



3.19 What are floodplains?

Floodplains are low-lying areas located adjacent to the channel of a river, stream, or other type of waterbody. These areas are subject to periodic flooding during heavy rains and/or long periods of wet weather. The flood prone area of a stream or river system is twice the height of its maximum bankfull depth, therefore in areas of lower topographic relief, such as the Atlantic Coastal Plain of South Carolina, the floodplain would, by definition, be more expansive than in regions of higher elevation.¹¹⁰ Coastal Plain rivers, in particular, have been described as generally meandering with broad alluvial valleys.¹¹¹

A floodplain provides important functions in the natural environment such as:

- providing temporary storage of flood waters;
- preventing heavy erosion caused by fast moving water;
- providing a vegetative buffer to filter silt and contaminants before entering a waterbody;
- recharging and protecting groundwater; and
- accommodating the natural movement of streams.

3.19.1 What agencies regulate floodplains?

The National Flood Insurance Program is administered by the Federal Emergency Management Agency (FEMA), with the SCDNR serving as the state National Flood Insurance Program Coordinating Office. Through the assistance of FEMA and SCDNR, Dillon, Marion, and Horry Counties have performed Flood Insurance Studies to identify flood hazards for the purposes of floodplain management and insurance determinations. Those portions of floodplain areas that are considered jurisdictional wetlands are additionally regulated by Sections 401 and 404 of the Clean Water Act.

Congress created the National Flood Insurance Program in 1968 to minimize the taxpayer burden caused by escalating flood costs and to reduce such costs in the future by implementing floodplain protection ordinances and flood insurance that placed a premium on actual flood related risk.

3.19.2 How were the floodplain boundaries determined for this study?

The National Flood Insurance Program produces map zones of flooding risk, Flood Insurance Rate Maps that can be obtained from FEMA. The limits of floodplains are determined by forecasting the elevation to which flood waters may rise during a 100-year storm event and then overlaying them onto a map showing the existing topography. A 100-year floodplain is the area adjacent to a waterbody that has a one percent chance of flooding in any given year. A floodway is the area within a waterbody that must be free from any type of encroachment (obstacle) to allow the discharge of water during a 100-year flood without raising the water levels more than one foot.

¹¹⁰ Rosgen, Dave, *Applied River Morphology* (Pagosa Springs: Wildland Hydrology Books, 1996) 19.

¹¹¹ Shankman, D. and Smith, L. "Stream Channelization and Swamp Formation in the U.S. Coastal Plain" *Physical Geology* 2004, Vol. 22: 22-38.



Mapping available for the project study area did not differentiate between the floodplains and floodways and all areas within the floodplain were designated as Zone A. Zone A is the flood insurance rate zone that corresponds to 100-year floodplains determined by approximate methods and has a one percent chance of flooding in any given year. Detailed hydraulic analyses are not performed by FEMA for Zone A areas so no Base Flood Elevations or depths are shown within this zone.

3.19.3 What floodplains might be affected by the project?

Approximately 28 percent of the land area within the project study area is within a FEMA designated 100-year floodplain. Table 3.56 lists the rivers, streams, and wetland areas within Zone A in the vicinity of the proposed alternatives. Figure 3-36, page 3-139, illustrates the extent of floodplains within the project study area.

Waterway	County	HUC Code (Watershed/ Tributary of)
Old Mill Creek	Dillon	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Pee Dee River	Dillon, Marion	03040204-030 (Little Pee Dee River)
Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Maidendown Swamp	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Horsepen Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Little Horsepen Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Smith Swamp	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Grassy Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Stackhouse Creek	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Lake Swamp	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Joiner Swamp	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Mill Branch	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Chinners Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Brunson Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Spring Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Dawsey Swamp	Horry	03040204-070 (Little Pee Dee River)
Tredwell Swamp	Horry	03040204-070 (Little Pee Dee River)



3.19.4 How do the alternatives affect floodplains?

Flood Insurance Rate Maps identifying the 100-year floodplain were used to determine impacts associated with the alternatives for the I-73 project. The No-build Alternative was also reviewed as part of the impact analysis. Proposed construction limits for each alternative was used to estimate the impacted area within the floodplain. Table 3.57, page 3-190, lists the floodplain crossings for each alternative.

3.19.5 What direct impacts would there be to floodplains?

There are 26 different potential crossing points for the eight alternatives. The maximum number of crossings for an alternative was 16 for Alternative 4, while the minimum of crossings was 5 for Alternative 3. The area of floodplain impacts was totaled for each alternative, and it was found that Alternative 3 would have the least amount of floodplain impacts with 94 acres, while Alternative 7 would have the highest impacts with 323 acres. Impacts for each alternative are summarized in Table 3.58, page 3-191. The No-build Alternative would not have an effect on the floodplains in the project study area.

Engineering analysis of the floodplain impacts were conducted to further avoid and reduce impacts by bridging where possible. The use of bridges serves a dual function by reducing wetland disturbance, while minimizing the impact of construction within the floodplain. Bridge piers would, however, have to be placed in regulatory floodways and/or floodplains for the construction of these structures. Furthermore, where feasible the proposed crossings are located adjacent to existing road crossings where the additional impact would be minimized.

The preliminary level of design for the bridges and culverts did not include detailed hydrology studies at this stage of project development. Additionally, the mapped areas within the project study area are all shown as Zone A, which does not provide base flood elevations. However, floodplain encroachments are not likely to increase the flooding in the area since bridge structures would need to be designed to FEMA standards and result in less than a one-foot rise in the base flood elevation. Furthermore, structures would provide the minimum freeboard¹¹² above the design flood elevation and would not be exceeded by the 100-year storm. In order for a transportation project to comply with Executive Order 11988, a detailed hydrological study of the Preferred Alternative must be completed. Bridge and culvert designs must be conducted, as required by 23 CFR 650, Subpart A, *Location and Hydraulic Design of Encroachment on Floodplains*. This analysis would include establishing base flood elevations and adjusting bridge and culvert designs to minimize the risk of flooding upstream to less than one foot, as required by FEMA. Ongoing design efforts and coordination with resource and regulatory agencies will ensure that floodplain impacts are minimized during the design process.

¹¹² Freeboard is “a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. ‘Freeboard’ tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.” Floodplain Management Association, last accessed April 23, 2006. http://www.floodplain.org/glossary_of_terms.htm



Table 3.57
Floodplain Crossings Locations and Impact Areas
Interstate 73 EIS: I-95 to Myrtle Beach Region

Location	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Length of Impact (ft)	Acres of floodplain encroachment
Little Pee Dee (U.S. 501)	X	X		X	X		X	X	15,381	157.4
Little Pee Dee (S.C. 917)			X			X			12,100	83.5
Lake Swamp			X			X			1,357	3.1
Joiner Swamp			X			X			0	0
Chinners Swamp (Mill Branch)	X			X				X	0	0
Chinners Swamp	X			X				X	0	0
Brunson Swamp	X			X				X	0	0
Spring Swamp	X			X					0	0
Dawsey Swamp	X			X				X	464	3.2
Dawsey Swamp (Trib A)		X			X		X		500	2.8
Dawsey Swamp (Trib B)		X			X		X		870	6.1
Tredwell Swamp	X			X				X	363	3.3
Reedy Creek (near Fox Bay)	X	X			X			X	290	2.4
Maidendown Swamp	X	X	X		X	X		X	702	4.5
Reedy Creek Main Channel				X			X		623	5.2
Little Reedy Creek				X			X		558	3.6
Little Horsepen Bay				X			X		3,190	29.4
Smith Swamp				X			X		1,016	9.4
Grassy Bay				X			X		9,700	98.2
Stackhouse Creek 1				X			X		360	2.2
Stackhouse Creek 2				X			X		600	4.1
Stackhouse Creek 3				X			X		370	2.7
Little Reedy Creek	X		X	X	X		X		1,100	2.5
Buck Swamp		X				X		X	0	0.00
Old Mill Creek		X				X		X	530	6.6
Reedy Creek		X				X		X	3,400	13.3
Total Crossings	10	8	5	16	6	7	12	11		



Table 3.58
Summary of Floodplain Impacts
Interstate 73: I-95 to the Myrtle Beach Region

Alternative #	Number of Crossings	Total Impacted Area (acres)
1	10	173
2	8	193
3	5	94
4	16	321
5	6	176
6	7	111
7	12	323
8	11	191

3.20 Are there any Federally-protected species or state species of concern in the project study area?

3.20.1 What are threatened and endangered species?

The *Endangered Species Act of 1973*, (ESA) as amended, requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Furthermore, the ESA requires that actions are not likely to result in the destruction or adverse modification of critical habitat of such species. The USFWS determines whether a species should be listed or not. Once listed, the species is protected under the ESA until its population has recovered to the point that it can be taken off the list, or delisted. If a federally-protected species is present in a project study area, the federal agency responsible for the project must consult with the USFWS or NOAA. These agencies determine whether the proposed actions are not likely to adversely impact the species or its habitat, which may lead to further decline or extinction.

Threatened and endangered species are plant and animal species that are at risk of becoming extinct throughout their range or a portion of their range.

3.20.2 What federally-listed species are potentially found in the project study area?

The *South Carolina Distribution Records of Endangered, Threatened, Candidate, and Species of Concern*, July 2005, was obtained from the USFWS. This is a list of known and possibly occurring threatened, endangered, candidate, and species of concern in South Carolina. The federally-protected species for the three counties that encompass the project study area are listed in Table 3.59, page 3-192.

Of the 15 species listed for Dillon County, Marion County, and Horry County, five are found primarily in marine or estuarine aquatic habitats (see species marked with “*” in Table 3.59, page 3-192). Two additional species marked with a †, sea-beach amaranth and the piping plover, require saltmarsh and/or beachfront



**Table 3.59
Federally-Protected Species in
Dillon County, Marion County, and Horry County, South Carolina
Interstate 73 EIS: I-95 to the Myrtle Beach Region**

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	COUNTY
Plants			
<i>Amaranthus pumilus</i>	Sea-beach amaranth [†]	Threatened	Horry
<i>Lindera melissifolia</i>	Pondberry	Endangered	Horry (possible)
<i>Oxypolis canbyi</i>	Canby's dropwort	Endangered	Horry (possible), Marion
<i>Schwalbea americana</i>	American chaffseed	Endangered	Horry (possible)
Animals			
<i>Trichechus manatus</i>	West Indian manatee*	Endangered	Horry
<i>Haliaeetus leucocephalus</i>	Bald eagle	Threatened	Dillon, Horry, Marion
<i>Picoides borealis</i>	Red-cockaded woodpecker	Endangered	Dillon, Horry, Marion
<i>Mycteria americana</i>	Wood stork	Endangered	Horry, Marion (possible)
<i>Dendroica kirtlandii</i>	Kirtland's warbler	Endangered	Horry (possible)
<i>Charadrius melodus</i>	Piping plover [†]	Threatened	Horry
<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle*	Endangered	Horry
<i>Dermochelys coriacea</i>	Leatherback sea turtle*	Endangered	Horry
<i>Caretta caretta</i>	Loggerhead sea turtle*	Threatened	Horry
<i>Chelonia mydas</i>	Green sea turtle*	Threatened	Horry
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	Endangered	Dillon (possible), Horry, Marion

Source: *South Carolina Distribution Records of Endangered, Threatened, Candidate, and Species of Concern*, July 2005.

[†]Indicates a species that requires saltmarsh and/or beachfront dune habitat.

*Indicates a species that inhabits marine or estuarine aquatic habitats.

dune habitat. No marine or estuarine aquatic, saltmarsh, or beachfront dune habitats exist in the project study area except along the shore, east of where the alternatives would be located; therefore, these species will not be discussed further in this section.

3.20.3 What has been done to avoid impacts to federally-protected species on this project?

The SCDNR Heritage Trust Program maintains a database of known locations of rare, threatened, and endangered species within the state of South Carolina. This database was added to a GIS data layer during the development of potential roadway alternatives. Buffers of varying widths, dependent on the species habitat requirements, were established around each of the known locations of federally-listed species:



- red-cockaded woodpecker sites were buffered ½ mile;
- wood stork sites were buffered 2500 feet;
- bald eagle sites were buffered ¼ mile; and
- federally-listed plant sites were buffered 100 feet.

These locations and point locations of rare state species were designated as constraints when developing alternatives. These constraints could not have the alternatives routed through them. Field visits were conducted along the preliminary alternatives in April, May, August, and September 2005 to evaluate whether potential habitat existed for the federally-listed species. Habitat types varied from suitable to marginally suitable to unsuitable, depending on the species.

3.20.4 What do the federally-listed species look like and where are they found?

Typically, federally-listed species require specific conditions to sustain them. Those conditions, or habitat requirements, are well documented for protected species. A literature search was performed to determine habitat requirements and to find descriptions of the federally-listed species that would aid in identification during field surveys. Important sources of reference information included natural resource agency data and published reports, various botanical and faunal literature, and available USFWS Recovery Plans. The following are descriptions of the federally-listed species known to occur or that could possibly occur and their habitat requirements.



Pondberry
Charleston County, S.C.
Photo by Jay Gable

Pondberry

Pondberry is a deciduous shrub with an alternate drooping leaf arrangement that reaches up to six feet in height. The leaves and other parts are aromatic, having a fragrance very similar to sassafras when crushed. In March, before the leaves come out, small yellow flowers appear in clusters along the branches. The bright red fruits mature in late summer to early fall. Pondberry grows along the edges of sandy lime sinks, ponds, swamp forests, open bogs, and in wet depressions in pine flatwoods. It prefers shaded areas, but is sometimes found in areas of full sun.

Pondberry has not been previously found in Dillon, Horry, or Marion Counties; however, according to the USFWS, it could possibly occur in Horry County. Areas of marginally suitable pondberry habitat were

What does suitable, marginally suitable, and unsuitable habitat mean?

Suitable habitat for a particular species means that special conditions that it requires to survive are present such as: the proper soil type; open or forested areas; the presence or the absence of water; nesting structures; and food sources.

Marginally suitable habitat is an area that has been altered from its natural condition in some way and the alteration has affected the special conditions that certain species of plants and/or animals need to survive. Often times protected species can survive in these altered areas.

Unsuitable habitat means that the special conditions required by species to survive are either not present or has been altered such that protected species can no longer live there.



present in and adjacent to the inundated forested wetlands found in the project study area, however, no pondberry was found during the preliminary field visits along the Build Alternatives.

Canby's dropwort

Canby's dropwort is a perennial herbaceous plant that grows to approximately four feet tall. It has a slender stem that is purplish at the base and green above. The stem may branch above the middle. The leaves are long, slender and quill-like. Flowers of Canby's dropwort are tiny (~0.1 inches across), with white petals and are arranged in compound umbels.¹¹³ Canby's dropwort favors the high water table, open canopy, and medium- to highly-organic soils found in cypress-pine ponds, sloughs, drainage ditches, wet meadows, and wet pine savannas.

According to the USFWS, Canby's dropwort could occur in Horry County, and is documented to occur in Marion County. Marginally suitable habitat is found in wetlands such as those found in maintained utility corridors; however, Canby's dropwort was not found during the preliminary field visits along the Build Alternatives.



Canby's dropwort
Marion County, S.C.

Photo by Gordon Murphy

American chaffseed

American chaffseed is an upright, perennial herb with a stem that is unbranched or only has branches at the base of the plant. It grows to a height of one to two feet. It has lance-shaped to elliptic alternate leaves that connect directly to the stem at the base. Upper leaves are reduced to small bracts, and the purplish yellow flowers of the plant arise from the area where the upper surface of these bracts meets the stem of the plant. The flowers, which are borne on small stalks, are tubular in shape and range from 1.2 to 1.4 inches in length. The inflorescence exhibited by the plant, with many stalked flowers concentrated on the upper portion of an unbranched stem is referred to as a raceme. Flowering occurs from April to June and fruits begin to mature shortly afterward in early summer. The fruit is a narrow capsule about a half-inch long.



American chaffseed
Williamsburg County, S.C.
Photo by Gordon Murphy

American chaffseed is restricted to longleaf pine flatwoods and savannas, ecotonal areas between peaty wetlands and xeric sandy soils (in the uphill portions), mesic loamy-soil slopes or swales in longleaf pine sandhill woodlands, and other open, grass-sedge systems. It typically requires areas

¹¹³ Murdock, Nora and Rayner, Douglas. *Recovery Plan for Canby's Dropwort*. Asheville Field Office, USFWS, 1990.



of habitat that are subject to frequent disturbance due to burning or occasional mowing and/or areas with a fluctuating water table. These conditions can impede the growth of some herbaceous species and thereby make the conditions more favorable for chaffseed to grow and compete due to its ability to better tolerate these conditions. This species prefers areas with an open or partially open overstory.

According to the USFWS, American chaffseed could occur in Horry County, however, it has not been found in any of the three counties. During the preliminary field visits no areas of potentially suitable habitat for this species were observed along the Build Alternatives. Fire has been excluded from the majority of the project study area so that herbaceous and shrubby vegetation is thick in areas that may otherwise be suitable for this species. In addition, the majority of the wet flatwood areas have closed canopies and dense understories that shade out this species.

Bald eagle

The bald eagle is a large bird of prey with a dark brown body and conspicuous white coloration on the head, neck, and tail. Its wingspan may reach up to seven feet, and it can weigh as much seven pounds as an adult. The bald eagle is typically associated with coasts, rivers, and lakes. The bald eagle requires large trees with an open limb structure for nesting, usually in a forest/marsh ecotone within one kilometer (0.62 miles) of open water. Large trees allow for bald eagles to build large nests that can support nesting for many years without falling. The open limb structure provides easy access and a clear view of foraging habitat. Nesting habitats initially selected by eagles usually have limited disturbance. Trees suitable for perching and future nesting sites are also important components of stable nesting territories. Fresh, brackish and marine habitats provide suitable foraging sites and these habitats can include open water, marsh and riverine types. Prime habitats are characterized by having shallow, slow moving water with abundant fish and bird prey. Preferred sites have suitable perch and roost sites with minimal disturbance. Large man-made reservoirs in South Carolina have provided many acres of new inland eagle foraging habitat. Concentrations of eagles may be found below hydroelectric dams where they forage on injured fish. Impounded marsh managed for waterfowl is also preferred foraging and nesting habitat.



Bald eagle

Photo by USFWS/Mike Lockart

Potentially suitable habitat for the bald eagle is present along the Little Pee Dee River within the project study area. However, no eagle nests were observed during the preliminary field visits along the Build Alternatives.

Red-cockaded woodpecker

The red-cockaded woodpecker is a small woodpecker with a wingspan up to 15 inches. The bird has black and white horizontal stripes on its back, white cheeks and breast, black-streaked flanks, and a black



cap and throat. Males have small red spots or “cockades” on each side of the cap just behind the eye.¹¹⁴ The cockade is very difficult to see in the field.

The red-cockaded woodpecker prefers old-growth pine forests (trees at least 60 years old) that are relatively free of hardwood undergrowth for nesting habitat. Suitable foraging habitat includes pine and pine hardwood stands with pine trees at least 30 years of age. Primary literature concerning the red-cockaded woodpecker states that colonies typically require areas of at least 100 acres of suitable habitat. The range of the red-cockaded woodpecker mirrors that of southern pine forests that it inhabits. Historically it was found from eastern Texas to Florida and north to New Jersey.



Red-cockaded woodpecker

Sumter County, S.C.

Photo by Gordon Murphy

The majority of the pine stands in the project study area have dense undergrowth present due to fire suppression. During the preliminary field visits, areas of planted/managed pine were observed that could serve as suitable foraging habitat. However, no suitable nesting habitat was observed near the foraging habitat identified along the Build Alternatives.

Wood stork

The wood stork is a large wading bird that reaches four feet in height and has a wingspan of up to five feet. The bird’s plumage is white except for the black feathers on its tail, primary feathers, and the trailing edge of its wings. Its head and neck are featherless and its long bill is black in color.¹¹⁵

Wood storks typically nest in the upper branches of black gum (*Nyssa biflora*) or cypress (*Taxodium distichum*) trees that are in standing water of swamps along rivers and streams or adjacent to shallow lakes. Standing water deters mammalian predators and is an essential element of colony sites. Storks require open access to nest trees and are frequently found in trees adjacent to open water areas. They frequently feed in large groups in open wetlands where prey species are available and water depths are less than 20 inches. Forested riverine floodplain habitats are frequently used, but a variety of ponds, ditches and diked marsh impoundments are important habitats. Receding water, especially in areas that flood in the spring and begin to dry up in the summer, enhances feeding by concentrating fish for the catch. Storks also forage around low tide along



Wood stork

Photo by

USFWS/John & Karen Hollingsworth

¹¹⁴ USFWS, *The Red Book*. 1993.

¹¹⁵ USFWS, *The Red Book*. 1996.



many coastal tidal creeks. In South Carolina, colony sites are surrounded by extensive wetlands, in particular palustrine forested wetlands.

Potentially suitable habitat for the wood stork does exist in the cypress-tupelo swamps along major drainages such as the Little Pee Dee River and Buck Swamp in the project study area. However, no areas within the project study area have been documented as stork nest sites, and there may be an insufficient amount of shallow marshy foraging habitat in the area for the Little Pee Dee River swamp to attract them. No wood storks or their rookeries were observed along the Build Alternatives during the preliminary field visits.

Kirtland's warbler

Kirtland's warbler is a small (approximately six inches) wood warbler with a finely pointed bill. The plumage is bluish-gray with black streaks on the back. The male has a black mask. The underparts are yellow with distinct dark streaks on the sides of the breast. Another identifying characteristic is that it constantly bobs its tail up and down.

Kirtland's warbler is a very rare transient in South Carolina. It breeds in only a few protected stands of jack pines in Michigan, and over-winters in the Bahamas. Its migration takes it across the state in late April to early May, and early September to October. The bird frequents thickets and woodland edges on high ground just beyond the wet margins of lakes and swamps, often in association with flocks of other songbirds.



Kirtland's warbler
Photo by Cory Glidersleeve

Potentially suitable habitat for Kirtland's warbler is present along major drainages such as the Little Pee Dee River and Buck Swamp within the project study area. Kirtland's warblers were not observed along the Build Alternatives during the preliminary field visits.

Shortnose sturgeon

The shortnose sturgeon is a fish that reaches a maximum length of approximately four feet and weigh as much as 14 pounds. It has a life-span that reaches up to 60 years or more. The forked tail of the fish is larger on the upper lobe than the lower lobe. It has five rows of bony plates called scutes that run the length of its body. One row of scutes is located on each side and along its back, and two rows of scutes are located along its belly. The shortnose sturgeon varies in color from olive gray to yellowish brown on its sides. Darker coloration is found along the midline of its dorsum and the top of the head, and the underside is typically pale in color. The shortnose sturgeon possesses a short, blunt snout. Its mouth protrudes from



the underside of the snout enabling it to forage along the substrate for prey items such as mussels and crustaceans.

The shortnose sturgeon is found in riverine, estuarine, and occasionally near-shore marine environments of eastern North America and the Atlantic Ocean. Spawning and larval stages of the life cycle typically occur in freshwater channels of large, unobstructed river basins from as far inland as the fall line to the zone of tidal influence in estuarine or brackish channels. Foraging occurs near the freshwater/saltwater interface in riverine and estuarine environments, i.e., sounds and bays of river basin deltas. In South Carolina, the drainage basins utilized for spawning and foraging are the Pee Dee/ Waccamaw, Santee, Cooper, ACE Basin (Ashepoo, Combahee and Edisto rivers), and Savannah.¹¹⁶ Threats include pollution, incidental take by commercial fisheries, impingement at hydroelectric and nuclear power intakes, poaching, and alteration of habitat due to damming of rivers.



Shortnose sturgeon

Image: Duane Raver

The NMFS has identified the mainstem portions of the Little Pee Dee River within the project study area as adult sturgeon spawning habitat and many of the smaller streams with associated inundated wetlands as potential nursery habitat. Spawning migrations occur from January through March.

3.20.5 How could federally-protected species be affected by the proposed project?

The proposed alternatives avoid all known locations of federally-protected species. However, once the Preferred Alternative is selected, intensive field surveys for federally-listed species will be performed in the identified suitable and marginally-suitable habitats in conjunction with the wetland delineation. If federally-protected species are found during the field surveys, informal consultation with the USFWS would occur. If it is determined that unavoidable impacts would occur to a federally-protected species, formal consultation with the USFWS would occur.

Suitable habitat for American chaffseed was not identified along the Build Alternative corridors. Marginally-suitable habitat was identified for pondberry and Canby’s dropwort. Suitable habitat for the bald eagle, wood stork, Kirtland’s warbler, red-cockaded woodpecker, and shortnose sturgeon was identified along the Build Alternatives. None of these species were observed during the preliminary site visits.

A review of the SCDNR species occurrence database indicates that pondberry has not been previously documented in Dillon, Horry, or Marion Counties. According to the list of federally-protected obtained from the USFWS, it could possibly occur in Horry County. Areas of marginally suitable habitat were observed adjacent to the inundated forested wetlands found along all of the Build Alternatives. Pondberry was not observed during the preliminary site visits. Therefore, it is anticipated that the proposed project would not affect the species.

¹¹⁶SCDNR Comprehensive Wildlife Conservation Plan website, <http://www.dnr.sc.gov/wcp/pdf/Sturgeon.pdf> Last Accessed May 22, 2006.



According to the SCDNR species occurrence database, Canby's dropwort has not been previously documented in the project study area. According to the list of federally-protected obtained from the USFWS, Canby's dropwort possibly occurs in Horry County. Marginally suitable habitat occurs within the construction limits of the Build Alternatives; however, Canby's dropwort was not observed during the preliminary field visits. Therefore, it is anticipated that the proposed project would not affect the species.

Suitable habitat for the bald eagle is present along the Little Pee Dee River within the project study area; however, no nests were observed at the proposed river crossings during the preliminary site visits. Therefore, it is anticipated that the proposed project would not affect the species.

Potentially suitable habitat for the wood stork exists in the cypress-tupelo swamps along major drainages such as the Little Pee Dee River and Buck Swamp in the project study area. However, no areas within the project study area have been documented as stork nest sites, and there may be an insufficient amount of shallow marshy foraging habitat in the area for the Little Pee Dee River swamp to attract them. Therefore, it is anticipated that the proposed project would not affect the species.

Suitable habitat that the Kirtland's warbler uses during migration exists in the project study area. However, nesting and over-wintering habitat would not be lost as a result of the proposed project. In addition, suitable temporary habitat is common in South Carolina for transient migrants of this species and is therefore not a limiting factor. Therefore, it is anticipated that the proposed project would not affect the species.

Red-cockaded woodpeckers are known to nest within the project study area. However, no old-growth pine forests free of hardwood undergrowth was observed within the construction limits of the Build Alternatives. Most of the pine stands present within the construction limits are less than 30 years of age or have dense undergrowth present due to fire suppression and therefore not suitable for nesting or foraging habitat. No red-cockaded nest cavities or woodpeckers were observed during the preliminary site visits. It is anticipated that the proposed project would not affect the species.

Suitable habitat was identified for the shortnose sturgeon. The proposed project would cross the Little Pee Dee River as well as streams identified as nursery habitat. For projects that involve bridge crossings of rivers used by the shortnose sturgeon for spawning migrations, the SCDOT has agreed to implement a seasonal moratorium for all in water work between February 1 and April 30, and work will not impede more than 50 percent of the channel during the months of January through April. Filling wetlands associated with the smaller streams identified as nursery habitat would result in a direct loss of potentially suitable nursery habitat. The project may affect, but is not likely to adversely affect, the shortnose sturgeon.



With the exception of the shortnose sturgeon, it is anticipated that the proposed project would not affect any federally listed species. However, thorough field surveys will be conducted at the suitable and marginally suitable habitats that have been identified for the Preferred Alternative. It is anticipated any of the alternatives may affect, but not likely to adversely affect the shortnose sturgeon.

3.20.6 What would happen if a federally-protected species was affected by the proposed project?

Section 7 of the Endangered Species Act of 1973 requires federal agencies ensure that their activities will not jeopardize the continued existence of federally protected species. If it is determined during the development of the project that the action may jeopardize the continued existence of federally listed threatened or endangered species or its designated critical habitat, formal Section 7 consultation would begin and the USFWS would prepare a biological opinion in which practicable alternatives would be identified that could allow the completion of the project. If it is determined that the proposed project would jeopardize the continued existence of a species or modify its critical habit with the implementation of the practicable alternatives the USFWS may issue an incidental take statement.

3.20.7 What would indirect and cumulative impacts to federally-protected species be?

Known locations of red-cockaded woodpecker nesting colonies were avoided by the I-73 project. A GIS analysis was performed to determine if impacts to known occurrences of federally-protected species within the project study area would occur as the result of induced development associated with the I-73 project. The analysis indicated that development associated with all of the Build Alternatives and the No-build Alternative, as predicted by the land use models, would encroach into the red-cockaded woodpecker 0.5-mile buffer. No other federally protected species are anticipated to be indirectly impacted by the project.

The proposed project may affect, but is not likely to adversely affect the shortnose sturgeon. No direct impacts to the bald eagle or wood stork would occur as a result of the project. However, cumulative impacts could occur to these species. Shortnose sturgeon threats include pollution, incidental take by commercial fisheries, impingement at hydroelectric and nuclear power intakes, poaching, and alteration of habitat due to damming of rivers.¹¹⁷ The bald eagle originally declined primarily due to low reproductive success caused by man's use of the pesticide DDT. Today the biggest threats are habitat disturbance by humans, illegal shooting, electrocution, and impact injuries. Since the 1930's, the decline in the population of wood storks in the United States has been attributed in large part to alteration of foraging and nesting habitat, particularly in historic rookery areas in south Florida.¹¹⁸ As development begins to encroach on the riparian wetland and upland habitat along the Little Pee Dee River and the Pee Dee River, habitat for the eagle and wood stork could be lost, and water quality degradation could impact the shortnose sturgeon. As discussed in the Section 3.17.11, cumulative impacts to these linear systems are anticipated to occur along the edges. Currently there are approximately 10,136 acres of riparian habitat protected along the Little Pee Dee River

¹¹⁷National Marine Fisheries Service. 1998. *Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum)*.

Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service.

¹¹⁸ Johnson, Terry W., et. al. *Protected Animals of Georgia*. Nongame-Endangered Wildlife Program, Georgia Department of Natural Resources, Wildlife Resources Division, Nongame Wildlife-Natural Heritage Section, 1999.



within the Little Pee Dee River Heritage Preserve, Little Pee Dee State Park, and the Little Pee Dee State Park Heritage Bay Preserve. Additionally, the riparian wetlands associated with these rivers are protected to a certain degree by the Section 404 permit process.

3.20.8 What state species of concern may be in the project study area?

Table 3.60, page 3-202 to 3-203, is a list of state listed rare, threatened, and endangered species from the SCDNR that are known to occur in Dillon, Horry, and Marion Counties. Most state species occur in Horry County, while only a few occur in Dillon and Marion. Suitable habitat may be present in the project study area for any of these species. Alternatives 1, 4, and 8 would encroach on a 300 foot buffer around a known Venus' fly-trap population. These are the only Build Alternatives with the potential to impact known locations of state species of concern.

3.21 How would wildlife and their habitat be impacted by this project?

Wildlife species require various habitats to meet their food and nesting needs. Swamps and forests provide the most valuable habitat within the project study area because of higher wildlife species diversity while agricultural fields and managed pine plantations are generally less diverse. The diversity and abundance of wildlife associated with the various aquatic and terrestrial habitats within the project study area are localized due to habitat fragmentation as the result of historic and current agriculture and silviculture practices within the project study area. The greatest concentrations of wildlife within the project study area are anticipated to be found along the forested riparian wetlands and uplands associated with the major drainage systems such as the Little Pee Dee River, Back Swamp, Buck Swamp, and Lake Swamp. Wildlife species typically use these linear forested habitats not only as foraging areas but also as travel corridors through their home range. Mammals, such as white tailed deer and raccoons frequently migrate along these corridors. SCDNR records indicate that signs of black bear have been observed along the Little Pee Dee River in the project study area. Migratory birds, such as the eastern kingbird, northern Parula warbler, and Prothonotary warblers rely on the mid-story of these forested riparian habitats as nesting and foraging areas as well.

Wildlife along the Build Alternatives could be directly impacted by the proposed action as a result of the following: habitat displacement from construction of the proposed new roadway, disruption from noise and vehicle activity, wildlife movement barriers, wildlife/vehicle collisions, and construction impacts including noise disruption and hazards to small animals during clearing and grading. Mammals, amphibians, and reptiles would most likely be impacted by wildlife/vehicle collisions. The nesting and feeding habitats of birds, mammals, amphibians, and reptiles could be reduced as a result of the proposed road construction. Fish and invertebrates would be most sensitive to degradation of water quality conditions potentially caused by the addition of impervious surfaces. In order to provide a method for comparison of potential wildlife impacts, Table 3.61, page 3-204, provides the total acres of forested habitat that would potentially be impacted along each of the Build Alternatives.



Table 3.60
State Listed Rare, Threatened, and Endangered Species
Known to Occur in Dillon, Horry, and Marion Counties, S.C.
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Scientific Name	Common Name	Status	Habitat	Counties
Plants				
<i>Asclepias pedicellata</i>	Savannah milkweed	S1	Dry or seasonally wet pine savannas and flatwoods.	Horry
<i>Coreopsis rosea</i>	Rose coreopsis	S2	Drawdown zones of black water rivers (the Waccamaw in Horry County).	Horry
<i>Dionaea muscipula</i>	Venus' fly-trap	S1	Wet, sandy ditches, open longleaf pine savannas, pocosin ecotones and sphagnum openings in pocosins, especially those with frequent burns and no competing understory growth.	Horry
<i>Echinodorus parvulus</i>	Dwarf burhead	S2	Drawdown zones of Coastal Plain ponds, pineland ponds, and blackwater riverbanks.	Horry
<i>Fimbristylis perpusilla</i>	Harper's fimbristylis	S2	On muddy bottoms and silty margins of drying pine barren ponds and Coastal Plain blackwater rivers; seasonally exposed mudflats along pond margins, river shores, and in the center of seasonal ponds; silty sandbars in rivers.	Horry
<i>Helenium brevifolium</i>	Shortleaf sneezeweed	S1	Bogs, springhead seepage forests, boggy stream banks, boggy clearings, and other saturated soils.	Horry
<i>Isoetes riparia</i>	River bank quillwort	S1	Wet soil along muddy or sandy shores (including tidal shores and estuaries) of rivers, streams, and in swamps.	Dillon, Marion
<i>Liliaeopsis carolinensis</i>	Carolina liliaeopsis	S1	Open mud flats of pond shores, swamps, freshwater marshes, interdune ponds, ditches, and shores of brackish to freshwater estuarine sounds and rivers, often immersed in the water.	Horry
<i>Lipocarpa micrantha</i>	Half-chaff sedge	S2	Moist to wet sandy soils, commonly on alluvial sands, of riverbank draw-down zones, pond margins, streams, and ditches.	Horry
<i>Lygodium palmatum</i>	American climbing fern	S1S2	Moist, sandy, intensely acid soil of: sandstone outcrops, montane bogs, moist forests, or roadsides adjacent to above	Horry
<i>Parnassia caroliniana</i>	Carolina grass-of-Parnassus	S1S2	In wet longleaf pine, pond pine, or pond cypress savannas, often over calcareous substrates, where fire is a factor.	Horry
<i>Pteroglossaspis ecristata</i>	Crestless plume orchid	S2	Scrub oak lands, pine-palmetto flatwoods, acid seepage slopes, dry-mesic pine savannas and roadsides, especially those with frequent burns.	Horry
<i>Sabatia</i>	Plymouth gentian	S1	In sandy and peaty margins of streams	Horry



Table 3.60 (continued)
State Listed Rare, Threatened, and Endangered Species
Known to Occur in Dillon, Horry, and Marion Counties, S.C.
Interstate 73 EIS: I-95 to the Myrtle Beach Region

<i>Sabatia kennedyana</i>	Plymouth gentian	S1	In sandy and peaty margins of streams and ponds, and savannas. Also, in seasonally exposed drawdown banks of the Waccamaw River, adjacent ditches, and disturbed flats.	Horry
<i>Scleria baldwinii</i>	Baldwin nutrush	S1/S2	In wet, peaty or sandy soils in pinelands, and borders of ponds, drainage ditches, and borrow-pits, often in shallow water. In our area, it favors wet savannas, under <i>Pinus serotina</i> , <i>P. palustris</i> , and/or <i>Taxodium ascendens</i> .	Horry
<i>Sporobolus teretifolius</i>	Wire-leaved dropseed	S1	Permanently moist to wet savannas on essentially flat terrain underlain by a clay layer. The open canopy is composed of pond and/or longleaf pine with sparse to locally dense shrub patches. Also found in ecotones between pine/oak/wiregrass uplands and red maple-sweet gum-swamp tupelo drainages.	Horry
<i>Stylisma pickeringii</i> var. <i>pickeringii</i>	Pickering's morning-glory	S1	Coarse, white sands in open sandhills or in other dry, barren, sandy woods with sparse ground cover, scant litter accumulation, and little canopy cover.	Horry
Animals				
<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	S2?	Dilapidated buildings, under bridges, and in large cavity trees near permanent water.	Dillon, Horry, Marion
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	S1	Limestone caves in the mountains reaching 1,500 feet or more in elevation.	Horry
<i>Fundulus diaphanus</i>	Banded killifish	S1	Blackwater systems, including some with a tidal influence. However, they rarely venture into brackish water. It prefers calm, slow, clear or brown-stained waters of creeks, rivers, lakes, and ponds with a sand and gravel bottom near scattered submerged and emergent vegetation. It congregates in large schools.	Horry

Notes:

S1 = Critically imperiled statewide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation.

S2 = Imperiled statewide because of rarity or factor(s) making it vulnerable.



**Table 3.61
Potential Wildlife Habitat Impacts in Acres
Interstate 73: I-95 to Myrtle Beach Region**

	Alternatives							
	1	2	3	4	5	6	7	8
Total Wetland Area	417.6	443.6	384.1	497.1	413.0	413.1	492.2	448.6
Total Natural Uplands	533.4	513.9	446.6	488.8	484.6	475.9	439.9	562.8
Total Habitat Impact	951.0	957.5	830.7	985.9	897.6	889.0	932.1	1,011.4

Source: THE LPA GROUP INCORPORATED, 2006.

As indicated in Table 3.61, Alternative 3 would impact the least amount of potential wildlife habitat followed by Alternatives 6, 5, 7, 1, 2, 4, and 8, in ascending order of impacts. This ranking is based on the total amount of potential habitat available along the alternative corridors and does not take into consideration poor quality habitats such as isolated woodlots surrounded by agricultural fields or housing developments. However, these poorer quality areas do provide refuge and nesting habitat for some species of birds, mammals, reptiles, and amphibians.

As described in Section 3.17 of this document, all of the Build Alternatives would cross Back Swamp and the Little Pee Dee River. The crossings of Alternatives 1, 2, 4, 5, 7, and 8 would be located at the existing U.S. Route 501 crossing. Although a portion of I-73 would be situated in the median of U.S. Route 501, where it would cross Back Swamp the mainline of the roadway and associated access ramps, and the shift to avoid impacts to Galivants Ferry Historic District, would contribute to fragmentation of riparian habitats. Alternatives 3 and 6 would cross Back Swamp and the Little Pee Dee River immediately adjacent to the existing S.C. Route 917 crossing and would not contribute to habitat fragmentation. Because of the extent of bridges that would be constructed over the wetland and aquatic habitats at each of these crossings, terrestrial species would have unobstructed passage along the corridors.

Alternatives 2 and 6 would cross Buck Swamp and Lake Swamp on new alignment. Alternative 3 would cross Lake Swamp and Alternative 8 would cross Buck Swamp. Although these crossings of riparian habitat on new alignment would be on structure, they could contribute to riparian habitat fragmentation.

Potential impacts to wildlife could be minimized by the appropriate timing of construction activities to avoid fish breeding periods, bridging suitable aquatic spawning and feeding areas where feasible, and limiting clearing outside the fill limits. Although the project would reduce the amount of available wildlife habitat, large undeveloped tracts and potential wildlife corridors remain along streams within the project study area.

3.22.1 What indirect and cumulative impacts would occur to wildlife?

Indirect impacts to wildlife could occur due to the loss of habitat associated with development that would occur as the result of the construction of the Build Alternatives and the No-build Alternative. Table 3.62



**Table 3.62
Potential Indirect Wildlife Habitat Impacts in Acres
Interstate 73: I-95 to the Myrtle Beach Region**

	Alternatives								
	1	2	3	4	5	6	7	8	No-build
Total Wetland Area	274.3	276.3	272.3	272.1	282.7	279.0	278.0	280.7	218.7
Total Natural Uplands	1,092.9	1,025.6	1,074.5	1,059.7	1,091.9	1,077.5	1,073.3	1,076.5	887.8
Total Habitat Impact	1,367.2	1,301.9	1,346.8	1,331.8	1,374.6	1,356.5	1,351.3	1,357.2	1,106.5

Source: THE LPA GROUP INCORPORATED, 2006.

provides potential indirect impacts to wildlife habitat associated with each alternative based on the predictions of the land use models.

As shown in Table 3.62, the potential indirect impacts to wildlife habitat would be basically the same for all the Build Alternatives. The difference between the lowest impact, Alternative 2, and the highest impact to wildlife habitat, Alternative 5, would be approximately 73 acres. The No-build Alternative would have less indirect impacts. However the difference in habitat impacts between the No-build Alternative and the lowest Build Alternative, Alternative 5, would be less than 200 acres.

Based on the results of the land use models, most of the projected development would occur in the fragmented forested upland areas with some impacts to fragmented wetland habitats (see Sections 3.16 and 3.17). Many amphibian species rely on seasonally wet depressions, located in uplands, for breeding and development. Often times these wetland depressions are considered “isolated” and would not be protected by state and federal regulations, therefore could be more vulnerable to habitat loss. Impacts to the riparian wetland and upland habitats are anticipated to occur along the edges of the systems with the highest potential for upland habitat loss because of the protection provided by the Section 404 permit process. These impacts could restrict the movement of terrestrial wildlife species along the forested corridors and would result in the loss of nesting and foraging habitat for migratory birds.

Cumulative impacts to wildlife species could occur regardless of the alternative that is selected as the Preferred Alternative. The Horry County population of black bears appears to have the highest density south of Conway as indicated by automobile/bear collision data obtained from SCDNR. All of the collisions within the I-73 project study area have occurred south of Conway. Several of these occurred along S.C. Route 22 and it is anticipated that increased traffic on this roadway could increase the number of automobile/bear collisions. Additionally, as the area between Conway and the Atlantic Intracoastal Waterway continues to develop, bear habitat would be lost and/or fragmented. The increased traffic on S.C. Route 22 could result in an increase in the number of collisions with other species, such as white tailed deer and raccoons.



SCDNR's Little Pee Dee Heritage Preserve would offer protection for a portion of the riparian habitats. However, there are gaps between preserves that have no protection other than the Section 404 permit and mitigation process. Other Heritage Preserves, State Parks, and natural areas are present in the project study area; however, isolated "islands" of habitat are less than ideal for supporting healthy wildlife populations.

Another potential for cumulative impacts to birds would result from the construction of cell towers along I-73. Studies indicate that migratory birds frequently collide with lighted cell and radio towers that are greater than 200 feet in height when flying at night and during inclement weather when visibility is hindered. It is likely that towers would be constructed along the Preferred Alternative; however there is no way to predict at this point how tall the towers would be.

Cumulative impacts associated with the introduction of nonnative invasive plant species could occur as a result of the project. Highways tend to serve as conduits for the spread of invasive plant species which out-compete native species and eventually dominate a habitat. Once these plants become established at one location along a roadway, they can spread into surrounding woodlands and along the length of the roadway, and the plants continue to spread long after the road construction is complete. Invasive plant species can be introduced and spread in a variety of ways during road construction. One common source for the introduction of seeds or plants that root easily is from the construction equipment itself. Construction equipment that has not been properly washed-off to remove seeds and plant material before leaving the previous construction site is an invasive plant vector. Additionally, the spread of invasive plants that already occur at the road construction site is possible when topsoil is stripped at home sites where invasive species, such as Chinese privet, were used as ornamental plants. The top soil is generally stockpiled, since it is not suitable for construction purposes, and used as top-dressing for shoulders and medians. Dormant seeds, and roots and tubers in the soil could then be spread along the new roadway. FHWA and SCDOT best management practices would be implemented to reduce the likelihood of the spread of non-native invasive plant species along the Preferred Alternative.

3.22 Would Wild and Scenic Rivers be impacted by the alternatives?

Wild and Scenic Rivers are rivers and streams that are federally-protected under the Wild and Scenic Rivers Act for their scenic, cultural, historic, recreational, wildlife, geologic or other values. The USDA (through the U.S. Forest Service) and the U.S. Department of Interior (through the USFWS, Bureau of Land Management, and National Park Service) maintain the National Inventory of Rivers which are designated or may be eligible for wild and scenic rivers designation. The National Inventory of Rivers did not contain any listed or eligible rivers within the project study area; therefore, no impacts to federal Wild and Scenic Rivers would occur.¹¹⁹

In South Carolina, rivers may also be protected under the South Carolina Scenic Rivers Act of 1989 for their scenic, cultural, historic, recreational, botanical, geologic, or wildlife values. The SCDNR's South Carolina Scenic Rivers Program website identified portions of the Little Pee Dee River as a state scenic river (Figure 3-36, page 3-139). The Little Pee Dee River has two designated areas. A fourteen-mile stretch located from

¹¹⁹ National Park Service Wild and Scenic Rivers Website, http://www.nps.gov/rivers/wildriverslist.html#ga_nc_sc (last accessed March 3, 2006).



U.S. Route 378 to the Little Pee Dee River's confluence with the Great Pee Dee River has been designated.¹²⁰ The other area is a 48-mile section located in Dillon County between the Marlboro County line and the Marion County line.¹²¹ The potential alternatives cross the Little Pee Dee River outside the limits of the South Carolina Scenic Rivers-designated areas of the Little Pee Dee River. Therefore, designated areas of rivers listed under the South Carolina Scenic Rivers Act of 1989 would not be impacted by the proposed alternatives.

3.23 What resources are expected to be affected uniformly?

3.23.1 Coastal Zone Resources

Who protects the coastal zone?

The *Coastal Zone Management Act of 1972*, as amended, requires that projects within the coastal zone comply, to the maximum extent practicable, with approved state coastal management programs.¹²² The South Carolina Coastal Zone Management Act gives SCDHEC-OCRM the authority to promote the economic and social welfare of the citizens, while protecting the sensitive and fragile areas of the coast. SCDHEC-OCRM has direct permitting authority over development in the critical areas of the coastal zone, which includes coastal waters, tidelands, beaches, and the oceanfront beach/dune system (Figure 3-38, page 3-209). In addition, SCDHEC-OCRM reviews and certifies all state/federal permit applications and activities, as well as issues state stormwater and sediment reduction permits within the coastal zone counties.¹²³

Where is the coastal zone?

The coastal zone of South Carolina encompasses coastal waters and submerged areas seaward to the state's jurisdictional line (Figure 3-38, page 3-209). Lands and waters of the eight coastal counties, which include Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry and Jasper are also within the coastal zone of South Carolina. Horry County is the only coastal county within the project study area.

The South Carolina Coastal Management Plan¹²⁴ lists the following twelve Geographical Areas of Particular Concern that should be avoided during development, when possible:

- Heritage Trust Program Preserves;
- State Wildlife Preserves;
- State Parks;
- Scenic Rivers;

¹²⁰ *Ibid.*

¹²¹ South Carolina General Assembly Website, http://www.scstatehouse.net/sess116_2005-2006/bills/3782.htm (last accessed March 3, 2006).

¹²² 16 U.S.C. §1456(c)

¹²³ South Carolina Department of Health and Environmental Control Website, <http://www.scdhec.gov/environment/ocrm/regs/enforcement.htm>, accessed 10/5/05

¹²⁴ Policies and Procedures of the South Carolina Coastal Management Program Website, <http://www.scdhec.gov/environment/ocrm/regs/docs/CZMP95.pdf>, accessed 02/24/06



- Marine and Estuarine Sanctuaries;
- Shellfish Areas;
- Ground Water Resources;
- Threatened or Endangered Species Habitats;
- Navigation Channels;
- State Ports;
- Mining Operations; and,
- Areas of Special Historic, Archeological or Cultural Significance.

The South Carolina Coastal Management Plan recommends that consideration be given to the enhancement and protection of scenic vistas and preservation of unique tree canopies and natural areas along the roadway projects. In addition, it also encourages the study of mass transit alternatives in urban areas and a comprehensive study of the potential for secondary growth inducement from new road construction.

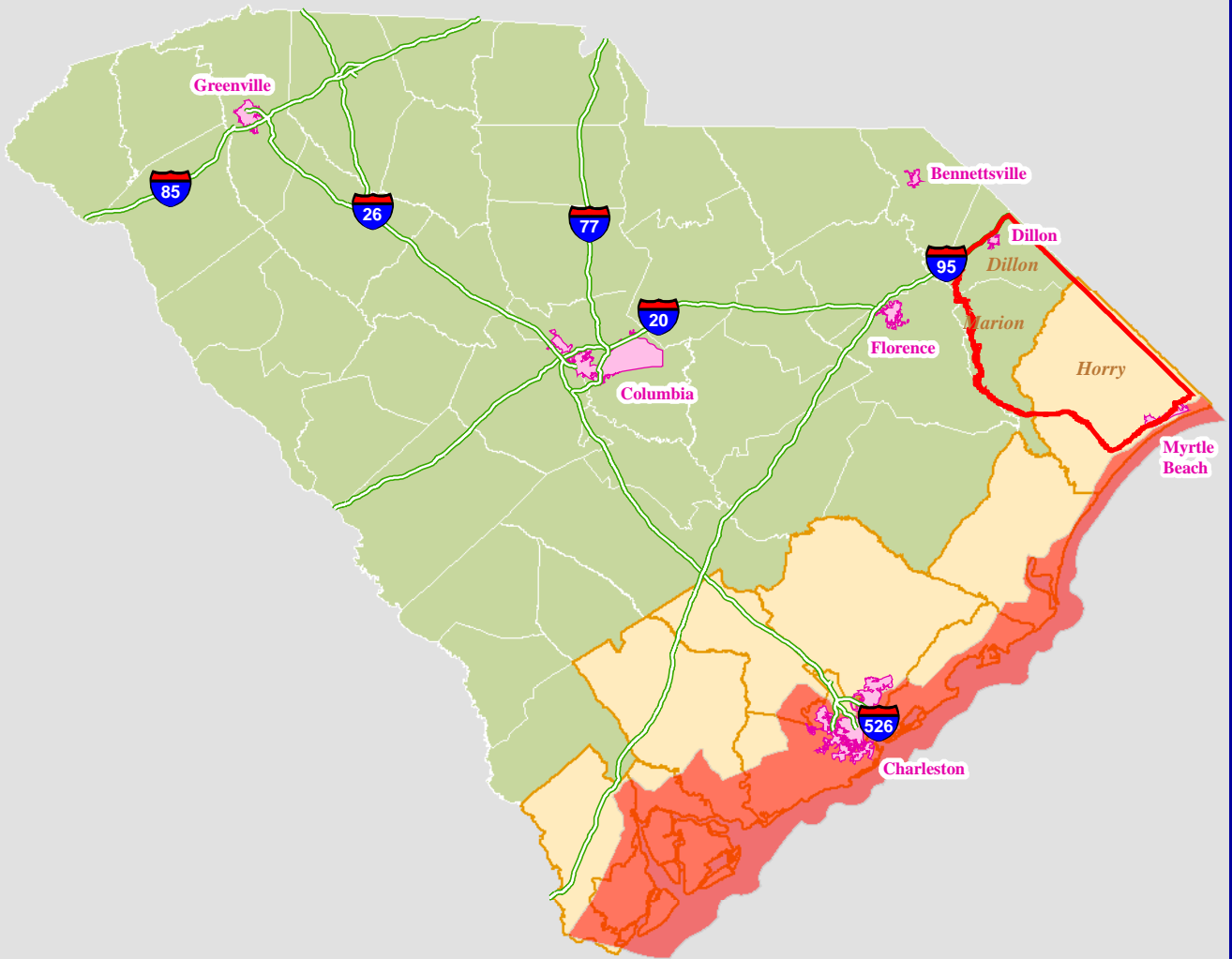
What direct impacts would occur to the coastal zone as a result of this project?

This project would not impact any critical areas of the coastal zone since these areas are mostly located along the coastline in the project study area, while the project would be constructed further inland. Geographical Areas of Concern may be impacted by this project. SCDHEC-OCRM, as an ACT member, took part in alternative development and efforts were made to adhere to the policies and recommendations of the South Carolina Coastal Management Plan. In addition, Geographical Areas of Concern that were within the project study area were designated as constraints and avoided to the extent possible during alternative development.

SCDHEC-OCRM will issue permits and will review and certify the permits to be issued by the USACE within Horry County, based on their guidelines for certification of highway projects. The guidelines include recommendations and policies to minimize impacts to wetlands, navigable waters, hydrologic characteristics of streams, and barrier islands.

What indirect and cumulative impacts are anticipated to occur to the coastal zone?

Horry County has experienced substantial growth and change over the last 40 years. However, the vast majority of that growth and development has occurred in the immediate coastal areas of Horry County, which are beyond the boundary of the project study area (refer to Chapter 1). According to the Horry County Comprehensive Plan, substantial development is anticipated to occur in land surrounding the City of Conway and an area extending from the coastline inward approximately eight to ten miles (Figure 3-38). The No-build development pattern has been estimated, based upon existing growth trends. This shows substantial development in Horry County.



Legend






-  Interstate
-  Critical Area
-  Coastal Zone
-  City
-  Project Study Area



FIGURE 3-38
COASTAL ZONE COUNTIES AND
CRITICAL AREA BOUNDARY



3.23.2 Would there be any Coastal Barriers impacted by the project?

Under the Coastal Barrier Resource Act of 1982, agencies are prohibited from using federal funds that would impact undeveloped coastal barrier units in the Coastal Barrier Resource System. No coastal barriers exist in the project study area; therefore, no impacts are anticipated to this resource.

3.23.3 Energy

Transportation accounts for 27.7 percent of both direct and indirect energy consumption in the United States.¹²⁵ Direct consumption includes energy that is consumed by vehicles traveling on the roadways, while indirect energy consumption refers to the energy consumed during the construction and maintenance of a new facility. Energy consumption for vehicle operation and facility maintenance represents long-term energy impacts while construction energy is typically a large one-time energy expenditure.

What energy consumption would occur during construction of the project?

Construction of the proposed project would initially require the consumption of energy and resources that would not be used if the project were not built. Completion of the facility, however, would more than compensate for the energy lost during construction by increasing the efficiency of automotive traffic through the area. While construction would use energy resources for a short timeframe, the savings would be realized over the life of the facility. The primary categories of energy consumption during construction are:

- excavation of rock and soil, and the transport and compaction of roadway embankment materials;
- manufacture, transport, and utilization of various construction materials (aggregate, concrete, street, etc.); and,
- manufacture, transport and installation of various manufactured items (guard rail, signs, lighting, etc.).

In general, the amount of expended energy during construction would be a function of construction cost.

What energy consumption would occur as a result of the operation of the project?

Additional energy would be expended throughout the operational life of a transportation facility, mostly for vehicular travel in the form of fuel. Other lesser, but accumulative, energy uses include tires, oil, and miscellaneous vehicular maintenance items. Energy consumption due to travel would be directly proportional to project usage. In addition, roadway maintenance would require an ongoing expenditure of energy in the form of maintenance materials and the fuel required for roadway, bridge, and drainage repairs. In general, energy consumption for maintenance would be relatively constant and independent of project usage.

An estimate of change in VMT was made regarding potential impact with and without the proposed alternatives based on the project travel demand model. By comparing change in VMT in the build conditions from comparable estimates for the No-build Alternative, it is possible to derive percent change in VMT for

¹²⁵Energy Information Administration. Official Energy Statistics from the U.S. Government.
<http://www.eia.doe.gov/basics/energybasics101.html> last accessed April 23, 2006.



motorists throughout the proposed project study area. In reviewing the proposed alternatives, it was found that there would be a total net decrease in energy consumption statewide of 0.22 percent in the design year 2030.

What is the conservation potential of the project?

Energy conservation would come from one or more of the following factors:

- reduced vehicle-miles of travel;
- more efficient vehicle operation speeds;
- reduced accident potential;
- reduced construction effort; and
- reduced traffic volume on existing area roadways.

3.24 What permits could be necessary in order to construct the alternatives?

3.24.1 Section 404 of the Clean Water Act

The USACE is authorized under Section 404 of the Clean Water Act to issue permits for the placement of dredged or fill material in waters of the United States, including jurisdictional wetlands. Jurisdictional wetlands exist onsite and would be delineated according to the *1987 Corps of Engineers Wetlands Delineation Manual*.¹²⁶ Impacts to waters of the United States and jurisdictional wetlands will be quantified and will require USACE authorization under Section 404.

3.24.2 Section 401 Water Quality

Applicants for state and federal permits for projects that would result in a discharge to wetlands and waters of the United States must obtain a Section 401 Water Quality Certification from SCDHEC. It involves a review of the proposed project and analyzes its potential impact to water quality. This review is performed to ensure that any discharge into jurisdictional areas is in accordance with State water quality standards.

3.24.3 Coastal Zone Consistency Certification

Section 307(C) of the *Coastal Zone Management Act of 1972* requires that development projects in the coastal zone comply to the maximum extent practicable with approved state coastal management programs. SCDHEC-OCRM is the federally-approved coastal management authority in South Carolina. Horry County is one of eight counties in South Carolina that are subject to coastal zone regulations. Any project located within the coastal zone that requires a state and/or federal permit must be certified by SCDHEC-OCRM that the proposed project is consistent with the policies of the coastal zone management program.

¹²⁶ U.S. Army Engineer Waterways Experiment Station Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual* (1987), Technical Report Y-87-1.



3.24.4 Stormwater Management and Sediment Reduction Act of 1991

The *Stormwater and Sediment Reduction Act of 1991* applies to any land disturbing activity over two acres. The regulation was implemented to reduce the adverse effects of stormwater and sediment run-off and requires completion of a site plan illustrating controls. The application must be sealed by a Professional Engineer to obtain the permit.

The SCDHEC Bureau of Water acts as the administrator, but the regulation of the program is delegated to SCDHEC-OCRM in the eight coastal counties. Written authorization from SCDHEC-OCRM is required before any land disturbance can take place.

3.25.5 Section 9 and Section 10 of the Rivers and Harbors Act of 1899

Section 9 of the Rivers and Harbors Act of 1899 regulates obstruction of navigable waters by bridges and causeways. The authority granted to the USACE to issue permits for the construction of bridges over, and causeways in, navigable waters for Section 9, was transferred to the USCG by the U.S. Department of Transportation Act of 1966. Bridge construction over navigable waters would require a USCG Section 9 permit. The vertical and horizontal clearances of the structures that would be constructed over the Little Pee Dee River would match the exiting bridges, at a minimum, and a permit would not be required. However, coordination with the USCG may be required.

Section 10 of the Rivers and Harbors Act of 1899 authorizes the Secretary of the Army, acting through the Chief of Engineers and administered by the USACE, to issue permits for activities which affect the navigable waters of the United States. The Act prohibits unauthorized obstruction or alteration of any navigable waters of the United States; the construction of any structure in or over any navigable water of the United States; the excavation from, or deposition of material in, such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless permitted by the USACE. Placing permanent fill material into navigable waters during the construction of bridges would require a USACE Section 10 permit.