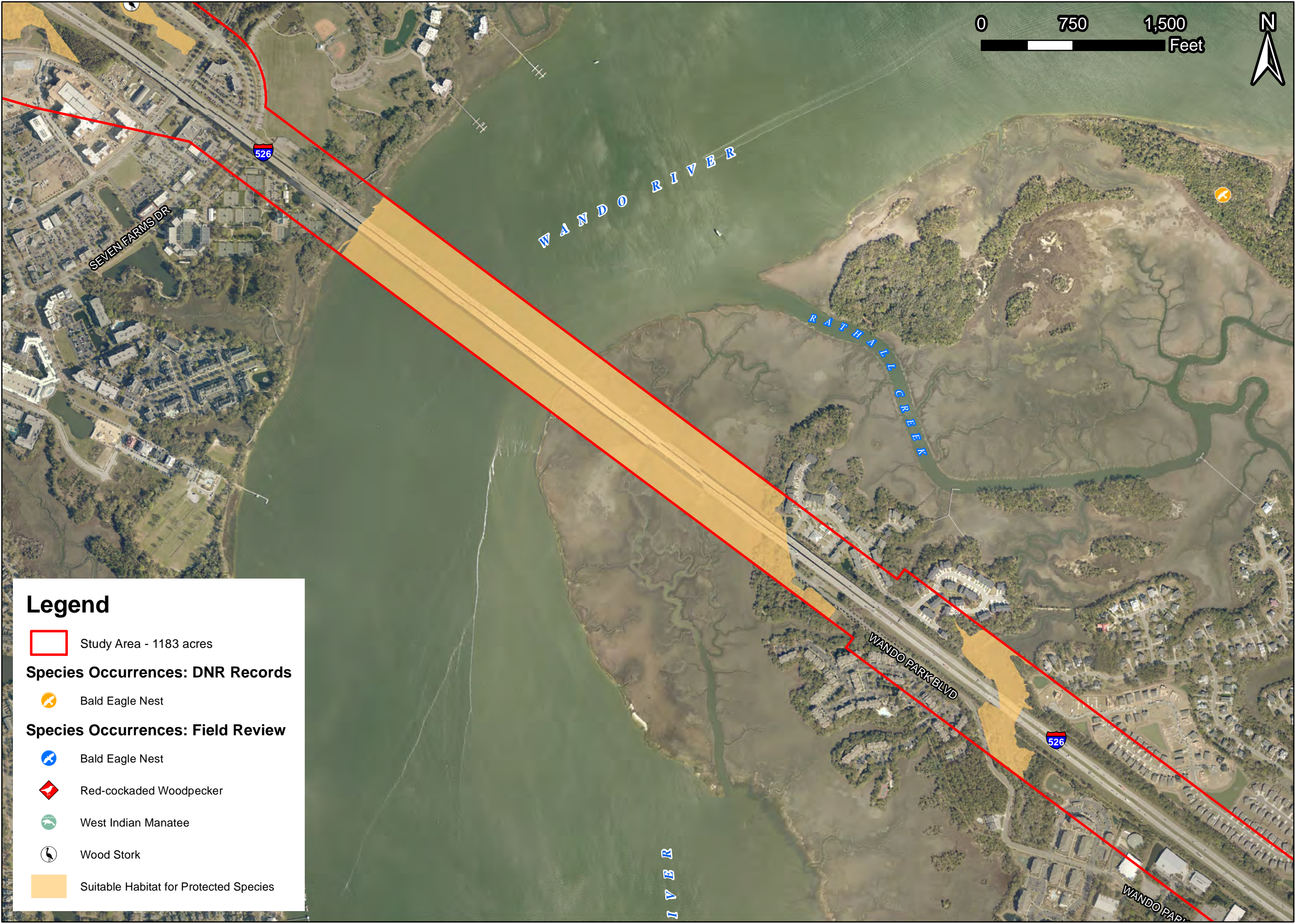
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 5 of 10



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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 6 of 10




Legend

 Study Area - 1183 acres


Species Occurrences: DNR Records

 Bald Eagle Nest

Species Occurrences: Field Review

 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species

Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



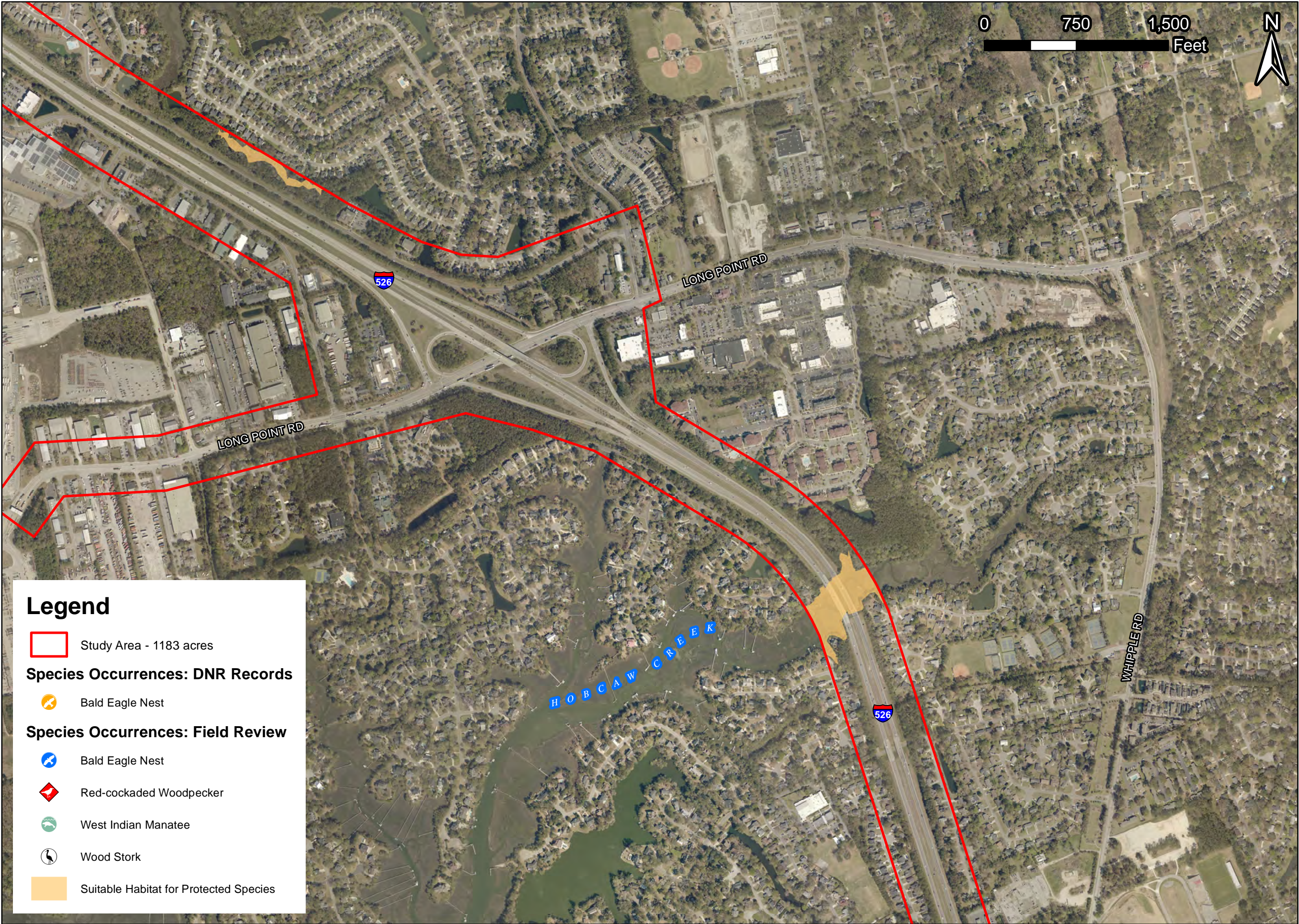
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 7 of 10



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I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



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Scale: 1 in = 750 feet	
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 8 of 10

Legend

Study Area - 1183 acres

Species Occurrences: DNR Records

Bald Eagle Nest

Species Occurrences: Field Review

Bald Eagle Nest

Red-cockaded Woodpecker

West Indian Manatee

Wood Stork


Suitable Habitat for Protected Species

Date: March 13, 2020	
Scale: 1 in = 750 feet	
Job No.: P032102	
Drawn By: TDM	Checked By: TRC


Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 8 of 10




Legend


 Study Area - 1183 acres


Species Occurrences: DNR Records


 Bald Eagle Nest

Species Occurrences: Field Review

 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species

Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 13, 2020

Scale:
1 in = 750 feet


Job No.:
P032102

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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure 9 of 10




Legend

 Study Area - 1183 acres


Species Occurrences: DNR Records

 Bald Eagle Nest

Species Occurrences: Field Review

 Bald Eagle Nest

 Red-cockaded Woodpecker

 West Indian Manatee

 Wood Stork

 Suitable Habitat for Protected Species

Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 13, 2020

Scale:
1 in = 750 feet

Job No.:
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Federally Protected
Species
Occurrences
and
Suitable Habitat
Figure10 of 10

Appendix D FEDERALLY PROTECTED SPECIES DESCRIPTIONS AND POTENTIAL IMPACTS

FEDERALLY PROTECTED SPECIES IN CHARLESTON AND BERKELEY COUNTIES, SOUTH CAROLINA

Common Name	Scientific Name	Natural Community or Habitat
Amphibian		
Frosted flatwoods salamander	<i>Ambystoma cingulatum</i>	Breeds in shallow ponds typically within fire-maintained pines
Bird		
Red knot*	<i>Calidris canutus rufa</i>	Swash zone on beaches and muddy banks; migratory through winter
Piping plover*	<i>Charadrius melodus</i>	Swash zone on beaches and muddy banks; migratory through winter
Red-cockaded woodpecker	<i>Picoides borealis</i>	Mature open pines maintained by fire; preference for longleaf pine
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Nests in large trees <0.5 miles of open water; Typically forage over open water
Wood stork	<i>Mycteria americana</i>	Forages in open shallow water; Nests in mature swamps
Bachman's warbler*	<i>Vermivora bachmanii</i>	Dense canebrakes
Eastern black rail*	<i>Laterallus jamaicensis ssp. jamaicensis</i>	Dense freshwater and brackish marshes
Fish		
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Anadromous; Deep rivers for spawning
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Brackish water; freshwater for spawning
Mammal		
Finback whale*	<i>Balaenoptera physalus</i>	Open ocean
Humpback whale*	<i>Megaptera novaengliae</i>	Open ocean
North Atlantic Right whale*	<i>Balaena glacialis</i>	Open ocean, shallow coastal water critical habitat for calving
Sei whale*	<i>Balaenoptera borealis</i>	Open ocean
Sperm whale*	<i>Physeter macrocephalus</i>	Open ocean
West Indian manatee	<i>Trichechus manatus</i>	Marine, brackish, and freshwater systems; Migrate to Florida for winter
Northern long-eared bat	<i>Myotis septentrionalis</i>	Roosts in trees and winter in caves and mines
Reptile		
Green sea turtle*	<i>Chelonia mydas</i>	Open ocean and coastal inlets; Juveniles forage in shallow water
Kemp's ridley sea turtle*	<i>Lepidochelys kempii</i>	Open ocean; Rarely nests on SC beaches
Loggerhead sea turtle*	<i>Caretta caretta</i>	Open ocean; Beachfront for nests
Leatherback sea turtle*	<i>Dermochelys coriacea</i>	Open ocean; Beachfront for nests
Plant		
Seabeach amaranth*	<i>Amaranthus pumilus</i>	High dunes of the beach
American chaffseed	<i>Schwalbea americana</i>	Disturbance dependent; Open canopy moist soil habitat
Pondberry	<i>Lindera melissifolia</i>	Wetland margins; Preference for limestone sinks and shallow depressions
Canby's dropwort	<i>Oxypolis canbyi</i>	Open canopy wet soil habitat; preference for Carolina bays

*Listed in Charleston County, not listed in Berkeley County.

Amphibians:

Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – Federally Threatened; Critical Habitat

Frosted flatwoods salamander adults are black or dark grey with white or silver reticulations, spots, or stripes covering their bodies, and a white-speckled dark underside. They are 3.5-5.3 inches long as adults. The adults migrate to breeding ponds from October to November. Larvae hatch and grow in inundated fire-dependent pine flatwood forest ponds from January until May. Larvae are dark brown, darker on top gradually turning lighter to the underside with a tan to gold lateral stripe down their side (SREL: Flatwoods Salamander). Larvae can take up to 2 years to reach adulthood (NatureServe: Frosted Flatwoods Salamander).



"Frosted Flatwoods salamander." <https://www.fws.gov/athens/endangered/teherps.html>

Potential impacts: Frosted flatwoods salamander minimally suitable habitat (seasonal wetlands within the stands of loblolly pines) can be found within the I-526 LCC EAST. However, there are no known records of Frosted flatwoods salamanders within the corridor. No designated critical habitat for the Frosted Flatwoods salamander exists within or near the I-526 LCC EAST.

Birds:

Red knot (*Calidris canutus rufa*) – Federally Threatened

Red knots are a medium-sized shorebird that winter on the beaches and tidal flats of South Carolina. Their nonbreeding/wintering plumage is gray above and whitish underneath. Their black bill is stout with a tapered tip that is slightly longer than the head length. They have a "small head, small eyes, and short neck" with short legs and dark gray feet (USFWS 2014). During breeding season, much of the face, breast, and upper belly are reddish. They feed on invertebrates in sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (USFWS 2014).



"Red Knot." Breese, Gregory. https://www.fws.gov/refuge/Ten_Ten_Islands/wildlife_and_habitat/birds/red_knot.html

Piping plover (*Charadrius melodus*) – Federally Threatened

Piping plovers are small (7-inch-long) shorebirds that feed on small invertebrates in sparsely vegetated sandy beaches and muddy tidal creek banks. They breed and nest on beaches on the northern Atlantic Coast and the Great Lakes and winter along the South Atlantic, Gulf Coast, and Caribbean beaches and islands. Spring migration occurs between February and April; fall migration occurs between July and September. While the birds are generally sandy-gray with a white underside and rump, the breeding plumage adds a black breast band, a black brow band, orange legs, and an orange bill with a black tip. Wintering birds have orange to yellow legs, the bill is solid black, and the black breast and brow bands disappear (USFWS 2003a).

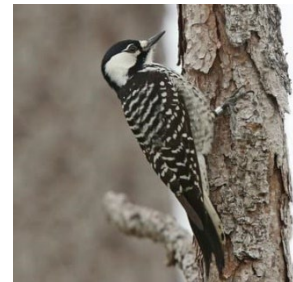


"Piping Plover." US Fish and Wildlife. <https://nhpbs.org/natureworks/pipingplover.htm>

Potential impacts: Piping plovers use mudflats and sandy beaches during winter migration along the coast of South Carolina. While beaches are not found within the I-526 LCC EAST, mudflats are present that could serve as foraging habitat, such as those found within the Naval Weapons Station spoil island in the Cooper River. No designated critical habitat for the Piping Plover exists within or near the I-526 LCC EAST (USFWS 2001).

Red-cockaded woodpecker (*Picoides borealis*) – Federally Endangered

Red-cockaded woodpeckers are small (7-inch-long) colonially nesting woodpeckers that are black with white horizontal stripes on the body, a large white cheek patch on the face, and a black cap and nape. The males have a small patch of red feathers (the cockade) which can be found in the upper corner of the cheek patch but are only exposed when agitated. They only nest in cavities of living, mature (at least 70-year-old) pine trees and prefer long-leaf pines (*Pinus palustris*) that have been maintained by a frequent (less than 5 year) fire regimen. They nest colonially in clusters of 1-20 nests over 3-60 acres. Maintained, in-use cavity trees are obvious due to sap drips around the cavity hole that turn white when hardened. They forage for insects in the bark of pine trees that are at least 30 years old and over 10 inches in diameter at breast height (USFWS 2003b).

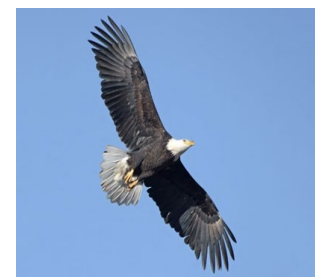


"Red-cockaded Woodpecker."
www.allaboutbirds.org/guide/Red-cockaded_Woodpecker/id.

Potential impacts: Red-cockaded woodpecker cavity "starts" were found near Clements Ferry Rd in living loblolly pine trees that are estimated to be over 70 years old (Appendix C). The understory growth is reduced by regular flooding and therefore minimally suitable. These sites were investigated multiple times during 2019 but did not seem to change in appearance over time, indicating these efforts were abandoned. No other pine stands within the I-526 LCC EAST were mature enough to support red-cockaded woodpecker foraging or nesting.

Bald Eagle (*Haliaeetus leucocephalus*) – Protected under the Bald and Golden Eagle Protection Act

Bald eagles are large raptors (6 foot wingspan) which are mottled brown and white until they reach maturity at 4-5 years old when they develop a brown body with a white head and tail. They primarily feed on fish, but also feed on waterfowl, and carrion; when prime food options are absent, they will also eat small terrestrial animals (USFWS 2007). They hunt by sight and are often seen soaring or perched high in a tree near water. The South Carolina Department of Natural Resources describes Bald eagle foraging habitats such as, "shallow, slow moving water with abundant fish and waterfowl" (SCDNR 2015). They nest in canopies of large trees usually within half of a mile from coastlines, rivers, and lakes. Nests are usually around 4-6 feet across and 3 feet deep. They typically return to the same areas each year and reuse the same nest (USFWS 2007). They can be found nesting and rearing young in South Carolina from November to March (SCDNR 2015). Eagle nest locations are required to have a buffer zone (660 feet) around nests (USFWS 2007).



"Bald Eagle." Macaulay Library.
<https://ebird.org/species/baleag>.

Potential impacts: Bald eagle habitat for nesting and foraging is frequently encountered within the I-526 LCC EAST (Appendix C). Visual surveys of the tallest trees across all habitat types within the I-526 LCC EAST

resulted in no bald eagle nest sightings during the survey period. Two eagle nests are present near the corridor. One is approximately 4000 feet upriver from the I-526 LCC EAST bridge over the Wando River. The other is approximately 2500 feet southeast of the easternmost I-526 LCC EAST terminus.

Wood stork (*Mycteria americana*) – Federally Threatened

American wood storks are large wading birds standing about 45 inches tall with a large, decurved bill, a conspicuous unfeathered, dark gray head and neck and white plumage except on the black trailing edges of the wings. They soar on thermals with neck outstretched and a wingspan of 60-65 inches. Wood storks feed by moving the bill through shallow (6-10 inches deep) water slightly open until it touches a small fish when they snap the bill shut. They feed in both freshwater and estuarine waters including marshes, tidal creeks, and swamps especially during periods of falling water levels when the pools are more concentrated. They can be found nesting in South Carolina from mid-February until September building colonial nests primarily using cypress tree swamps (USFWS 1997).



"American wood stork." USFWS.
https://www.upi.com/Science_News/2014/06/27/The-Souths-wood-stork-to-be-taken-off-endangered-list/9631403907725/

Potential impacts: Wood storks nesting habitat was not found within the I-526 LCC EAST (Appendix C). Wood storks were observed foraging in wetland ponds and excavated ponds within the I-526 LCC EAST during surveys (Appendix C). The closest rookery is located approximately 5 miles away at Buzzard's Island Heritage preserve and was active in 1997 (SCDNR 2017).

Bachman's Warbler (*Vermivora bachmanii*) – Federally Endangered

Bachman's warblers are extremely rare and are thought to be extinct due to the lack of sightings since 1988. They are 10 to 11 cm in total length. Males are "olive-green above with yellow forehead, lores, eye-ring, chin, and underparts, a black throat and crown, and dusky wings and tail" and have a yellow shoulder patch and bright rump. The female is olive green with yellow forehead and under parts. The historical nesting habitat for this warbler included low wetlands with dense thickets of cane (*Arundinaria gigantea*) and dwarf palmetto (*Sabal minor*) (USFWS 1999).



"Bachman's Warbler."
https://identify.whatbird.com/obj/822/_/Bachmans_Warbler.aspx

Potential impacts: Bachman's warbler habitat does not exist along the I-526 LCC EAST.

Eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*) – Proposed to be Threatened

Eastern black rails are 10-15 cm in total length, blackish-gray undersides, chestnut back with small white spots, pointed black bill, bright red eyes, and long dark gray legs and toes. According to the USFWS, "the birds occupy relatively high elevations along heavily vegetated wetland gradients, with soils that are moist or flooded to a shallow depth" and require a dense canopy and fine stemmed emergent plants to safely forage for small invertebrates and seeds. Coastal South Carolina was considered a historical stronghold for this subspecies. They nest from



"Eastern Black Rail." Hand, Christy.
<https://www.birdwatchingdaily.com/news/conservation/feds-list-eastern-black-rail-threatened/>

March to August in shallow water or moist soil for its nesting sites. They are difficult to detect because of their preference to run or walk, rather than fly, through dense vegetation (USFWS 2019).

Potential impacts: Eastern black rails suitable dense wetland habitat is found within the I-526 LCC EAST (Appendix C). However, this species is difficult to detect without considerable effort.

Fish:

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) – Federally Endangered

Atlantic sturgeon are large (14 feet) fish with five rows of bony plates called scutes along the length of their body and have a blue-ish black to olive back with a pale belly, long snouts with 4 whisker-like barbels for detecting prey, and their tail fin is longer at the top than at the bottom. They are benthic foragers that suck food into their mouths from the bottom of the water column at all stages of life. They spend much of their lives in the saltwater but spawn in flowing freshwater below the fall line of large freshwater rivers with a coastal estuary (NOAA: Atlantic Sturgeon webpage). Spawning sites must be well-oxygenated, between 13 and 26 degrees Celsius (C), more than 1.2 meters deep, and have rocky substrate. Juveniles grow in transitional salinity zones (salinities of 0.5-5 parts per thousand (ppt), 5-18 ppt, and 18-30 ppt) with soft substrate. Once the subadults enter marine waters (salinity greater than 30 ppt), they remain in oceanic and estuarine waters until spawning occurs. Adults mature between 5 and 19 years old. They spawn every 1-5 years. There are two cohorts within this species. One breeds in the spring; the other breeds in the fall (Atlantic Sturgeon Status Review Team 2007).



"Atlantic Sturgeon." NOAA.
<https://www.fisheries.noaa.gov/species/atlantic-sturgeon>

Potential impacts: Atlantic sturgeon has designated Critical Habitat in the Cooper River within the I-526 LCC EAST project area for this species (Appendix C).

Shortnose sturgeon (*Acipenser brevirostrum*) – Federally Endangered

Shortnose sturgeon are 4 feet long at maturity with rows of bony plates called scutes along the length of their body, a dark back with a pale belly, rounded snouts with 4 whisker-like barbels for detecting prey, and their tail fin is longer at the top than at the bottom. They feed on benthic insects, crustaceans, mollusks, and fish by crushing them with their mouth plates. Shortnose sturgeon spawn in freshwater and forage in mesohaline habitat (salinities of 5-18 ppt). They venture into the ocean to undergo coastal migrations but are otherwise typically estuarine. Males mature at 2-3 years and may spawn annually, while females mature by 6 years and spawn every 3-5 years. Spawning occurs in late winter, typically before Atlantic sturgeons, in water temperatures from 8 to 15 C and water velocities 25-130 centimeters per second (cm/s) on gravel substrate (NOAA 2015). They require similar foraging habitat and resources to the Atlantic sturgeon but can be found farther upriver (Shortnose Sturgeon Status Review Team 2010).



"Shortnose Sturgeon." NOAA Fisheries.
<https://www.fisheries.noaa.gov/species/shortnose-sturgeon>

Potential impacts: Shortnose sturgeon are likely to use the Cooper and Wando Rivers to migrate upriver to spawning grounds, approximately 35 miles away, near the Pinopolis Dam tailrace (Ruddle 2018) (Appendix C).

Mammals:

Finback whale (*Balaenoptera physalus*) – Federally Endangered

Finback, or Fin, whales are found in deep, offshore waters. They are the second largest whale growing to be 75-85 feet long and can be distinguished by their hooked fin located two-thirds of the way down their back, short pectoral fins, and V-shaped head. They are easily recognized by the bi-colored jaw which is pale on the right side and dark on the left. According to the National Oceanic and Atmospheric Association (NOAA), they are found in all oceans but migrate mostly between temperate latitudes for calving in the winter and polar latitudes for feeding in the summer. They feed by filtering small fish and krill through their baleen plates, eating up to 2 tons of food a day (NOAA: Fin Whale webpage).



"Fin Whale." NOAA.
<https://www.fisheries.noaa.gov/species/fin-whale>

Humpback whale (*Megaptera novaengliae*) – Federally Endangered

Humpback whales are primarily black-bodied, with white on their fins, bellies, and tails, have a small fin about two-thirds of the way down their bodies, and grow up to 60 feet long with fins as wide as 18 feet. They can generally be found close to shore (Cupka and Murphy 2005a) They filter-feed on small crustaceans and fish through baleen plates (NOAA: Humpback whale webpage). According to NOAA, they migrate between Arctic feeding grounds in the summer to calving in shallow, warm water near reefs in the tropics (NOAA: Humpback whale webpage).



"Humpback Whale." NOAA.
<https://www.fisheries.noaa.gov/species/humpback-whale>

North Atlantic Right whale (*Balaena glacialis*) – Federally Endangered; Critical Habitat

Right whales are one of the most endangered large whales with less than 450 individuals remaining. They have rounded heads which take up about one-third of their body length and no dorsal fin, reach lengths of 60 feet long, and have stout pectoral fins. Their faces are generally covered in yellowish-white bumps and their bodies are black with white spots on the belly. Right whales filter feed on small fish and crustaceans near the continental shelf but have been known to move over deep waters as well (Cupka and Murphy 2005b). NOAA recognizes the shallow, coastal waters between Cape Fear, North Carolina to below Cape Canaveral, Florida, as critical habitat for calving (NOAA:North Atlantic Right Whale webpage). In the winter of 2018-2019, six calves were born and identified by biologists on the southeastern coast, including the Hilton Head area (Peterson 2019).



"North Atlantic Right Whale." NOAA.
<https://www.fisheries.noaa.gov/species/north-atlantic-right-whale>

Sei Whale (*Balaenoptera borealis*) – Federally Endangered

Sei whales are long, sleek, 40 to 60 feet long, have a dark blueish-grey body with a cream-colored underside, and a tall hooked dorsal fin two-thirds of the way down their back. They are found in subtropical, temperate, and subpolar waters around the world. They feed by straining food through their baleen plates. They are unusual in that they sink below the surface of the water vertically when they dive and do not arc and then dive like other whales. They live individually or in small family groups of two to five animals (NOAA: Sei Whale webpage).



"Sei Whale." NOAA.
<https://www.fisheries.noaa.gov/species/sei-whale>.

Sperm whale (*Physeter macrocephalus*) – Federally Endangered

Sperm whales are large, dark grey, 40 to 52 feet long, and have a single blowhole offset to the left side of the head. They have smallish rounded flippers and a small, low, thick, rounded dorsal fin. The head is about a third of the length of the body, the skin wrinkled behind the head, and the lower jaw is narrow, with a visible row of white teeth, and a white mouth. Sperm whales can dive up to 2000 feet deep to capture prey like the giant squid. They live in all oceanic waters where some populations migrate, but other populations don't seem to migrate. Calves are born at about 13 feet long (NOAA: Sperm Whale webpage).



"Sperm Whale." NOAA
<https://www.fisheries.noaa.gov/species/sperm-whale>

Potential impacts: Whales can be found utilizing near shore coastal waters for several purposes. The North Atlantic right whale uses the coast for calving (NOAA: North Atlantic Right Whale webpage). While the river channels are dredged and maintained for commercial ships, it is highly unlikely for whales to utilize the rivers found within the I-526 LCC EAST. It is important to note that a right whale was trapped and killed in the Charleston Harbor, approximately 5 miles downriver, in January 1880 (Evans 2016).

West Indian manatee (*Trichechus manatus*) – Federally Threatened

West Indian manatees are greyish marine mammals with bulbous bodies and no dorsal fin. They reach lengths over 14 feet long. They reside in shallow marine, brackish, and freshwater systems eating vegetation (USFWS 2001). They cannot live in temperatures under 68 degrees Fahrenheit (F), so their range expands and contracts from warmer to cooler months (USFWS webpage 2019). In South Carolina, they will move far into the freshwater rivers until the river becomes too shallow or they encounter an obstruction (Murphy and Griffin 2005).



"West Indian Manatee."
<https://www.fws.gov/southeast/wildlife/mammals/manatee/>

Potential impacts: Manatees are commonly found in the Cooper and Wando Rivers. A manatee rescue was ongoing near the West Rock facility in the Cooper River during the time of habitat surveys (West Rock staff and pers. comm. 2018; Appendix C).

Northern long-eared bat (*Myotis septentrionalis*) – Federally Threatened

The Northern long-eared bat has dark brown fur on their backs and lighter brown underneath, a body length of 3 to 3.7 inches long, and long ears with a pointed triangular tragus. In summer, they roost in a wide variety of dead trees, under bark, in caves, and will also roost in human structures. These bats forage for insects in a wide variety of forest types (USFWS 2015). They hibernate in caves, where white-nose syndrome (WNS) is prevalent. Since WNS is the primary cause of species decline, critical habitat is not protected under the ESA (USFWS 2016).



"Northern Long-Eared Bat." USFWS
<https://www.fws.gov/Midwest/endangered/mammals/nleb>

Potential impacts: No Northern long-eared bat maternity roosts or hibernation sites were known to exist within the I-526 corridor during the time of the surveys. Since northern long-eared bats roost in snags and pines, there is a considerable amount of summer roosting habitat available. There are no known wintering habitats nearby (SCDNR 2019).

Reptiles:

Green sea turtle (*Chelonia mydas*) – Federally Threatened

Green sea turtles reach shell lengths of three to four feet long and are easily recognized by the two large scales located between their eyes. They primarily eat vegetation and reside nearshore to feed on seagrass beds (NOAA Green turtle webpage). They occasionally use South Carolina's beaches for nesting (SCDNR 2013). Green sea turtles often swim upriver and have been found in the lower reaches of the Wando River near the mouth of Horlbeck Creek (SCDNR and pers. comm. Jan. 2020).



"Green Turtle." NOAA.
<https://www.fisheries.noaa.gov/species/green-turtle>.

Kemp's ridley sea turtle (*Lepidochelys kempii*) – Federally Endangered

Kemp's ridley is a small grayish-olive colored sea turtle only reaching shell lengths of 26 inches. They feed on fast swimming crabs such as the blue crab (*Callinectes sapidus*). They spend much of their time in coastal areas such as estuaries (NMFS and FWS 2015). Two nests have been identified on South Carolina's beaches (exact location unknown) as of 2015 (SCDNR: Kemp's Ridley webpage).



"Kemp's Ridley Turtle." NOAA..
<https://www.fisheries.noaa.gov/species/kemps-ridley-turtle>

Loggerhead sea turtle (*Caretta caretta*) – Federally Threatened; Critical Habitat

Loggerhead sea turtles are a large turtle (up to 3 feet long), with a reddish-brown shell color, and relatively large heads that enable them to feed on hard-shelled prey such as whelks (SCDNR: Loggerhead Sea Turtle webpage). While they spend much of their adult lives foraging along the Mid-Atlantic Bight to Cape Hatteras, NC, they return to the same nest they hatched from during nesting season (mid-May to mid-August) (Murphy and Griffin 2005). South Carolina oceanic beaches represents 65% of the nesting females (average is 1,272 per year) within the



"Loggerhead Turtle." NOAA.
<https://www.fisheries.noaa.gov/species/loggerhead-turtle>

Northern Recovery Unit (Georgia, South Carolina, North Carolina, and Virginia) (Murphy and Griffin 2005b).

Leatherback sea turtle (*Dermochelys coriacea*) – Federally Endangered

Leatherback sea turtles are very large (shell up to 5.5 feet long), black sea turtles with a leathery covered carapace. They spend most of their adult lives feeding on jellyfish in the open ocean only coming to land to lay eggs on sandy beaches (NOAA: Leatherback Turtle webpage). In South Carolina, they have been found feeding on cannonball jellyfish near the coastline and are infrequently found nesting on sandy beaches [Murphy and Griffin 2005 (2)].



"Leatherback Turtle." NOAA.
<https://www.fisheries.noaa.gov/species/leatherback-turtle>

Potential impacts: All sea turtles nest on sandy, oceanfront beaches. They forage in coastal estuarine and marine environments (USFWS 2019). The I-526 corridor does not contain any potential sea turtle nesting sites, however Green sea turtles have been trapped by SCDNR in the Wando River upriver from the I-526 LCC EAST (SCDNR and pers. comm Jan 2020; Appendix C).

Plants:

Seabeach amaranth (*Amaranthus pumilus*) – Federally Threatened

The seabeach amaranth is a profusely branching, clumping annual plant with pink fleshy stems and leaves, and inconspicuous flowers that grows in transitional dunes of the Atlantic coast. The leaves are small (0.5-1-inch diameter) with indented veins, cluster near the tip of the stem, and have a small notch at the rounded tip. The USFWS describes their habitat as "occur[ing] on barrier island beaches, where its primary USFWS habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of non-eroding beaches" (USFWS 1996). It is best to survey between July and October (USFWS 1996).



"Seabeach Amaranth." USFWS.
https://www.fws.gov/raleigh/species/es_seabeach_amaranth.html

Potential impacts: Seabeach amaranth habitat does not occur within the I-526 LCC EAST.

American Chaffseed (*Schwalbea americana*) – Federally Endangered

American chaffseed is a perennial herb with unbranched stems, purplish and yellow tube-like flowers, lance-shaped leaves are 1-2 inches long, and are densely hairy throughout. Fruits are long, narrow capsules enclosed in a sac-like structure. It is hemi parasitic, relying on other plants for some nutrients, but is not host-specific. It occurs in "open, moist pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems". It is dependent on disturbance in the form of fire, mowing, or fluctuating water tables to maintain open canopies and blooms from May to August typically 1-2 months after a fire (USFWS 1995).



"American chaffseed." USFWS.
<https://www.fws.gov/southeast/wildlife/plants/american-chaffseed/>

Potential impacts: Suitable habitat for American chaffseed was not identified within the I-526 LCC EAST during surveys.

Pondberry (*Lindera melissifolia*) – Federally Endangered

Pondberry is a small (1-6 feet) deciduous shrub with leaves that are oval to oblong-shaped, thin, alternate, pointed tips, rounded base, entire margins, and the undersides are sparsely to densely covered in fine hairs. The leaf is strongly aromatic when crushed and resembles the smell of Sassafras (*Sassafras albidum*). It blooms before leaf emergence during February and March with small yellow flowers. They reproduce either through seeds, which are a bright red half inch long drupe, or vegetatively through colonial expansion of stems. The preferred South Carolina habitats are the “margins of limestone sinks and shallow depressions” (USFWS 1993).



https://www.fs.fed.us/wildflowers/Rare_Plants/profiles/TEP/lindera_melissifolia/index.shtml.

Potential impacts: Suitable habitat for Pondberry was not found within the I-526 LCC EAST during surveys.

Canby's dropwort (*Oxypolis canbyi*) – Federally Endangered

Canby's dropwort is a perennial herb with white flowers that resemble Queen Anne's lace, stiff, slender, hollow leaves on a round stem that grows to be 2.6-3.9 feet tall. The flower is made of compound umbels of small, five-parted, white flowers that bloom from mid-July to September and produce a small seed (0.16-0.24 inch) as early as October. Canby's dropwort suitable soil is sandy loam or acidic peat mucks underlain with clay. They grow best with little or no canopy cover (USFWS 1990).



"Canby's dropwort." Suiter, Dale.
https://www.fws.gov/raleigh/species/es/canbys_dropwort.html.

Potential impacts: Suitable habitat for Canby's dropwort was not found within I-526 LCC EAST during surveys.

BERKELEY COUNTY

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Amphibians	Frosted flatwoods salamander (T, CH)	<i>Ambystoma cingulatum</i>	January 1-April 30	Larvae present in breeding ponds
	Gopher frog (ARS)	<i>Lithobates capito</i>	Breeding: October-March	Call survey: February-April
Birds	American wood stork (T)	<i>Mycteria americana</i>	February 15-September 1	Nesting season
	Bald eagle (BGEPA)	<i>Haliaeetus leucocephalus</i>	October 1-May 15	Nesting season
	Red-cockaded woodpecker (E)	<i>Picoides borealis</i>	March 1-July 31	Nesting season
	Saltmarsh sparrow (ARS)	<i>Ammospiza caudacuta</i>	Fall/winter	Fall/winter surveys
Crustaceans	None Found			
Fishes	Atlantic sturgeon* (E)	<i>Acipenser oxyrinchus*</i>	February 1-April 30	Spawning migration
	Shortnose sturgeon* (E)	<i>Acipenser brevirostrum*</i>	February 1-April 30	Spawning migration
Insects	Frosted elfin (ARS)	<i>Callophrys irus</i>	March - June	
	Monarch butterfly (ARS)	<i>Danaus plexippus</i>	August-December	Overwinter population departs: March-April
Mammals	Northern long-eared bat (T)	<i>Myotis septentrionalis</i>	Year round	Winter surveys not as successful
	Tri-colored bat (ARS)	<i>Perimyotis subflavus</i>	Year round	Found in mines and caves in the winter
	West Indian manatee (T)	<i>Trichechus manatus</i>	May 1-November 15	In coastal waters
Mollusks	None Found			
Plants	American chaffseed (E)	<i>Schwalbea americana</i>	May-August	1-2 months after a fire
	Boykin's lobelia (ARS)	<i>Lobelia boykinii</i>	May-August	
	Canby's dropwort (E)	<i>Oxypolis canbyi</i>	Mid-July-September	
	Carolina-birds-in-a-nest (ARS)	<i>Macbridea caroliniana</i>	July-November	
	Ciliate-leaf tickseed (ARS)	<i>Coreopsis integrifolia</i>	August-November	
	Pondberry (E)	<i>Lindera melissifolia</i>	February-March	
	Raven's seedbox (ARS)	<i>Ludwigia ravenii</i>	June-October	
	Sun-facing coneflower (ARS)	<i>Rudbeckia heliopsidis</i>	July-September	
Reptiles	Eastern diamondback rattlesnake (ARS)	<i>Crotalus adamanteus</i>	Most of the year	Peak: April-November
	Southern hognose snake (ARS)	<i>Heterodon simus</i>	Most of the year	
	Spotted turtle (ARS)	<i>Clemmys guttata</i>	February-mid April	

CHARLESTON COUNTY

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Amphibians	Frosted flatwoods salamander (T, CH)	<i>Ambystoma cingulatum</i>	January 1-April 30	Larvae present in breeding ponds
	Gopher frog (ARS)	<i>Lithobates capito</i>	Breeding: October-March	Call survey: February-April
Birds	American wood stork (T)	<i>Mycteria americana</i>	February 15-September 1	Nesting season
	Bachman's warbler (E)	<i>Vermivora bachmanii</i>	May 1-June 15	Breeding
	Bald eagle (BGEPA)	<i>Haliaeetus leucocephalus</i>	October 1-May 15	Nesting season
	Black-capped petrel (ARS)	<i>Pterodroma hasitata</i>	April-October	Offshore water primarily
	Eastern black rail (P)	<i>Laterallus jamaicensis jamaicensis</i>	April-June	Minimum of five surveys/survey point
	Piping plover (T, CH)	<i>Charadrius melodus</i>	July 15-May 1	Migration and wintering
	Red-cockaded woodpecker (E)	<i>Picoides borealis</i>	March 1-July 31	Nesting season
	Red knot (T)	<i>Calidris canutus rufa</i>	August 1-May 31	Migration and wintering
	Saltmarsh sparrow (ARS)	<i>Ammodramus caudacuta</i>	Fall/winter	Fall/winter surveys
Crustaceans	None Found			
Fishes	Atlantic sturgeon* (E)	<i>Acipenser oxyrinchus*</i>	February 1-April 30	Spawning migration
	Shortnose sturgeon* (E)	<i>Acipenser brevirostrum*</i>	February 1-April 30	Spawning migration
Insects	Frosted elfin (ARS)	<i>Callophrys irus</i>	March - June	
	Monarch butterfly (ARS)	<i>Danaus plexippus</i>	August-December	Overwinter population departs: March-April
Mammals	Finback whale* (E)	<i>Balaenoptera physalus*</i>	November 1-April 30	Off the coast
	Humpback whale * (E)	<i>Megaptera novaengliae</i>	January 1-March 31	Migration off the coast
	Northern long-eared bat (T)	<i>Myotis septentrionalis</i>	Year round	Winter surveys not as successful
	Right whale* (E)	<i>Balaena glacialis</i>	November 1-April 30	Off the coast
	Sei whale* (E)	<i>Balaenoptera borealis</i>		
	Sperm whale* (E)	<i>Physeter macrocephalus</i>		
	Tri-colored bat (ARS)	<i>Perimyotis subflavus</i>	Year round	Found in mines and caves in the winter
	West Indian manatee (T)	<i>Trichechus manatus</i>	May 1-November 15	In coastal waters
Mollusks	None Found			

CHARLESTON COUNTY

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Plants	American chaffseed (E)	<i>Schwalbea americana</i>	May-August	1-2 months after a fire
	Boykin's lobelia (ARS)	<i>Lobelia boykinii</i>	May-July/August	
	Canby's dropwort (E)	<i>Oxypolis canbyi</i>	Mid-July-September	
	Ciliate-leaf tickseed (ARS)	<i>Coreopsis integrifolia</i>	August-November	
	Pondberry (E)	<i>Lindera melissifolia</i>	February-March	
	Seabeach amaranth (T)	<i>Amaranthus pumilus</i>	July-October	
Reptiles	Eastern diamondback rattlesnake (ARS)	<i>Crotalus adamanteus</i>	Most of the year	Peak: April-November
	Green sea turtle ** (T)	<i>Chelonia mydas</i> **	May 1-October 31	Nesting and hatching
	Kemp's ridley sea turtle ** (E)	<i>Lepidochelys kempi</i> **	May 1-October 31	In coastal waters
	Leatherback sea turtle ** (E)	<i>Dermochelys coriacea</i> **	May 1-October 31	Nesting and hatching
	Loggerhead sea turtle ** (T, CH)	<i>Caretta caretta</i> **	May 1-October 31	Nesting and hatching
	Southern hognose snake (ARS)	<i>Heterodon simus</i>	Most of the year	
	Spotted turtle (ARS)	<i>Clemmys guttata</i>	February-mid April	

* Contact National Marine Fisheries Service (NMFS) for more information on this species.

** The U.S. Fish and Wildlife Service (FWS) and NMFS share jurisdiction of this species.

ARS Species that the FWS 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.

ARS* Species that are either former Candidate Species or are emerging conservation priority species.

BGEPA Federally protected under the Bald and Golden Eagle Protection Act

C FWS or NMFS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list these species.

CH Critical Habitat

E Federally Endangered

P or P – CH Proposed for listing or critical habitat in the Federal Register

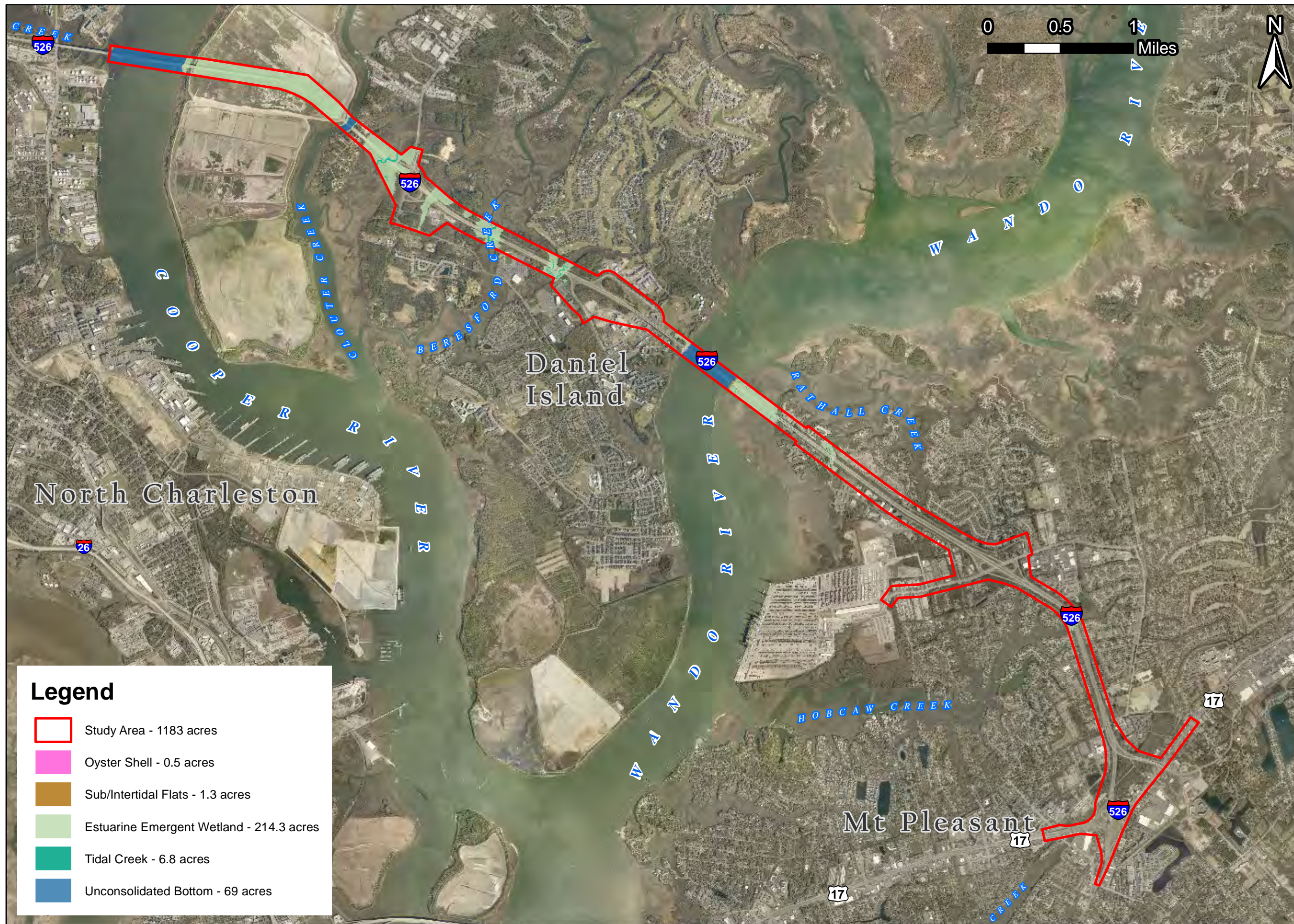
S/A Federally protected due to similarity of appearance to a listed species

T Federally Threatened

These lists should be used only as a guideline, not as the final authority. The lists include known occurrences and areas where the species has a high possibility of occurring. Records are updated as deemed necessary and may differ from earlier lists.

For a list of State endangered, threatened, and species of concern, please visit <https://www.dnr.sc.gov/species/index.html>.

Appendix E ESSENTIAL FISH HABITAT FIGURES



Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

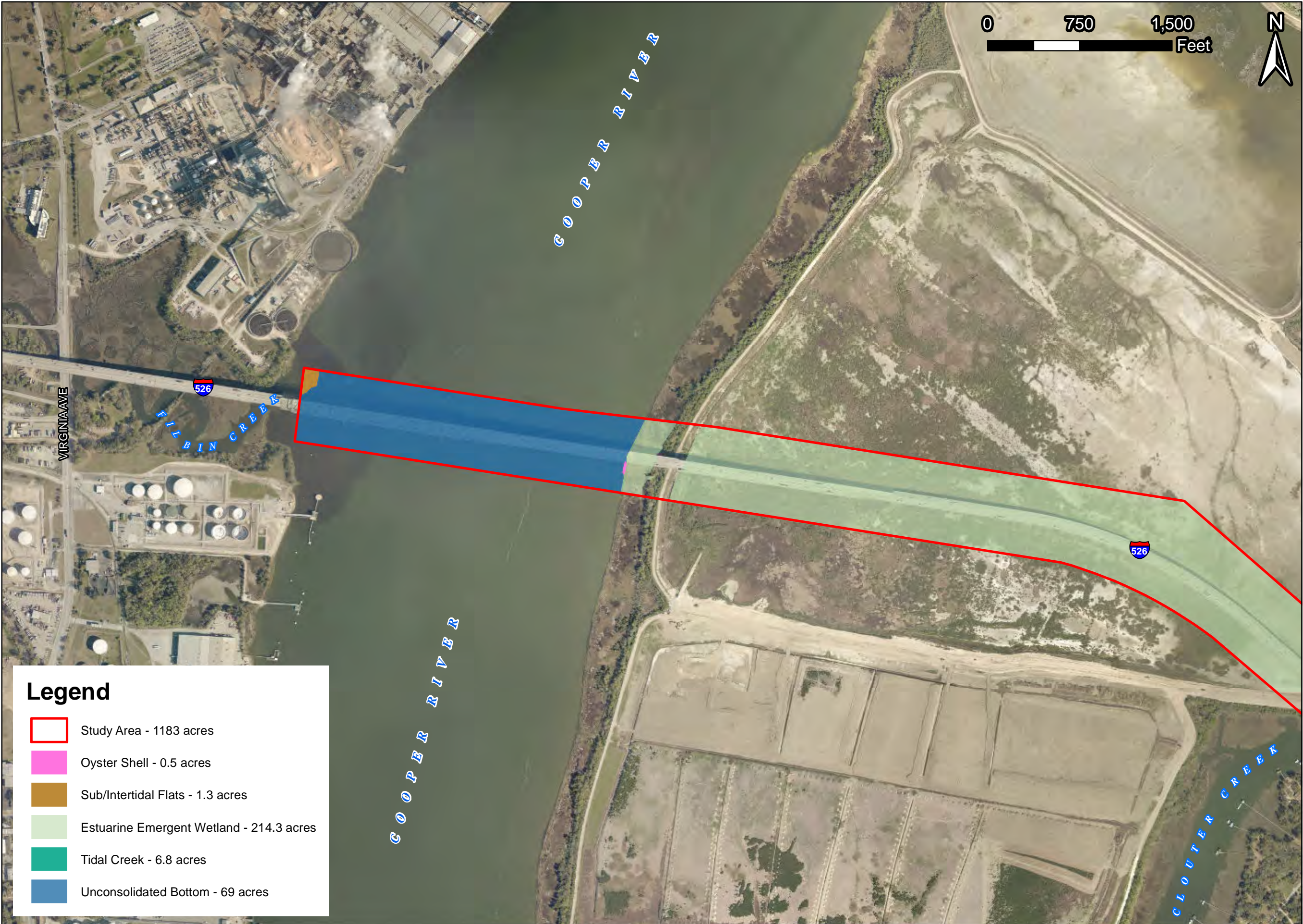
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1 in = 1 miles

Job No.:
P032102


Drawn By: TDM	Checked By: TRC
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Essential
Fish
Habitat
Classifications

Figure 1 of 10



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres



Prepared For:



**I-526
Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

Scale:
1 in = 750 ft

Job No.:
P032102


Drawn By: TDM	Checked By: TRC
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**Essential
Fish
Habitat
Classifications**

Figure 2 of 10



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres



Prepared For:



**I-526
Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

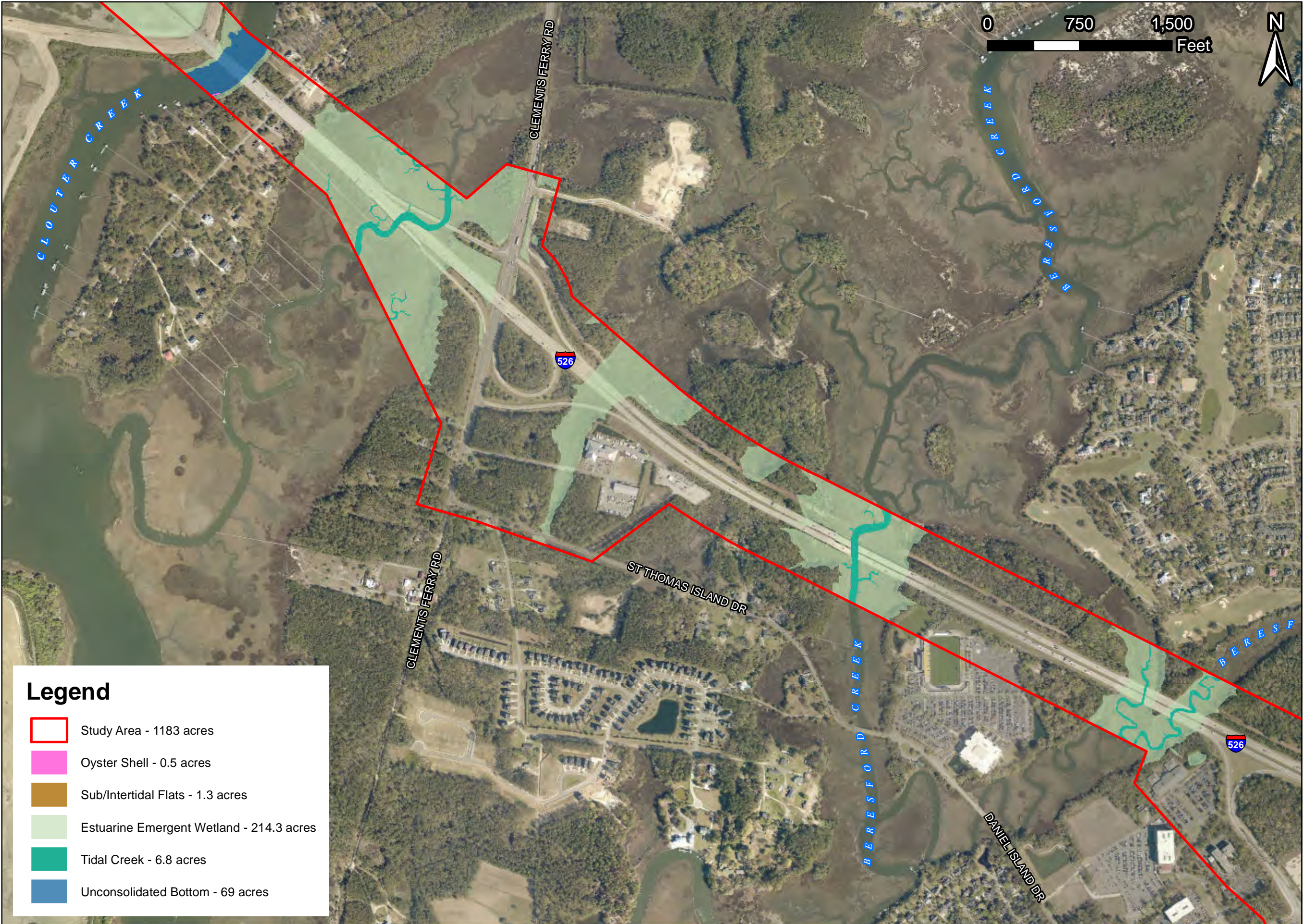
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1 in = 750 ft

Job No.:
P032102


Drawn By: TDM	Checked By: TRC
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**Essential
Fish
Habitat
Classifications**

Figure 3 of 10



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres



Prepared For:



**I-526
Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

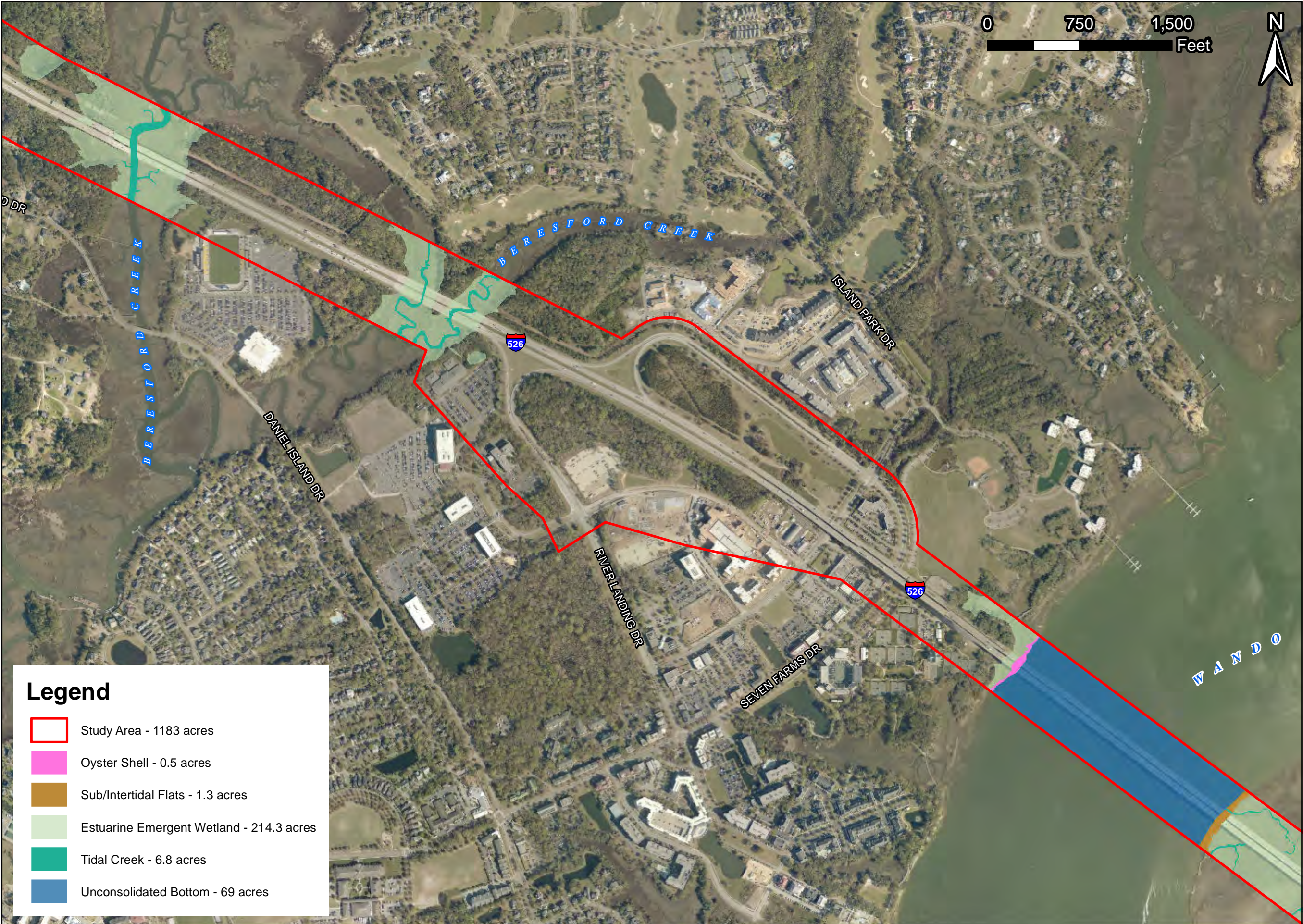
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1 in = 750 ft

Job No.:
P032102

Drawn By: TDM	Checked By: TRC
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**Essential
Fish
Habitat
Classifications**

Figure 4 of 10



Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

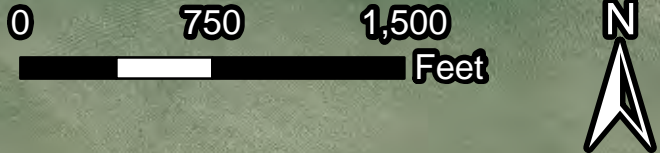
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1 in = 750 ft

Job No.:
P032102

Drawn By: TDM	Checked By: TRC
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Essential Fish Habitat Classifications

Figure 5 of 10



Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

Scale:
1 in = 750 ft

Job No.:
P032102

Drawn By: TDM	Checked By: TRC
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Essential Fish Habitat Classifications

Figure 6 of 10

Legend

- Study Area - 1183 acres
- Oyster Shell - 0.5 acres
- Sub/Intertidal Flats - 1.3 acres
- Estuarine Emergent Wetland - 214.3 acres
- Tidal Creek - 6.8 acres
- Unconsolidated Bottom - 69 acres



Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

Scale:
1 in = 750 ft

Job No.:
P032102


Drawn By: TDM	Checked By: TRC
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Essential Fish Habitat Classifications

Figure 7 of 10



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres



Prepared For:



**I-526
Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

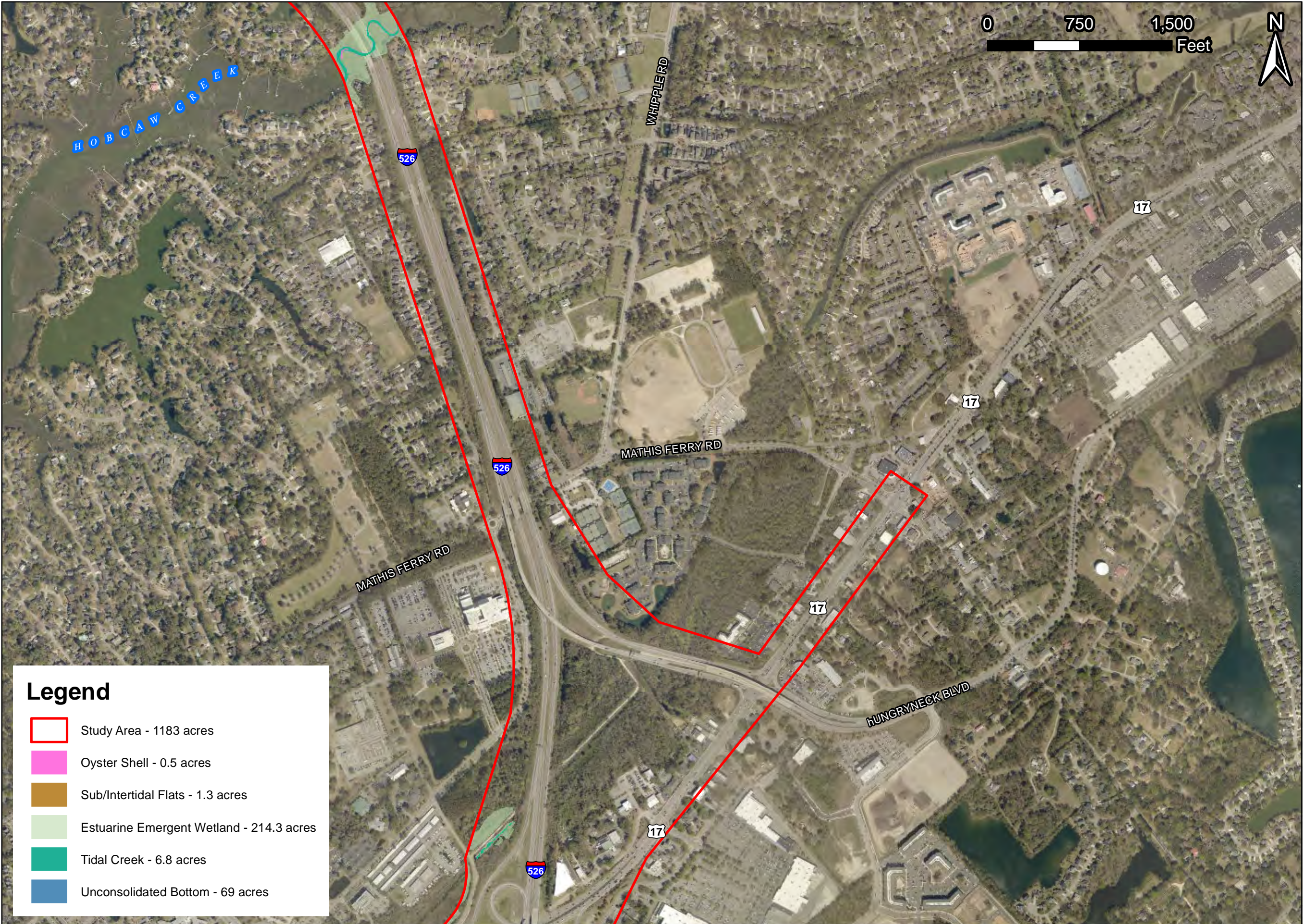
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1 in = 750 ft

Job No.:
P032102


Drawn By: TDM	Checked By: TRC
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**Essential
Fish
Habitat
Classifications**

Figure 8 of 10



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres



Prepared For:



**I-526
Lowcountry
Corridor
EAST**

Berkley and Charleston
Counties, SC



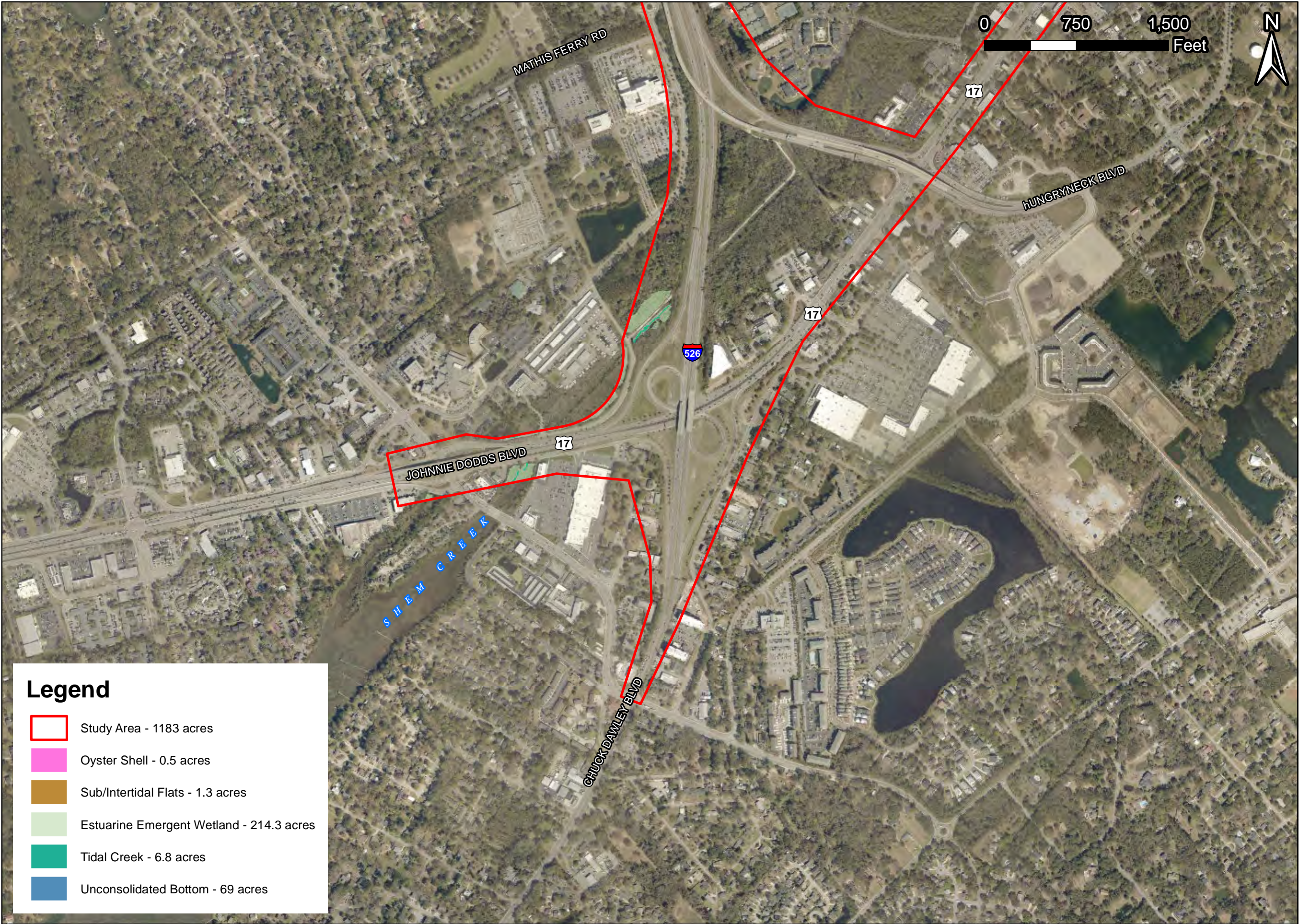
Date:
March 12, 2020

Scale:
1 in = 750 ft







Job No.:
P032102

Drawn By: TDM	Checked By: TRC
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**Essential
Fish
Habitat
Classifications**



Legend

-  Study Area - 1183 acres
-  Oyster Shell - 0.5 acres
-  Sub/Intertidal Flats - 1.3 acres
-  Estuarine Emergent Wetland - 214.3 acres
-  Tidal Creek - 6.8 acres
-  Unconsolidated Bottom - 69 acres

Prepared For:



I-526 Lowcountry Corridor EAST

Berkley and Charleston
Counties, SC



Date:
March 12, 2020

Scale:
1 in = 750 ft

Job No.:
P032102

Drawn By: TDM	Checked By: TRC
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Essential Fish Habitat Classifications

Figure 10 of 10

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