MID-CURRITUCK BRIDGE STUDY

NATURAL RESOURCES TECHNICAL REPORT

WBS ELEMENT: 34470.1.TA1
STIP NO. R-2576
CURRITUCK COUNTY
DARE COUNTY

Prepared by:

CZR Incorporated
4709 College Acres Drive, Suite 2
Wilmington, North Carolina 28403

Prepared for:

Parsons Brinckerhoff
434 Fayetteville Street, Suite 1500
Raleigh, North Carolina 27601

and for the

NORTH CAROLINA
Turnpike Authority
Raleigh, North Carolina

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1.0 Introduction

The North Carolina Turnpike Authority (NCTA), a division of the North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Final Environmental Impact Statement (FEIS) to evaluate proposed improvements in the Currituck Sound area. The proposed action is included in NCDOT's 2009-2015 *State Transportation Improvement Program* (STIP), the North Carolina Intrastate System, the *North Carolina Strategic Highway Corridor Plan*, and the *Thoroughfare Plan for Currituck County*. This report focuses on the potential direct impacts of the detailed study alternatives under consideration for implementation, which include the detailed study alternatives identified in the *Draft Environmental Impact Statement* (DEIS) (i.e., ER2, MCB2, and MCB4), as well as the Preferred Alternative identified in the FEIS. An assessment of the potential indirect and cumulative effects of the detailed study alternatives is presented in the *Indirect and Cumulative Effects Technical Report* (East Carolina University and Parsons Brinckerhoff, 2011).

The 6,622.9-acre project area is in northeastern North Carolina and includes the Currituck County peninsula on the mainland and its Outer Banks, as well as the Dare County Outer Banks north of Kitty Hawk (see Figures 1 and 2 in Appendix A). The project area is south of the Virginia Beach-Norfolk, Virginia (Hampton Roads) metropolitan area. The project area encompasses two thoroughfares, US 158 from its junction with NC 168 to NC 12 (including the Wright Memorial Bridge) and NC 12 north of its intersection with US 158 to its terminus in Currituck County. US 158 is the primary north-south route on the mainland. NC 12 is the primary north-south route on the Outer Banks. The Wright Memorial Bridge connects the mainland with the Outer Banks.

The proposed action responds to three underlying needs in the project area. These needs are based on the following travel conditions:

- The project area's main thoroughfares (US 158 and NC 12) are becoming increasingly congested, and congestion will become even more severe in the future.
- Increasing congestion is causing travel time between the Currituck County mainland and the Currituck County Outer Banks to increase, especially during the summer.
- Evacuation times for residents and visitors who use US 158 and NC 168 as an evacuation route far exceed the State-designated standard of 18 hours.

An alternatives screening study was conducted for the project. Its findings were discussed with federal and state environmental resource and regulatory agencies in a series of Turnpike Environmental Agency Coordination (TEAC) meetings in 2006, 2007, 2008, and 2009. Based on discussions at TEAC meetings, and written comments received from the agencies and public, the *Alternatives Screening Report* (Parsons Brinckerhoff, 2009) for the proposed project identified three alternatives to be carried forward for detailed study in the DEIS along with the No-Build Alternative. The DEIS detailed study alternatives identified are ER2, MCB2, and MCB4. MCB2 and MCB4 also include two bridge corridor alternatives, C1 and C2. The Preferred Alternative is MCB4/C1 with design refinements to reduce potential impacts.

1.1 DEIS Detailed Study Alternatives

The DEIS detailed study alternatives (see Figure 3 in Appendix A) are described below:

- **ER2**
    - Adding for evacuation use only, a third outbound evacuation lane on US 158 between NC 168 and the Wright Memorial Bridge as a hurricane evacuation improvement or using the existing center turn lane as a third outbound evacuation lane; in either case one inbound lane on the Wright Memorial Bridge and on the Knapp (Intracoastal Waterway) Bridge would be used as a third outbound evacuation lane;
    - Widening US 158 to a six-lane super-street between the Wright Memorial Bridge and Cypress Knee Trail that widens to eight lanes between Cypress Knee Trail and the Home Depot driveway;
    - Constructing an interchange at the current intersection of US 158, NC 12, and the Aycock Brown Welcome Center entrance, including six through lanes on US 158 starting at the Home Depot driveway and returning to four lanes just south of Grissom Street; and
    - Widening NC 12 to three lanes between US 158 and a point just north of Hunt Club Drive in Currituck County (except where NC 12 is already three lanes in Duck) and to four lanes with a median from just north of Hunt Club Drive to Albacore Street.
- **MCB2**
    - Constructing a 4.7- to 5.3-mile-long two-lane toll bridge across Currituck Sound, as well as approach roads and/or bridges and an interchange at US 158;
    - Adding for evacuation use only, a third outbound evacuation lane on US 158 between NC 168 and the Mid-Currituck Bridge as a hurricane evacuation improvement or using the existing center turn lane as a third outbound evacuation lane; in either case one inbound lane on the Knapp (Intracoastal Waterway) Bridge would be used as a third outbound evacuation lane;

  - Widening US 158 to a six-lane super-street between the Wright Memorial Bridge and Cypress Knee Trail and an eight-lane super-street between Cypress Knee Trail and the Home Depot driveway;
  - Constructing an interchange at the intersection of US 158, NC 12, and the Aycock Brown Welcome Center entrance, including six through lanes on US 158 starting at the Home Depot driveway and returning to four lanes just south of Grissom Street; and
  - Widening NC 12 to three lanes between US 158 and a point just north of Hunt Club Drive in Currituck County (except where NC 12 is already three lanes in Duck) and to four lanes with a median from just north of Hunt Club Drive to NC 12's intersection with the Mid-Currituck Bridge.

- **MCB4**
  - Constructing a 4.7- to 5.3-mile-long two-lane toll bridge across Currituck Sound, as well as approach roads and/or bridges and an interchange at US 158;
  - Adding for evacuation use only, a third outbound evacuation lane on US 158 between NC 168 and the Mid-Currituck Bridge as a hurricane evacuation improvement or using the existing center turn lane as a third outbound evacuation lane; in either case one inbound lane on the Knapp (Intracoastal Waterway) Bridge would be used as a third outbound evacuation lane;
  - Adding for evacuation use only, a third outbound evacuation lane on US 158 between the Wright Memorial Bridge and NC 12 as a hurricane evacuation improvement or using the existing center turn lane as a third outbound evacuation lane; in either case one inbound lane on the Wright Memorial Bridge would be used as a third outbound evacuation lane; and
  - Widening NC 12 in Currituck County to four lanes with a median from Seashell Lane to NC 12's intersection with the Mid-Currituck Bridge.

The unique characteristic of a super-street, included along US 158 east of the Wright Memorial Bridge with ER2 and MCB2, is the configuration of the intersections. Side-street traffic wishing to turn left or go straight must turn right onto the divided highway where it can make a U-turn through the median a short distance away from the intersection. After making the U-turn, drivers can then either go straight (having now accomplished the equivalent of an intended left turn) or make a right turn at their original intersection (having now accomplished the equivalent of an intention to drive straight through the intersection).

For MCB2 and MCB4, two design options are evaluated for the approach to the bridge over Currituck Sound, between US 158 and Currituck Sound. Option A would place a toll plaza within the US 158 interchange. The mainland approach road to the bridge over Currituck Sound would include a bridge over Maple Swamp. With Option B, the approach to the bridge over Currituck Sound would be a road placed on fill within Maple Swamp. Aydlett Road would be removed and the roadbed restored as a wetland. Traffic traveling between US 158 and Aydlett would use the new bridge approach road. A local connection would be provided between the bridge approach road and the local Aydlett street system. The toll plaza would be placed in Aydlett east of that local connection so that Aydlett traffic would not pass through the toll plaza when traveling between US 158 and Aydlett. No access to and from the Mid-Currituck Bridge would be provided at Aydlett.

Also for MCB2 and MCB4, there are two variations of the proposed bridge corridor (see Figure 3 in Appendix A) in terms of its terminus on the Outer Banks. Bridge corridor C1 would enter the Outer Banks through the southern end of Phase I of the Corolla Bay subdivision, physically dividing it into two parts and using three residential lots in a subdivided but undeveloped portion. It would then connect with NC 12 at an intersection approximately two miles north of the Albacore Street retail area. Bridge corridor C2 would connect with NC 12 approximately one-half mile south of the Albacore Street retail area. The length of the proposed bridge over Currituck Sound would be approximately 4.7 miles with bridge corridor C1, whereas it would be approximately 5.3 miles with bridge corridor C2.

When impacts differ for the three alternatives (ER2, MCB2, and MCB4) between the mainland approach road design options (Option A and Option B) and/or the two bridge corridors (C1 and C2), the names of the alternatives are augmented with suffixes for the mainland approach road design option and/or the bridge corridor. For example, MCB2 with mainland design Option B and the C1 corridor is referred to as MCB2/B/C1. In situations where impacts differ between the bridge corridors but the design option on the mainland is not relevant to the comparison, only the corridor suffix is used (e.g., MCB2/C1). When differences are confined to the mainland design options, only the design option suffix is used (e.g., MCB2/A). If no suffix is provided (e.g., MCB2), then the reader can assume that impacts would be identical irrespective of the mainland design option or corridor terminus alternative used.

1.2 Preferred Alternative

The Preferred Alternative is MCB4/C1 with Option A (see Figure 4 in Appendix A). It also includes several design refinements to reduce impacts, in response to government agency and public input and comments. These refinements include:

- Provision of a median acceleration lane at Waterlily Road. This safety feature would allow left turns to continue to be made at Waterlily Road and US 158. Bulb-outs for u-turning vehicles also would be provided at the re-aligned US 158/Aydlett Road intersection and the US 158/Worth Guard Road intersection to provide greater flexibility for local traffic in turning to and from existing side streets near the US 158/ Mid-Currituck Bridge interchange.

- Reducing the amount of four-lane widening along NC 12 from that with MCB4/C1 from approximately 4 miles to approximately 2.1 miles, plus left turn lanes at two additional locations over approximately 0.5 mile. The 2.1 miles of NC 12 widening would be concentrated at three locations: the bridge terminus, the commercial area surrounding Albacore Street, and Currituck Clubhouse Drive.

- Constructing roundabouts on NC 12 instead of signalized intersections at the bridge terminus and Currituck Clubhouse Drive.

- Terminating the bridge in a roundabout at NC 12 also allowed the C1 bridge alignment to be adjusted to remove curves and thereby reduced its length across Currituck Sound by approximately 250 feet (from approximately 24,950 feet [4.7 miles] to 24,700 feet).

- Provision of marked pedestrian crossings along NC 12 where it would be widened. They would be placed at locations identified by Currituck County plans (Albacore Street, Orion's Way, and Currituck Clubhouse Drive are under consideration for inclusion in the next Currituck County thoroughfare plan), as well as at North Harbor View Drive and the bridge terminus (one across NC 12 and one across the bridge approach road).

For hurricane evacuation, the Preferred Alternative includes:

- On the mainland, reversing the center turn lane on US 158 between the US 158/Mid-Currituck Bridge interchange and NC 168 to provide additional road capacity during a hurricane evacuation and reduce clearance times.

- On the Outer Banks, adding approximately 1,600 feet of new third outbound lane to the west of the NC 12/US 158 intersection to provide additional road capacity during a hurricane evacuation. The additional lane would start at the US 158/Cypress Knee Trail/Market Place Shopping Center intersection and end approximately 450 feet west of the Duck Woods Drive intersection, a total distance of approximately 1,600 feet. From this point, the new lane would merge back into the existing US 158 westbound lanes over a distance of approximately 300 feet.

1.3 Mid-Currituck Bridge Construction

NCTA is currently proposing the construction methodologies described below for construction of the bridge over Currituck Sound to minimize construction-related water quality impacts to Currituck Sound and other jurisdictional waters, as practicable. If a Mid-Currituck Bridge is included in the alternative selected for implementation, NCTA would continue to work with environmental resource and regulatory agencies as the project progresses into final design and permit application to refine this approach. Construction methodologies proposed for building a Mid-Currituck Bridge include:

- A combination of work trestle and barges, including:
  - An approximately 1,900-foot-long work trestle extending from the western shoreline. Based on the limited presence and sparse coverage of submerged aquatic vegetation (SAV) found only along the shoreline in the western side of Currituck Sound, an open trestle would not be necessary. This closed surface work trestle is envisioned to be approximately 50 feet wide. Its footprint would allow a parked crane and a small lane to allow necessary materials to pass the crane for loading onto barges. The bridge in this area of the sound would be constructed from the work trestle. The barge method would be used east of the trestle. A barge loading area would be located at the eastern end of this trestle.
  - Remaining construction from small, low draft barges for approximately 20,000 feet or 3.8 miles. The barges would be launched from the trestle extending off the shoreline from Narrow Shore Road in Aydlett.
  - On the eastern side, use of temporary construction trestle for approximately 4,500 feet or 0.9 mile (over SAV habitat [including existing beds] = 3,000 feet and over shallow water = 1,500 feet). Bridge erection equipment would operate on the trestle to place the components of the bridge foundation and spans. An open trestle would be used to minimize the shading of SAV habitat during construction. Marine industry standard pans attached to equipment would be used to capture any accidental release of petroleum products from equipment.
  - Construction from land for approximately 400 feet total.
  - Construction duration of 52 months.
- Driving of bridge piles with no jetting (using pressurized water to wash out a hole for a pile to set in).
- The bridge would likely be built beginning at both ends simultaneously. Construction also could begin in a third location, at the eastern-most point of construction from barges.

1.4 Maple Swamp Bridge Construction

In Maple Swamp, wooden crane mats would be used in the cleared right-of-way to distribute the crane loads and provide a suitable platform for erecting the bridge.

1.5 Access and Construction Staging for Construction Materials and Equipment

On the Currituck County mainland, construction materials and equipment would be transported by truck along US 158 and staged in the US 158/Mid-Currituck Bridge interchange area for most mainland construction. Transport to Currituck Sound of construction materials and equipment for building the Currituck Sound bridge would be via Aydlett Road (between US 158 and Aydlett only) and Narrow Shore Road. Depending on whether project right-of-way in Maple Swamp could be used for transporting materials, the bridge corridor through Maple Swamp also may be used for access to the Narrow Shore Road area. Construction materials and equipment also would be staged on vacant upland sites along Narrow Shore Road near the western Currituck Sound bridge ending.

On the Outer Banks, construction materials and equipment would be transported by truck via NC 12 to construction sites. Construction materials and equipment would be staged on vacant upland sites near the NC 12 widening areas and at the eastern endings of the Currituck Sound bridge.

1.6 Stormwater Management

NCTA would comply with NC Session Law 2008-211 (An Act to Provide for Improvements in the Management of Stormwater in the Coastal Counties in Order to Protect Water Quality) to the maximum extent practicable for the additional impervious surface area that would be created by the construction of the Preferred Alternative if it is selected for implementation.

Of the approximately 71.5 acres of additional impervious surface area (new built upon area with the Preferred Alternative), about 28 acres would be associated with the bridge over Currituck Sound and 11 acres with the bridge over Maple Swamp. The remaining approximately 33 acres would be associated with US 158 improvements, interchange ramps/bridges, toll facilities, local road connections, parking areas, and NC 12 widening. In addition, there are about 18 acres of existing roadway impervious surface area in the project area associated with existing US 158 and the portions of existing NC 12 to be widened.

Compliance with NC Session Law 2008-211's requirement for new development to capture and treat the first 1.5 inches of runoff from additional impervious surface areas would be met, to the maximum extent practicable, through a combination of pollutant source control and capture and treatment. Source control would be through the use of pavement sweeping and vacuuming on bridge decks. Capture and treatment would be through the use of bridge closed drainage systems, stormwater wetlands, wet detention basins, rooftop rainwater harvesting, and other traditional roadway Best Management Practices (BMPs), to the maximum extent practicable. Capture and treatment would occur for 56 of the 71.5 acres of new impervious surface area.

The following paragraphs describe how stormwater would be managed with the Preferred Alternative. Similar approaches, as applicable, would have been used with the other detailed study alternatives if one of them had been selected as the Preferred Alternative. A final stormwater management plan for minimizing the potential impact of project pollutants would be developed in association with the North Carolina Department of Environment and Natural Resources, Division of Water Quality (NCDENR-DWQ), as well as other appropriate state and federal environmental resource and regulatory agencies, during final design and permitting of the Preferred Alternative.

1.6.1 Stormwater Management for Uplands on the Mainland and the Outer Banks

In uplands areas on the mainland and the Outer Banks, stormwater capture and treatment would be through typical roadway BMPs using infiltration trenches and basins. To the maximum extent practicable, all 33 acres of non-bridge additional impervious surface area, plus all 18 acres of existing roadway impervious surface area in the project's area of affect, would have the first 1.5 inches of runoff captured and either treated or used in the project site. Additionally, a rooftop runoff system may be used for buildings and/or toll plaza awnings to capture and use water on site or to infiltrate it. Alternative pavement materials, such as pervious pavements, also may be used in parking areas associated with the toll plaza.

With the Preferred Alternative, there would be no outfalls from NC 12 to Currituck Sound or the Atlantic Ocean. The accommodation of drainage on NC 12 was a focus in developing the preliminary designs along NC 12, both because a wider NC 12 would generate more runoff and because road flooding would continue to occur on NC 12 during storm events without improvement.

Much of NC 12 within the project area is in a topographic (rise and fall of the land) depression. To the east, the dune area along the coastline forms a ridge line. Similarly, to the west, the land generally rises near Currituck Sound. As a result, NC 12 is in a topographic "bathtub." In addition, there are no streams providing for water discharge, or other outlets for runoff, except in those locations where NC 12 is adjacent to Currituck Sound. Under existing conditions, stormwater runoff makes its way to low areas and eventually infiltrates into the ground. In some places the road itself is the low point, and thus there are parts of NC 12 that experience chronic flooding problems. Other complicating factors include the groundwater elevation, which is near the surface (in some places within 2 feet), and the extensive land development that has occurred along NC 12, particularly in the towns of Southern Shores and Duck.

The preliminary designs for NC 12 with the detailed study alternatives, including the Preferred Alternative, generally use infiltration strategies for the majority of the project, along with a limited number of outfalls to Currituck Sound in the case of MCB2 and ER2. Infiltration strategies involve locations for water to be absorbed into the ground rather than be transported to and released into a water body like Currituck Sound. The infiltration strategies would include infiltration basins and linear infiltration strips (roadside ditches). Infiltration basins and linear infiltration strips would remain dry except during and after storms. These volume-based BMPs would be sized to store temporarily the runoff from a 10-year storm. The infiltration strategies closely replicate existing drainage patterns, while improving storage capacity during the infiltration process. The specific approach to be taken varies along the roadway corridor for the NC 12 widening alternatives.

1.6.2 Stormwater Management for Maple Swamp and Currituck Sound

The stormwater management plan for the Maple Swamp and Currituck Sound bridges with the Preferred Alternative would have the following components:

- Source Control. Source control would be used on both the Maple Swamp and Currituck Sound bridges. Source control would be provided by frequent deck cleaning using state of the art, multi-function cleaning equipment that employs mechanical, vacuum, and regenerative air systems. Weather conditions would be monitored on site and additional deck cleaning would be done in advance of anticipated significant storm events. Source control through deck cleaning would be a contractual element of the agreement between NCTA and the concessionaire operating and maintaining the toll bridge. Failure by the concessionaire to comply with contractual terms could result in a financial penalty.

  Modern pavement sweeping and vacuuming technology has been shown to remove effectively upwards of 97.5 percent of materials that cause pollution from the bridge deck (Real World Street Cleaner Pickup Performance Testing, Roger C. Sutherland, PE, Pacific Water Resources, Inc., July 2008). Even when graduated by particle size, this technology removes over 90 percent of the smallest particles and nearly all of the larger particles. Use of this technology prior to a storm event would remove the vast majority of the pollutants from the bridge runoff, thereby substantially improving the water quality of the runoff reaching the sound. Therefore, the sweeping approach is a pre-treatment method.

- Stormwater Capture at the Ends of the Maple Swamp Bridge. For the bridge over Maple Swamp, stormwater would be captured from each end of the bridge (for 500 feet) and piped to infiltration basins for treatment. The remaining length of this 1.5-mile-long bridge would have pre-treated discharge (via frequent vacuum/sweeping deck cleaning) through scuppers to the Maple Swamp wetland system. The height of the scuppers over Maple Swamp would vary because of the grade on the bridge and the ground elevations in Maple Swamp. Based on current plans, the bottom of the scuppers would be between 7 feet and 18 feet above the ground of Maple Swamp. If the energy of the water exiting the scuppers is determined to be a problem, dissipation would be provided either at the scupper pipe outlet or on the ground.

- Stormwater Capture over Existing SAV Habitat (including Existing Beds) at the Eastern End of the Currituck Sound Bridge. For the bridge over Currituck Sound, the first 1.5 inches of stormwater runoff would be captured from the eastern end of the bridge for a distance of 4,000 feet to prevent direct discharge into existing SAV habitat (including existing beds) along the eastern shore of the sound. The runoff would be piped to the end of the bridge for treatment to either a stormwater wetland or a wet detention basin. The bridge stormwater collection system would be subject to:

- Regular pipe inspections and maintenance (including debris and litter removal); and
- Periodic removal and disposal of accumulated sediments in the wet detention basin.

The remaining length of this 4.7-mile-long bridge would have no stormwater capture and would have pre-treated discharge (via frequent vacuum/sweeping deck cleaning) through bridge scuppers into Currituck Sound. According to FHWA research (Design of Bridge Deck Drainage, HEC 21, May 1993), stormwater from bridge scuppers that are 25 feet or greater above the ground has no erosive force. Instead, because of wind and other normal conditions encountered during rain and storm events, this water returns to a state similar to rain. For the bridge over Currituck Sound, the scupper height would be approximately 22 feet above the water. Therefore, impacts to existing SAV habitat (including existing beds) and potential SAV habitat (see Section 4.2.1.2) because of stormwater concentrations discharging from scuppers would be minimal. In addition, NCTA would ensure the stability of the sound is not affected by erosion as a result of stormwater discharge from scuppers by an annual inspection.

- Treatment of Existing Impervious Road Surface Where the Project Improves Those Roads. The water capture and treatment program proposed for the two bridges would result in an uncaptured bridge area of 24 acres on the bridge over Currituck Sound and 10 acres on the bridge over Maple Swamp. Stormwater in these areas would directly discharge into their receiving bodies; however, greater than 90 percent (possibly as high as 97.5 percent) of the pollutants would have already been removed (i.e., pre-treated) through frequent deck cleaning via sweeping and vacuuming.

  As indicated above, to the maximum extent practicable, all 33 acres of non-bridge additional impervious surface area, plus all 18 acres of existing roadway impervious surface area in the project's construction limits, would have the first 1.5 inches of runoff captured and either treated or used in the project site. The net effect of this approach would be to offset the 34 acres of uncaptured (yet greater than 90 percent treated) bridge area with the 18 acres of treatment for existing roadway impervious surface area. This results in a net of 16 acres of uncaptured (yet greater than 90 percent treated) new impervious surface area. Traditional bridge collection and stormwater wetland treatment systems are thought to achieve about 85 percent removal of Total Suspended Solids and 40 percent removal of Total Nitrogen and

Total Phosphorus. This results in 15 to 60 percent of the pollutants being discharged into receiving waters even with treatment.

- Water Quality Monitoring and Research. A water quality monitoring program would be conducted as a part of bridge operations. It would monitor the effectiveness of the bridge deck cleaning program so adjustments to the program could be made as needed. The monitoring program would first establish (test) existing water quality levels, including turbidity levels. Research also could be supported for a better understanding of the effect of bridge deck cleaning and/or the effect of bridge deck stormwater runoff on existing SAV habitat (including existing beds) and potential SAV habitat receiving waters.

2.0 Methodology and Qualifications

All work conducted towards the completion of this document was performed according to approved NCDOT protocols defined in the Natural Environment Unit (NEU) standard operating procedures dated July 24, 2006. These are the procedures that were in force at the time the natural resource assessment was initiated. On-site fieldwork was conducted in April 1994 and June 1995; during the period from September 2007 through January 2008; in May, July, and October 2008; and in January 2009. Jurisdictional areas identified in the project area were verified in the field by Bill Biddlecome with the US Army Corps of Engineers (USACE) on November 1, 2007, December 6, 2007, January 8, 2008, and October 22, 2008. David Wainwright with the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ) verified jurisdictional areas in the field on December 19, 2007 and October 22, 2008. Stephen Lane with the NCDENR, Division of Coastal Management (DCM) verified all CAMA Areas of Environmental Concern (AEC) within the project area in the field on November 30 and December 1, 2010. A jurisdictional determination was signed by Bill Biddlecome in August 2009 for the entire project area. Further details of the methodology and findings are reported in the respective sections of this report. The principal personnel contributing to this document were:

Investigator:	Steve Beck
Education:	B.S. Biology, Juniata College
Experience:	Biologist, CZR Incorporated, 2006-2009
Responsibilities:	Wetland and stream delineations and assessments, aquatic and terrestrial community assessment, threatened and endangered species assessment, document preparation.

Investigator:	T. Travis Brown
Education:	B.S. Wildlife Biology, Murray State University M.S. Biology, Murray State University
Experience:	Biologist, CZR Incorporated, 2007-2008
Responsibilities:	Aquatic and terrestrial community assessment, threatened and endangered species assessment, document preparation.

Investigator:	Samuel Cooper
Education:	B.S. Biology, Northland College M.S. Marine Biology, UNC-Wilmington
Experience:	Project Manager, Sr. Environmental Scientist, CZR Incorporated 1988-present
Responsibilities:	Project review and coordination.

Investigator: Barbara Goad
Experience: Graphics Manager/CADD Operator, CZR Incorporated, 1988-present
Responsibilities: Computer and manual generated AutoCadd and ArcGIS.

Investigator: Lorrie Laliberte Boswell
Education: B.A. Conservation Biology, UNC-Wilmington
M.S. Coastal Marine and Wetland Studies, Coastal Carolina University
Experience: Biologist, CZR Incorporated, 2006-present
Responsibilities: Document preparation, impact evaluations, wildlife assessments.

Additional CZR Incorporated personnel who contributed to portions of the field work and/or documentation for this project were Julia Berger, Mark Grippo, Katherine Braly, and Terry Jones. Appendix D lists the qualifications of these contributors.

3.0 Physical Resources

Currituck County and Dare County are in northeastern North Carolina within the Tidewater Region of the Atlantic Coastal Plain physiographic province. The project area is depicted on Figure 2 in Appendix A. Topography of the project area consists of nearly level and gently sloping land that drains primarily into Currituck Sound and the North River. Mainland portions of the project corridors traverse several distinctive landscapes. The eastern edge of Great Swamp occurs west of US 158 along the edge of the project area. Great Swamp is a low elevation wetland associated with the North River. Along the western side of the project area, US 158 follows a well drained ridge. East of this ridge lies a broad, level, poorly drained, linear depression occupied by Maple Swamp. Another well drained ridge occurs between Maple Swamp and Currituck Sound. Mainland development is concentrated along these upland ridges. Elevations on the mainland range from near sea level to approximately 20 feet above sea level, and elevations along the Outer Banks range from sea level to approximately 40 feet above sea level on top of dunes.

3.1 Soils

The soil data from the US Natural Resources Conservation Service (NRCS) for Currituck and Dare counties identify 29 soil types and areas occupied by water within the project area (NRCS, 2008) (see Table 1).

3.2 Water Resources

3.2.1 Surface Waters

The project region is in the Pasquotank River Basin (US Geologic Survey [USGS] Hydrologic Unit 03010205), a drainage basin covering approximately 3,750 square miles in the North Carolina Coastal Plain physiographic province. It encompasses numerous small watersheds that empty into the Albemarle, Currituck, Croatan, Roanoke, and Pamlico sounds, in addition to the sounds themselves. The Pasquotank River Basin forms part of the Albemarle-Pamlico Estuarine System, the second-largest estuarine system in the United States. NCDENR-DWQ has divided North Carolina’s major drainage basins into subbasins. The project area falls within Pasquotank subbasin 03-01-54 (NCDENR-DWQ, 2006).

Surface waters of the project area are found primarily in association with the open waters of Currituck Sound. The Atlantic Intracoastal Waterway (AIWW) and Jean Guite

Table 1. Soil Types Occurring within the Project Area

Mapping Unit	Soil Series	Drainage Class	Hydric Status
AaA	Altavista fine sandy loam	Moderately well drained	Hydric
At	Augusta fine sandy loam	Somewhat poorly drained	Hydric*
BnD	Beaches-Newhan complex	Excessively drained	Hydric
BoA	Bojac loamy sand	Well drained	Nonhydric
Ca/CaA	Cape Fear loam	Very poorly drained	Hydric
CnA	Conetoe loamy sand	Well drained	Nonhydric
CnA/Cb	Conaby muck	Very poorly drained	Hydric
CoB	Corolla fine sand	Moderately well or somewhat poorly drained	Hydric*
CrB	Corolla-Duckston complex	Moderately well or poorly drained	Hydric
Cu/CuA	Currituck mucky peat	Poorly drained	Hydric
Do	Dorovan mucky peat	Very poorly drained	Hydric
Ds	Dragston loamy fine sand	Somewhat poorly drained	Hydric*
Dt/DtA	Duckston fine sand	Poorly drained	Hydric
Du/DuE	Dune land	Excessively drained	Nonhydric
DwD/DwE	Dune land-Newhan complex	Excessively drained	Hydric*
FrD	Fripp fine sand	Excessively drained	Hydric*
Mu	Munden loamy sand	Moderately well drained	Hydric*
NeC	Newhan fine sand	Excessively drained	Hydric*
NhC	Newhan-Corolla complex	Excessively drained	Hydric*
No	Nimmo loamy sand	Poorly drained	Hydric
Os/OsA	Osier fine sand	Poorly drained	Hydric
OuB	Ousley fine sand	Moderately well drained	Hydric*
Po	Ponzer muck	Very poorly drained	Hydric
Pt	Portsmouth fine sandy loam	Very poorly drained	Hydric
Ro	Roanoke fine sandy loam	Poorly drained	Hydric
StA/StB	State fine sandy loam	Well drained	Nonhydric
To	Tomotley fine sandy loam	Poorly drained	Hydric
W	Water	N/A	N/A
WnB	Wando loamy fine sand	Excessively drained	Nonhydric
Ws	Wasda muck	Very poorly drained	Hydric

Source: Soil data obtained from NRCS, 2008; hydric status from NRCS, 2008a.
*Soil type is primarily nonhydric, but contains hydric inclusions.

Creek (east of the Wright Memorial Bridge) are the only major drainages present within the project area. There are five additional jurisdictional un-named drainages identified within the project area (see Table 2). These include two canals which connect to Maple Swamp and drain into Great Swamp and Deep Creek (North River) that are along the mainland portion of US 158 (S001 and S002). Two modified natural streams were identified along US 158 that drain into Currituck Sound (S003 and S004). The southern

Table 2. Jurisdictional Stream Features Found in the Project Area

Water Resource[1]	Map ID	NCDENR-DWQ Index Number	Best Usage Classification	Appendix A Figure Where Illustrated
UT[2] to Deep Creek[3]	S001	30-2-8	SC[5]	5(d)
UT to Goose Pond[3]	S002	30-2-9	SC	5(d)
UT to Dowdy's Bay 1[4]	S003	30-1-15	SC	5(e)
UT to Dowdy's Bay 2[4]	S004	30-1-15	SC	5(e)
Jean Guite Creek[4]	Jean Guite Creek	30-1-17	SC	5(h)
UT to Sander's Bay[4]	S005	30-1-11	SC	5(l)

[1] In counterclockwise order around the project area, starting in the northwest quadrant, south of the Aydlett Road/US 158 intersection.

[2] Unnamed tributary

[3] North River/Albemarle Sound tributary

[4] Currituck Sound tributary

[5] All tidal salt waters protected for: secondary recreation such as fishing, boating, and other activities involving minimal skin contact; fish and noncommercial shellfish consumption; aquatic life propagation and survival; and wildlife.

portion of the project area (east of the Wright Memorial Bridge) crosses Jean Guite Creek and there is also a small stream (S005) identified within the maritime swamp near the C2 bridge corridor landing area on the Outer Banks that also drains into Currituck Sound. The location of each feature is shown on Figure 5 in Appendix A. The physical characteristics of these streams are provided in Table 3.

Several small natural ponds and naturalized excavated ponds exist on both the mainland and the Outer Banks (see Figures 5 and 6 in Appendix A). There are a total of 19 jurisdictional ponds that occur within the project area, totaling approximately 9.6 acres. One of these ponds occurs within Maple Swamp on the mainland (P1), and the other 18 ponds are found on the Outer Banks (P2-P20). Nine of these ponds (P1, P2, P4, P7-P9, and P16-P18) have surface hydrologic connections (often through jurisdictional wetlands) to Currituck Sound, which is a traditional navigable waterway. The other ten ponds were determined to be jurisdictional via sub-surface hydrologic connections created by porous sandy soils. Ponds that are not naturalized or are excavated wholly in uplands, such as stormwater retention ponds, are not jurisdictional and thus not included in open water acreage.

Table 3. Physical Characteristics of Stream Features in the Project Area

Map ID	Bank Height in Feet	Bankful Width in Feet	Water Depth in Feet	Channel Substrate	Velocity	Clarity	Appendix A Figure Where Illustrated
S001	3.0	15.0	0.0	Organic debris, silt, sand	N/A	N/A	5(d)
S002	1.0	5.0-10.0	0.3	Silt, sand	Slow	Turbid	5(d)
S003	2.0	5.0-20.0	0.3-1.5	Silt, sand	Moderate	Slightly turbid	5(e)
S004	0.0-1.0	5.0-8.0	0.0	Organic debris, silt, sand	N/A	N/A	5(e)
Jean Guite Creek	6.0	75.0	4.0	Silt, sand	Slow	Slightly turbid	5(h)
S005	1.0-2.0	5.0-10.0	0.3	Organic debris, silt, sand	Slow	Slightly turbid	5(l)

Note: Streams S001 and S004 did not have water present at time of evaluation.

Additional water resources in the project area include Currituck Sound, Maple Swamp, Great Swamp, and the Intracoastal Waterway (sometimes referred to as Coinjock Canal). Approximately 3,900 acres of Currituck Sound open water occur within the project area. The total drainage area for Currituck Sound is approximately 280 square miles. Currituck Sound is an oligohaline (brackish) estuary extending from the North Carolina/Virginia state line approximately 29 miles south to its confluence with Albemarle Sound. Water is supplied to Currituck Sound from three primary sources: riverine, precipitation, and marine. The main sources of fresh water include the North Landing River, Northwest River, Tull Creek, and Jean Guite Creek. Jurisdictional stream features S003, S004, and S005 also drain into Currituck Sound. The AIWW provides a hydrologic corridor between North River (a tributary to Albemarle Sound) and Currituck Sound.

Historic and present stressors to Currituck Sound include natural and anthropogenic fluctuations in nutrient loading, turbidity, and salinity (USACE, 2010). Increased development in the watershed has increased the amount of nutrients in runoff into the sound. Bottom disturbing fishing gear, construction of docks/piers/marinas, storms, shoreline erosion, dredging, boating, sedimentation, and runoff have all contributed to increased turbidity in the sound. The erosion of some marsh islands in the sound because of wave energy and decreased sediment accretion has increased the wind fetch, creating more wave energy that can re-suspend particles in the water, increasing turbidity (USACE, 2010).

However, data collected by USGS showed that the yearly average turbidity in Currituck Sound was relatively low during 2006 and 2007, meeting standards for Outstanding Resource Water (ORW) designation (< 25 NTU). Currituck Sound has been denied ORW designation in the past as a result of high nutrient levels and resulting algal blooms (NCDEHNR, 1994). The sound has become more saline since the late 1980s possibly as a result of winds driving more saline water into the sound from other water bodies, droughts, and ocean overwash during severe storms. The sound still does not have ORW designation. Increased salinity in the northern portion of Currituck Sound has been attributed to northerly winds driving water south from the Chesapeake Bay. The same data also suggested that increased salinity in the southern portion of Currituck Sound may be a result of southerly winds driving water north from the Albemarle Sound (Caldwell, 2001).

Maple Swamp has an approximate area of 4,350 acres with elevations ranging from sea level to 6 feet. Approximately 494 acres of Maple Swamp that are considered jurisdictional wetland occur within the project area and about 300 acres of that has been logged in the past three years. Water is supplied to Maple Swamp by proximity to groundwater and precipitation. Drainage may be influenced by wind-driven water in Currituck Sound. During storm events, the storm surge enters the northern end of Maple Swamp through Coinjock Bay and Currituck Sound. Existing SR 1140 (Aydlett Road) bisects Maple Swamp, linking Aydlett with US 158. Ten drainage culverts under the road allow water exchange between the southern and northern sections of the swamp. Although no published studies are available on Maple Swamp hydrology, topographic maps indicate water flow in the swamp to be primarily from south to north with field observations indicating that Aydlett Road may somewhat restrict this northward flow. A detailed analysis of Maple Swamp groundwater conducted for the project is presented in *Mid-Currituck Bridge Project, Preliminary Assessment of Maple Swamp Groundwater System* (Parsons Brinckerhoff, 2010). This analysis included a review of relevant literature and topography of the area and resulted in a conceptualization of groundwater flow in the swamp. The study concluded that groundwater primarily flows into the swamp from the adjacent ridges to the east and west, and then flows slowly out of the swamp from south to north into Currituck Sound. There are also several man-made canals that may occasionally drain the southern portions of Maple Swamp to the Great Swamp and North River.

Great Swamp and the adjacent forests and marshes bordering North River and Deep Creek have an approximate area of 233.6 square miles. Great Swamp is one of the largest swamps remaining in North Carolina (Frost et al., 1990). Water is supplied to Great Swamp by groundwater and precipitation. Within the project area, there are approximately 203.7 acres of Great Swamp that were determined to be jurisdictional wetlands. This area is found on the western side of US 158 throughout a substantial portion of the project area. While Deep Creek, North River, and the associated marshes mainly occur outside the project area, they are contiguous with Great Swamp. Also contiguous with Great Swamp is the AIWW. Several non-jurisdictional ditches transport runoff from roads and agricultural fields to Maple Swamp and Great Swamp. Jurisdictional stream features S001 and S002 connect to Maple Swamp and appear to drain primarily into Great Swamp.

3.2.2 Water Use Classification

All waters found within the project area are designated as “SC” under North Carolina's water quality classifications by NCDENR-DWQ (NCDENR-DWQ, 2008). This saltwater classification represents the minimum quality standards applicable to all saltwaters. Suitable activities for waters classified SC include “aquatic life propagation and survival, fishing, wildlife and secondary recreation” (NCDENR-DWQ, 2008a). Most of Currituck Sound and all waters of the project area are closed to harvesting shellfish for direct marketing purposes or human consumption. The waters of Currituck Sound are classified as joint fishing waters by agreement of the North Carolina Marine Fisheries Commission (NCMFC) and the North Carolina Wildlife Resources Commission (NCWRC), and are subject to fishing regulations enforced by both agencies (North Carolina Register, 15A NCAC 03Q.0202). There are no water bodies classified as High Quality Waters (HQW), Outstanding Resource Waters (ORW), or Water Supply watersheds (WS-I, WS-II) within 1.0 mile downstream of the project area. There are no waters within 1.0 mile of the project area designated on the 303(d) list because of high sedimentation/turbidity levels or highway runoff causing degraded water quality (NCDENR-DWQ, 2006).

Primary Nursery Areas (PNAs) are low salinity state-designated waters in the upper reaches of streams which are used by marine and estuarine fishes and invertebrates during early development. The only state-designated PNA in the project area is Jean Guite Creek which crosses US 158 just east of the Wright Memorial Bridge (see Figure 7 in Appendix A). All of the detailed study alternatives, with the exception of the Preferred Alternative, cross Jean Guite Creek. Secondary nursery areas occur in the lower reaches of streams and bays. Portions of Currituck Sound function as a secondary nursery area for diadromous fish species (fish that use both marine and freshwater habitats) that utilize the area, but no state-designated Secondary Nursery Areas are crossed by the detailed study alternatives, including the Preferred Alternative.

Anadromous (fish that spawn in freshwater but live mainly in saltwater) Fish Spawning Areas (AFSA) are low salinity, state-designated waters that contain the physical, chemical, and biological attributes necessary for anadromous fish to spawn successfully. No AFSA are crossed by the detailed study alternatives, including the Preferred Alternative.

Point source pollution within the project area is limited. There are three facilities requiring a National Pollution Discharge Elimination System Permit (NPDES) in Currituck County: the Mainland Water Treatment Plant (WTP), the Currituck County WTP, and the Southern Outer Banks Water System WTP. All of these facilities are located within the same subbasin as the project area. Violations have only been reported in relation to the Currituck County WTP (personal communication, Gil Vinzani, Environmental Engineer, NCDENR-DWQ, April 28, 2008). The facility has exceeded limits for daily Total Residual Chlorine (TRC) multiple times since 2005 (personal communication, Ron Berry, Environmental Engineer, NCDENR-DWQ, April 28, 2008).

Local non-point source pollution is typical of developed areas and generally is in the form of stormwater runoff. Additional potential pollution sources are incidental spills of petroleum and exhaust emissions associated with the heavy boat traffic in the area. The project area is influenced by basin-wide land uses, including runoff from agricultural and livestock operations.

3.2.3 Impacts to Water Quality

3.2.3.1 Temporary Impacts

The most notable temporary impact to water quality would be the increased turbidity levels produced during construction of the Mid-Currituck Bridge with MCB2, MCB4, and the Preferred Alternative. The duration and severity of these impacts would vary based on the number of simultaneous construction sites, which is likely to be a minimum of three, and the construction methods. Construction methods for a Mid-Currituck Bridge are described in Sections 1.3, 1.4, and 1.5. If a Mid-Currituck Bridge is included in the alternative selected for implementation, NCTA would continue to work with environmental resource and regulatory agencies as the project progresses into final design and permit application to refine these construction methods.

Increased turbidity and sedimentation in Currituck Sound could occur from pile-driving. Increases in turbidity and sedimentation can negatively affect aquatic flora and fauna by depressing light penetration, lowering dissolved oxygen levels, and limiting visibility. Turbidity curtains would be in place to contain particles suspended during pile-driving in submerged aquatic vegetation (SAV) habitat (including existing beds), as defined by NCMFC, as well as when necessary in potential SAV habitat (see Section 4.2.1.2). Driving piles generates less disturbance to the sediment than jetting; therefore, piles would not be jetted. In addition, remaining turbidity impacts from construction would likely diminish soon after construction ceased. Still, it is recognized that as a result of poor water circulation in the sound, some temporary impacts might become permanent if the environment could not recover from the disturbance. NCTA would conduct post-construction water quality studies and if water quality in the project area were deemed substantially degraded because of the project impacts, potential additional mitigation measures would be discussed with NCDENR-DWQ to ensure an environmentally responsible project.

Turbidity and sedimentation levels also would temporarily increase as a result of runoff from construction areas on land, until post-construction re-vegetation occurs. Temporary impacts to water quality from this source would be minimized through the use of NCDOT erosion and sedimentation control measures.

3.2.3.2 Permanent Impacts

Permanent impacts to water quality would be primarily associated with increased levels of bridge and highway runoff, which is considered a non-point source discharge. The effects of runoff are highly site specific. The primary pollutants associated with bridge and highway runoff include particulates, organic compounds, nutrients, and heavy metals. These pollutants accumulate on impervious surfaces and derive from automobiles and materials used in construction and maintenance of roadways. These substances have the potential to affect negatively aquatic life by directly or indirectly interfering with various biological processes and cycles. It is difficult to predict the amounts and specific types of future pollutants that will occur on a roadway, as well as the frequency and severity of future rain events which determine level of exposure. The highest traffic volumes (highest pollutant production) in the project area currently occur on summer weekends and it is assumed that this will continue in the future given the tourism-based nature of the Outer Banks.

Pollutants discharged into Currituck Sound from a bridge could dissipate slowly because of poor water circulation, and could result in higher sediment pollutant levels and bioaccumulation when compared to bridges over high-flow areas with better water circulation. Thermal and turbidity differences in runoff could also affect water quality by depressing oxygen levels and light penetration.

Based solely on the increased amount of impervious surface area (Table 4), MCB2 would result in the greatest increase in runoff, whereas ER2 (assuming reversing the center turn lane of US 158 for hurricane evacuation) would result in the smallest increase. The Preferred Alternative, MCB4, and ER2 with a third outbound lane on US 158 would have similar increases in impervious surface area with amounts between MCB2 and ER2 (with reversing the center turn lane). The removal of Aydlett Road (2.8 acres) is factored into impervious surface area calculations for Option B in Table 4. Use of mainland approach road Option A (included in the Preferred Alternative) would result in approximately 0.4 acre more impervious surface area than Option B. For the road widening portions of the detailed study alternatives, including the Preferred Alternative, infiltration strips and ditches that would transport water to dry infiltration basins would be implemented to treat highway runoff along NC 12. Along US 158, ditches would be used to transport water to existing outfalls. A detailed analysis predicting future pollutant concentrations in runoff for each DEIS detailed study alternative is presented in the *Assessment of Alternatives for Treating Bridge Runoff* (Parsons Brinckerhoff, 2009).

Table 4. Existing and Proposed Impervious Surface Areas by Detailed Study Alternative

	ER2 (acres)	MCB2/C1 (acres)	MCB2/C2 (acres)	MCB4/C1 (acres)	MCB4/C2 (acres)	Preferred Alternative
Option A						
Existing Impervious Surface	290.4	290.4	290.4	290.4	290.4	290.4
Proposed Impervious Surface	379.4 (344.7)	417.2 (412.0)	410.8 (405.6)	377.0 (370.4)	371.4 (364.8)	361.9
Increase in Impervious Surface						
Road	89.0 (54.3)	87.3 (82.1)	77.8 (72.6)	47.1 (40.5)	38.4 (31.8)	32.9
Bridge	0.0	39.5	42.6	39.5	42.6	38.6
Total/Percent Increase	89.0/30.6 (54.3/18.7)	126.8/43.7 (121.6/41.9)	120.4/41.5 (115.2/39.7)	86.6/29.8 (80.0/27.5)	81.0/27.9 (74.4/25.6)	71.5/24.6
Option B						
Existing Impervious Surface (acres)	NA	290.4	290.4	290.4	290.4	
Proposed Impervious Surface (acres)	NA	416.8 (411.6)	410.4 (405.2)	376.6 (370.0)	371.0 (364.4)	
Increase in Impervious Surface						
Road (acres)	NA	96.8 (91.6)	87.3 (82.1)	56.6 (50.0)	47.9 (41.3)	
Bridge (acres)	NA	29.6	32.7	29.6	32.7	
Total (acres)/ Percent Increase	NA	126.4/43.5 (121.2/41.7)	120.0/41.3 (114.8/39.5)	86.2/29.7 (79.6/27.4)	80.6/27.8 (74.0/25.5)	

The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. The removal of Aydlett Road is factored into impervious surface area calculations for Option B.

The stormwater management plan proposed for the Preferred Alternative is described in Section 1.6. NCTA would comply with NC Session Law 2008-211 (An Act to Provide for Improvements in the Management of Stormwater in the Coastal Counties in Order to Protect Water Quality) to the maximum extent practicable for the additional impervious surface area created by this project. A final stormwater management plan for minimizing the potential impact of project pollutants would be developed in association with NCDENR-DWQ and other state and federal environmental resource and regulatory agencies during final design of the alternative selected for implementation and in the process of obtaining related permits.

Additional impacts to water quality could occur from single pollution events such as incidents resulting in hazardous spills on proposed bridge structures or widened roadways. Based on the predominantly residential land use of the area and lack of heavy industry, bulk cargo is likely to consist of household and petroleum products. If spilled, these products degrade over time, but would have short-term negative effects on water quality. NCTA has a hazardous spill contingency plan should any spill occur. A hazardous spill contingency plan is also in place for Currituck and Dare counties and involves participants from local, state, and federal agencies.

Impacts to salinity, water supply, and wastewater treatment should not result from any of the detailed study alternatives, including the Preferred Alternative. Salinity levels would not change because of the presence of a bridge across Currituck Sound since existing flow patterns would not be altered. It is not expected that the increased impervious surface area with the detailed study alternatives, including the Preferred Alternative, would have a measurable effect on well fields and groundwater tables on the mainland or the Outer Banks. If any of the proposed improvements associated with the detailed study alternatives would impact existing septic tanks, the tanks would be properly removed prior to construction.

4.0 Biotic Resources

4.1 Terrestrial Communities

4.1.1 Terrestrial Habitat

Plant communities are represented as distinct assemblages of dominant vegetation. The communities within the project area were identified and characterized based on the dominant vegetation found in the canopy, subcanopy, shrub, and herbaceous strata. Plant communities were identified through the interpretation of aerial imagery (1998 Color-Infrared Digital Ortho Mosaics and 2002, and 2006-2007 color aerial photography), as well as through field observations conducted in April 1994 and June 1995; during the period from September 2007 through January 2008; in May, July, and October 2008; and in January 2009.

Plant communities vary with respect to local geologic, hydrologic, and soil conditions. Some communities have been influenced at some time by such disturbances as logging, livestock grazing, suppression of natural fires, and modification of hydrologic regimes. As a consequence of disturbance and plant succession, some of the habitats in the project area represent intermediate stages or ecotones of the distinct plant communities described in this section. These areas have been included within the most characteristic or representative community. Because of human disturbance, many of the biotic communities described below do not correspond directly to natural communities described by Schafale and Weakley (1990). Where applicable, the community or communities from Schafale and Weakley (1990) that most closely correspond to those described in this report have been included in the descriptions. All Section 404 jurisdictional wetland community names begin with the word “wetland.” This results in some redundancy (e.g., “Wetland Freshwater Marsh”), but provides a method of rapidly identifying all of the wetland communities. Two Section 404 jurisdictional communities (ponds and open water) that are considered “waters” rather than “wetlands” by USACE (1987) are described in Section 4.2.1.

Twenty-one (21) community types occur within the approximately 6,625-acre project area. Of these 21 communities, seven communities are the result of direct human disturbance, including: man-dominated land, agricultural land, pine forest, shrub/scrub, wetland man-dominated land, wetland pine forest, and wetland shrub/scrub. Fourteen (14) communities can be considered to be relatively natural systems: mixed-pine/hardwood forest, hardwood forest, maritime shrub/grassland, maritime forest, wetland mixed-pine/hardwood forest, wetland hardwood forest, wetland bay forest, wetland swamp forest, wetland maritime shrub/grassland, wetland maritime forest, wetland maritime swamp, wetland freshwater marsh, ponds, and open water. Scientific and common names of plants referenced in this report are found in Appendix B. Ponds and open water areas exist naturally and as a result of human disturbance within the project area and are described in Section 4.2.1. Figure 6 in Appendix A depicts the distribution of these communities throughout the project area. Table 5 contains the acreages of each biotic community type present in the entire project area, along with the associated Cowardin et al. (1979) classification codes and NCDENR-DWQ wetland quality rating (if applicable).

Table 5. Coverage of Biotic Communities within the Project Area[1]

Biotic Community	Cowardin Classification	NCDENR-DWQ Wetland Rating[2]	Acreage
Upland man-dominated land	N/A	N/A	1,031.19
Upland agricultural land	N/A	N/A	403.87
Upland pine forest	N/A	N/A	35.85
Upland shrub/scrub	N/A	N/A	21.74
Upland mixed-pine/hardwood forest	N/A	N/A	69.29
Upland hardwood forest	N/A	N/A	23.39
Upland maritime shrub/grassland	N/A	N/A	156.67
Upland maritime forest	N/A	N/A	96.77
Wetland man-dominated land	PEM1/2B, PSS1/3/4B	69.67	30.42
Wetland pine forest	PFO4B	49.00[2]	3.16
Wetland shrub/scrub	PSS1/3/4B	38.67	298.25
Wetland mixed-pine/hardwood forest	PFO1/3/4B	59.67	107.40
Wetland hardwood forest	PFO1/3E	74.33	102.73
Wetland bay forest	PFO1/3E	75.00[3]	5.72
Wetland swamp forest	PFO1/3F	78.00	166.29
Wetland maritime shrub/grassland	PEM1/2B, PSS1/3/4B	20.67	4.13
Wetland maritime forest	PFO1/3/4B	65.00	26.69
Wetland maritime swamp	E2SS/FO1/3/4P, PFO1/3/4F	74.33	27.06
Wetland freshwater marsh	E2EM1P	87.00	100.17
Pond	PUB2/3/4H/x, E1UB2/3/4Lx	N/A	9.62
Open water	E1UB2/3/4K/L/M/x, E1AB3L6	N/A	3,904.55
Total			6,625.15

[1] This table has been updated since the DEIS was published to reflect changes as a result of logging in Maple Swamp that occurred between 2006 and July 2010. Previously forested communities that were logged are now mapped as wetland shrub-scrub and are in the early stages of succession. Revisions were also made after wetland features were evaluated on November 30 and December 1, 2010 by a NCDENR-DCM representative verifying CAMA jurisdiction.

[2] Wetland ratings are an average from three sites within each community.

[3] Only one example of this wetland community is found in the project area.

4.1.1.1 Upland Man-Dominated Land

Areas mapped within this category include residential and commercial structures, roadways, and maintained areas such as lawns, yards, road edges, power line corridors, and non-jurisdictional ponds dug out of upland (such as stormwater retention ponds). Vegetation in these communities has been altered or natural succession has been restricted by routine human use or management. Agricultural and silvicultural dominated landscapes (shrub/scrub) are distinct man-created communities, but are excluded from this category for the purposes of accounting acreages of different land use.

4.1.1.2 Upland Agricultural Land

Agricultural land is composed of primarily croplands and a few pasture lands. Major crops of the area include corn, soybeans, potatoes, peanuts, and small grains.

4.1.1.3 Upland Pine Forest

The pine forest community represents areas where loblolly pine plantations have been cut and natural regeneration of a pine-dominated forest has occurred. The resulting community consists of a nearly monospecific stand of loblolly pine with few additional species.

4.1.1.4 Upland Shrub/Scrub

The shrub/scrub community is comprised of previously cultivated and recently logged lands that are in the early stages of regeneration. This community is defined more by disturbance history than by a distinct assemblage of plants. The vegetation of a shrub/scrub community is characterized by a dense shrub layer comprised of various combinations of sweetgum, red maple, tulip poplar, loblolly pine, wax myrtle, winged sumac, and eastern red cedar. These areas often have a dense growth of woody vines that include yellow jessamine, muscadine, greenbrier, Virginia creeper, Japanese honeysuckle, and poison ivy. Open areas within the shrub thickets contain weedy species such as blackberry, dog fennel, yarrow, Venus' looking-glass, cudweed, day flower, and pokeweed.

4.1.1.5 Upland Mixed-Pine/Hardwood Forest

The mixed-pine/hardwood forest represents a transitional community between pine forest and hardwood forest. This community is often indicative of an area that has been logged or used in agriculture, and is dominated by loblolly pine in combination with various species of hardwood. As the pines age and die out they are replaced by hardwoods, eventually resulting in a stable hardwood forest community.

Loblolly pine makes up a substantial portion of the canopy (50 percent or greater) along with numerous hardwood species that include tulip poplar, sweetgum, red maple, water oak, and laurel oak. The open shrub layer includes swamp red bay, horse sugar, giant cane, highbush blueberry, American holly, and sourwood. The sparse herbaceous layer includes netted chainfern in shaded, depressional areas.

4.1.1.6 Upland Hardwood Forest

The hardwood forest community most closely resembles the mesic mixed hardwood forest described by Schafale and Weakley (1990). This community occurs on moist upland soils adjacent to the wet hardwood forest and swamp forest communities. This community is dominated by species characteristic of both dry and mesic communities.

The closed canopy is dominated by a combination of upland trees that include white oak, southern red oak, and black oak, as well as more mesic species that include tulip poplar, sweetgum, water oak, and red maple. The sparse to moderately dense shrub layer also contains a mixture of dry upland and more mesic species that includes flowering dogwood, sourwood, ironwood, horse sugar, and giant cane. Common woody vines include poison ivy and greenbrier. The sparse herbaceous layer is comprised of ferns that include netted chainfern and southern lady fern in shaded, depressional areas.

4.1.1.7 Upland Maritime Shrub/Grassland

The maritime dry shrub/grassland community occupies sand deposits behind and between low dunes on barrier islands. This community includes areas that are similar to the maritime dry grassland and maritime shrub communities described by Schafale and Weakley (1990). Prior to artificial dune stabilization and man-induced alteration of hydrology, periodic sea water flooding would have eliminated all but the most salt tolerant species resulting in a distinct assemblage of herbaceous species interspersed with scattered clumps of shrubs. Increased protection from flooding has resulted in a community dominated by numerous weedy herbaceous and woody species that are characteristic of disturbed areas.

Areas dominated by trees and shrubs contain live oak, loblolly pine, eastern red cedar, persimmon, northern bayberry, and black cherry. Open areas dominated by herbaceous species contain switchcane, crabgrass, thoroughwort, broomsedge, toad flax, goldenrod, cudweed, rush, plantain, blackberry, and pineweed. Woody vines are also prevalent and include muscadine and greenbrier.

4.1.1.8 Upland Maritime Forest

The maritime forest community includes a mixture of forest communities described as maritime evergreen forest and maritime deciduous forest by Schafale and Weakley (1990). This community is located on the sound side of the Outer Banks where vegetation is protected from much of the ocean salt spray and overwash. This community may be composed almost entirely of live oaks and yaupon in the most ocean-exposed areas (eastern side of the forest). However, the more-protected, western portions of this community can consist of a more diverse canopy of hardwoods (e.g., red maple, sweetgum, water oak, and ironwood) and loblolly pines with an understory of relatively salt intolerant species such as flowering dogwood and giant cane.

4.1.1.9 Wetland Man-Dominated Land

Areas mapped within this category include residential and commercial maintained areas such as lawns, yards, road edges, and power line corridors. Vegetation in these communities has been altered or succession has been restricted by routine human use or management. Unlike the upland version of this community, habitats categorized within the wetland man-dominated lands have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Scrub-Shrub Wetlands" (codes PSS1/3/4B) or "Palustrine Emergent Wetlands" (codes PEM1/2B) that are maintained in a constant state of early succession by human activity.

4.1.1.10 Wetland Pine Forest

The wetland pine forest community represents areas where loblolly pine plantations have been cut and natural regeneration of a pine-dominated forest has occurred. The resulting community consists of a nearly monospecific stand of loblolly pine with few additional species. Unlike the upland version of this community, these areas possess the soil characteristics and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as a "Palustrine Forested Wetlands" (code PFO4B).

4.1.1.11 Wetland Shrub/Scrub

The wetland shrub/scrub community is comprised of previously cultivated and recently logged lands that are in the early stages of regeneration. This community is defined more by disturbance history than by a distinct assemblage of plants. The vegetation of a shrub/scrub community is characterized by a dense shrub layer comprised of various combinations of sweetgum, red maple, tulip poplar, loblolly pine, wax myrtle, winged sumac, and red cedar. These areas often have a dense growth of woody vines that include yellow jessamine, muscadine, greenbrier, Virginia creeper, Japanese honeysuckle, and poison ivy. Open areas within the shrub thickets contain weedy species such as blackberry, dog fennel, yarrow, Venus' looking-glass, cudweed, day flower, and pokeweed. Unlike the upland version of this community, habitats categorized within the wetland shrub/scrub community have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as a "Palustrine Scrub-Shrub Wetlands" (codes PSS1/3/4B).

4.1.1.12 Wetland Mixed-Pine/Hardwood Forest

The wetland mixed-pine/hardwood forest represents a transitional community between pine forest and hardwood forest. This community is often indicative of an area that has been logged or used in agriculture and is dominated by loblolly pine in combination with various species of hardwoods. As the pines age and die out they are replaced by hardwoods, eventually resulting in a stable hardwood forest community.

Loblolly pine makes up a substantial portion of the canopy (50 percent or greater) along with numerous hardwood species that include tulip tree, sweetgum, red maple, water oak, and laurel oak. The open shrub layer includes swamp red bay, horse sugar, giant cane, highbush blueberry, American holly, and sourwood. The sparse herbaceous layer is comprised of netted chainfern. Unlike the upland version of this community, habitats categorized within the wetland mixed-pine/hardwood forest category have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3/4B).

4.1.1.13 Wetland Hardwood Forest

The wetland hardwood forest community type occurs on areas of interstream flats with poorly drained mineral soils or shallow organic soils. Areas mapped as this community within the project area correspond to the non-riverine wet hardwood forest described by Schafale and Weakley (1990). The occurrence of this community is dependent on seasonal flooding or saturation, substantial mineral inputs, and the absence of fire. These areas grade into swamp forest as mineral content of the soil decreases and flooding frequency increases.

The vegetation of this community is characterized by a closed canopy dominated by laurel oak, water oak, swamp chestnut oak, tulip poplar, red maple, sweetgum, and swamp tupelo. The canopy composition differs substantially from that of the swamp forest in that oaks are a major component and the overall diversity of hardwoods is greater. The sparse shrub layer contains horse sugar, swamp red bay, American holly, giant cane, fetterbush, paw paw, ironwood, highbush blueberry, and sweet pepperbush. The sparse herbaceous layer contains netted chainfern, royal fern, and false nettle. Unlike the upland version of this community, habitats categorized within the wetland hardwood forest category have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3E).

4.1.1.14 Wetland Bay Forest

The community type classified as bay forest (Schafale and Weakley, 1990) occurs on areas of interstream flats that have very poorly drained organic soils. Within the project area, this community occurs on the Ponzer muck soil series. The occurrence of bay forest is dependent on a combination of factors that include seasonal flooding or saturation, the absence of substantial mineral inputs, the presence of very nutrient-poor organic soils, and the absence of fire for extended periods. Areas with greater mineral inputs and better nutrient availability support a greater diversity of hardwood trees, and areas with more frequent fires support various pocosin communities.

Vegetation of the bay forests within the project area is comprised of a closed canopy dominated primarily by loblolly bay and red maple with lesser amounts of swamp red bay, sweetgum, swamp tupelo, and sweetbay. The moderately dense to sparse shrub layer is dominated by swamp red bay, sweetbay, sweet pepper bush, highbush blueberry, and Virginia willow. The sparse herbaceous layer contains netted chainfern and Virginia chainfern. This community grades into swamp forest with a shift from nutrient-poor organic soils to mineral soils with greater nutrient availability. This community possesses the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3E).

4.1.1.15 Wetland Swamp Forest

Swamp forests of the project area most closely resemble the non-riverine swamp forest described by Schafale and Weakley (1990). This community occurs on very poorly drained interstream flats on both organic and mineral soils. Swamp forests of the project area occur on Ponzer muck, Wasda muck, Dorovan muck peat, Tomotley fine sandy loam, and Munden loamy sand. The occurrence of swamp forest is dependent on seasonal to frequent saturation or flooding and occasional mineral inputs that lead to improved nutrient availability relative to bay forest and pocosin communities. As mineral inputs decrease and fire frequency increases, these areas grade into bay forest.

Vegetation of the swamp forest is comprised of a closed canopy dominated primarily by red maple, swamp tupelo, and sweetgum with lesser amounts of swamp chestnut oak, water oak, and laurel oak. The moderately dense to sparse shrub layer is dominated by red bay, sweetbay, Virginia willow, highbush blueberry, and American holly. Woody vines include greenbrier, muscadine, and poison ivy. The sparse herbaceous layer contains netted chainfern, Virginia chainfern, royal fern, and lizard's tail. This community has the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3F).

4.1.1.16 Wetland Maritime Shrub/Grassland

The wetland maritime shrub/grassland community primarily occupies interdunal swales and other low areas on barrier islands. This community includes areas that are similar to the maritime wet grassland and maritime shrub communities described by Schafale and Weakley (1990). Prior to artificial dune stabilization and man-induced alteration of hydrology, periodic sea water flooding would have eliminated all but the most salt tolerant species resulting in a distinct assemblage of herbaceous species interspersed with scattered clumps of shrubs. Increased protection from flooding has resulted in a community dominated by numerous weedy herbaceous and woody species that are characteristic of disturbed areas.

Areas dominated by trees and shrubs contain loblolly pine, eastern red cedar, persimmon, wax myrtle, northern bayberry, and black cherry. Open areas dominated by herbaceous species contain switchcane, crabgrass, thoroughwort, broomsedge, toad flax, goldenrod, cudweed, rush, plantain, blackberry, and pineweed. Woody vines are also prevalent and include muscadine and greenbrier. Unlike the upland version of this community, habitats categorized within the wetland maritime shrub/grassland community have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Scrub-Shrub Wetlands" (codes PSS1/3/4B) or "Palustrine Emergent Wetlands" (codes PEM1/2B).

4.1.1.17 Wetland Maritime Forest

The wetland maritime forest community includes a mixture of forest communities described as maritime evergreen forest and maritime deciduous forest by Schafale and Weakley (1990). This community is located closer to the sound side of the Outer Banks where vegetation is protected from much of the ocean salt spray and overwash. This community may consist of a diverse canopy of hardwoods (e.g., red maple, sweetgum, water oak, ironwood, etc.) and loblolly pines with an understory of relatively salt intolerant species such as flowering dogwood, giant cane, and netted chain fern. Unlike the upland version of this community, habitats categorized within the wetland maritime forest community have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3/4B).

4.1.1.18 Wetland Maritime Swamp

Equivalent to the maritime shrub swamp of Schafale and Weakley (1990), this community occurs on sandy soils adjacent to the freshwater marshes of Currituck Sound. These areas are frequently inundated but receive less flooding than the marshes.

The vegetation is characterized by a closed canopy dominated by red maple, swamp tupelo, sweetgum, and loblolly pine. The dense to open shrub layer contains swamp red bay, wax myrtle, highbush blueberry, red maple, and sweetgum. The herbaceous layer varies from moderately dense at the edge of the freshwater marsh to sparse further into the forest. Species include marsh fern, netted chainfern, Virginia chainfern, royal fern, false nettle, pennywort, spadeleaf, mock bishop's weed, water hemlock, cut grass, slender spikegrass, sedges, rushes, and marsh seedbox. This community grades landward into maritime forest as flooding frequency decreases. These communities have the vegetation, soil characteristics, and hydrologic regime necessary to be regulated as a Section 404 jurisdictional wetland by USACE (1987). In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Palustrine Forested Wetlands" (codes PFO1/3/4F) or "Estuarine Intertidal Shrub-Scrub Forested Wetlands" (codes E2SS/FO1/3/4P).

4.1.1.19 Wetland Freshwater Marsh

Extensive areas of wetland freshwater marsh (Schafale and Weakley, 1990) occur along the margins of Currituck Sound on Currituck mucky peat soil. These areas are irregularly flooded by wind tides that bring in nutrients and sediments. A diverse assemblage of emergent herbaceous species dominates this community with scattered shrubs occurring on small isolated hummocks.

The freshwater marshes of the project area resemble the oligohaline variant described by Schafale and Weakley where cattail and big cordgrass are two of the dominant species. The oligohaline variant is slightly influenced by salt but retains high plant diversity. Additional herbaceous species include mock bishop's weed, creeping spikerush, arrow-head, duck potato, arrow arum, false nettle, pennywort, spadeleaf, water hemlock, bedstraw, cut grass, numerous sedges, rushes, three-square, bulrush, and marsh fern. Scattered shrubs on small hummocks include groundsel-tree, red maple, and swamp willow. This community grades upslope into maritime swamp and downslope into the open water of Currituck Sound. This community has the vegetation, soil characteristics, and hydrologic regime necessary to be delineated as a Section 404 jurisdictional wetland by USACE (1987) and the characteristics necessary to be regulated as an AEC (coastal marsh) under CAMA regulations. In the Cowardin et al. (1979) system of wetland classification these communities can be classified as "Estuarine Intertidal Emergent Wetlands" (code E2EM1P).

4.1.1.20 Logged Land in Maple Swamp

Field visits to locate logged areas in Maple Swamp were conducted on August 4 and 5, 2009 (aided by a GPS unit to identify logged boundaries) and August 16, 2010 (included a flight over the swamp to confirm logged boundaries). A total of approximately 1,253 acres of forest were removed by logging activity between 2006 and July 2010. Figures 6(b) and 6(c) in Appendix A show the approximate boundaries of most of the clear cut land in Maple Swamp based on the August 16, 2010 field visit; however, a small area of additional land was clear cut to the south of the area shown on Figures 6(b) and 6(c) in the vicinity of NC 136 (Macedonia Church Road).

Much of the recent logging activity was not accounted for in the DEIS analysis of temporary and permanent impacts to biotic communities as a result of the DEIS detailed study alternatives including either Option A or Option B through Maple Swamp (i.e., MCB2 and MCB4). However, the updated biotic communities impact analysis in Section 4.1.2 of this document accounts for the recent logging in presenting the updated impacts for MCB2 and MCB4, as well as the impacts for the Preferred Alternative. For example, as presented in Section 4.1.2, the impacts to wetland swamp forest for MCB2 and MCB4 have been reduced since the DEIS because much of this community type in the alternatives' corridors was logged and is now considered to be wetland shrub/scrub. In addition, the impacts to wetland shrub/scrub with MCB2 and MCB4 increased substantially because all of the logged biotic communities are now considered to be this community type.

The vegetation of the logged areas during 2009 to 2010 was representative of a wetland depression meadow/freshwater marsh-like community and wetland shrub/scrub. Portions of the logged areas also were being invaded by early successional tree species such as red maple and sweet gum. Through natural succession over time (decades), most of the logged areas will return to forested wetland communities if left undisturbed.

Clear cut logging alters some wetland functions and values. Comparison of NCDENR-DWQ rating values for wetland hardwood forest and swamp forest, the two most prevalent biotic communities in the logged areas, shows scores from 75 to 84 out of a possible 100, which represents the highest score. The power line crossing of Maple Swamp represents conditions similar to recently logged areas, and scored 69. The NCDENR-DWQ rating system incorporates weighted values in the following categories: water storage, stream bank/shore stabilization, pollution removal, wildlife habitat, aquatic life, and recreation and education. Because the NCDENR-DWQ rating system is weighted toward water quality functions, the scores may not accurately represent the difference in wildlife usage and diversity. Wildlife species preferring canopy strata and large areas of mature forests may not become re-established for decades after log removal. Because these logged areas are within the boundaries of a system identified by the North Carolina Natural Heritage Program (NCNHP) as a Significant Natural Heritage Area (SNHA), they did and do continue to have the potential to provide important and valuable habitat to the region.

4.1.1.21 Parcels in Maple Swamp and Great Swamp Potentially Separated from Public Access (Landlocked) by the Preferred Alternative

An access management study was completed for the Preferred Alternatives in April 2011. The access management study concluded that six landlocked parcels would be purchased as part of the Preferred Alternative. As shown on Figure 6(b) in Appendix A, three of these parcels are in Maple Swamp to the east of the US 158/Mid-Currituck Bridge interchange and the other three parcels are to the west of the interchange in Great Swamp. These six parcels, comprising a total of approximately 160 acres, would be purchased during right-of-way acquisition for the Preferred Alternative and preserved (assuming successful negotiations with willing sellers). Based on the results of the Maple Swamp logged land analysis discussed in Section 4.1.1.20 and as shown on Figure 6(b), the parcels to be preserved in Maple Swamp have not been logged. The parcels in Great Swamp also have not been logged.

As shown on Figure 6(b) the parcels that would be preserved in Great Swamp consist mostly of wetland swamp forest, with some man-dominated land, hardwood forest, wetland hardwood forest, and wetland mixed pine hardwood forest. The parcels that would be preserved in Maple Swamp consist mostly of wetland hardwood forest and wetland mixed pine hardwood forest, with some wetland swamp forest, hardwood forest, and man-dominated land.

4.1.1.22 Significant Natural Heritage Areas

There are several SNHAs designated by NCNHP present in the project area (see Figure 7 in Appendix A). Portions of the Pine Island/Currituck Club Natural Area are within Currituck Sound in the project area. The Pine Island/Currituck Club Natural Area contains an extensive tidal freshwater marsh system along the eastern side of Currituck Sound. This area is given a "C" status, which indicates that this is an outstanding example of this community, though this community may be represented by better examples in the state (NCNHP, 2005). Diverse marsh and shrub species can be found in this area, and this community is described in further detail in Section 4.1.1.19. Figure 7 in Appendix A shows the SNHAs and other natural resource-related features in the vicinity of the project area.

Maple Swamp is recognized by NCNHP as a SNHA. The area is a Natural Heritage Priority Area and is assigned a "B" status, which represents a statewide significant site that is among the highest quality occurrences in North Carolina. The significant features associated with this site include an unusually extensive stand of loblolly bay forest, which may represent the largest stand in the state and the most northern range of this community. Predominant communities associated with Maple Swamp and found within the project area also include non-riverine swamp forest and non-riverine wet hardwood forest. These communities are discussed in further detail in Section 4.1.1, but called wetland swamp forest and wetland hardwood forest.

Large portions of the forests and marshes surrounding North River and Deep Creek, including Great Swamp, are recognized by NCNHP as SNHAs. These areas are rated as having county significance, which indicates that they are significant, high quality sites, although there are better examples in the region as well as in the state as a whole. Significant features of these areas include good examples of tidal cypress/gum swamp and areas of tidal freshwater marsh. These areas are also assigned a "B" status (see above) because of the extensive tidal freshwater marsh areas and what are thought to be natural and/or virgin stands of tidal cypress/gum swamp.

4.1.1.23 Rare and Threatened Communities

Rare and threatened natural community types within the state are identified by NCNHP and ranked based on rarity or because of factors making a particular community especially vulnerable to degradation. Table 6 lists the rare and threatened natural communities that have been identified within the project area by NCNHP (2008a).

Table 6. Rare and Threatened Natural Communities Found within the Project Area

NCNHP Rare or Threatened Community Type	Contains Section 404 Areas	State Rank[1]	Global Rank[2]	Equivalent Mapped Communities
Maritime dry grassland	No	S2	G3	Upland maritime shrub/grassland
Maritime wet grassland	Yes	S2	G3	Wetland maritime shrub/grassland
Maritime shrub	Yes	S3	G4	Wetland maritime shrub/grassland, upland maritime shrub/grassland
Maritime swamp forest	Yes	S2S3	G2G3	Wetland maritime forest, wetland maritime swamp
Maritime evergreen forest	No	S1	G2G3	Maritime forest
Non-riverine wet hardwood forest	Yes	S1	G1	Wetland hardwood forest
Non-riverine swamp forest	Yes	S2S3	G2G3	Wetland swamp forest
Bay forest	Yes	S2	G3G4	Wetland bay forest
Tidal cypress/gum swamp	Yes	S3	G4	Wetland swamp forest[3]
Tidal freshwater marsh	Yes	S2S3	G4	Wetland freshwater marsh

Source: NCNHP, 2008a

[1] S1 = Critically imperiled in North Carolina because of extreme rarity or otherwise very vulnerable to extirpation in the state. S2 = Imperiled in North Carolina because of rarity or otherwise vulnerable to extirpation in the state. S3 = Rare or uncommon in North Carolina.

[2] G1 = Critically imperiled globally because of extreme rarity or otherwise very vulnerable to extinction throughout its range. G2 = Imperiled globally because of rarity or otherwise vulnerable to extinction throughout its range. G3 = Either very rare and local throughout its range, or found locally in a restricted area. G4 = Apparently secure globally, although it may be quite rare in parts of its range (especially at the periphery).

[3] There are no tidal cypress/gum swamps that occur within the project area. However, this community is contiguous with wetland swamp forest communities within the project area in Great Swamp and Maple Swamp.

Maritime Communities

These areas include maritime dry and wet grassland, maritime shrub, and maritime swamp and evergreen forests. Upland communities along barrier islands receive little protection from development pressures, and consequently have undergone extreme degradation. For these reasons, maritime communities include some of the most endangered communities in North Carolina (NCNHP, 2008a). Maritime communities, comprising upland and wetland habitats, are particularly susceptible to the effects of fragmentation. Maritime forests and swamps serve as relatively stable sources of refuge for many species of wildlife, contribute to the biodiversity of barrier islands, and often occur as "islands" of habitat along the Outer Banks. The maritime forests along the Currituck Outer Banks were given high priority status and were considered deserving of protection (Lopazanski et al., 1988). Most of the maritime forest along the sound side of the Outer Banks is under private ownership and subject to degradation. In order to help minimize the impacts of development on maritime forest, the Currituck County Unified Development Ordinance provides guidelines for both minimizing maritime forest impacts during site development and rehabilitating maritime forest. Since the 1980s, the County has worked proactively with property owners and developers to foster awareness of the importance of maritime forests. SNHAs such as Currituck Banks, Corolla Natural Area, Swan Island Natural Area, Currituck National Wildlife Refuge (CNWR), Pine Island/Currituck Club Natural Area, and Kitty Hawk Woods contain these maritime communities and are in the vicinity of the project area (see Figure 7 in Appendix A). Another SNHA in the vicinity of the project area is the Southern Shores Cypress Swamp. This small area is one of the few cypress swamps found on the Outer Banks.

Non-Riverine Wetland Forests

Non-riverine wet hardwood and swamp forests most commonly occur on very poorly drained flats in northeastern North Carolina. Within the project area, they occur in Maple Swamp. Loss of these communities can be attributed to logging, development, and conversion to agriculture and silviculture, since these areas are largely privately owned. Once impacted these areas are unlikely to return to their original state. These communities are heavily fragmented and only a few small stands containing large trees still exist. Smaller gum and maple trees with dense shrub layers now dominate most of these communities. The primary difference between non-riverine wet hardwood/ swamp forest and tidal cypress-gum swamp is topographic position and the source of flooding, with non-riverine swamp forests being flooded with high groundwater, as opposed to flowing or tidal sources (Schafale and Weakley, 1990). These are stable communities that provide refuge for a large diversity of neotropical migrants, local avian populations, reptiles, amphibians, and mammals (Schafale, 1999).

Tidal Communities

Tidal cypress/gum swamp and tidal freshwater marsh typically surround freshwater/ oligohaline water bodies in the coastal plain that are influenced by lunar and/or wind tides. Great Swamp and Currituck Sound are areas that contain estuarine and tidal communities within the project area. These communities are also found in SNHAs such as the North River/Deep Creek Marshes and Forest, Mamie Marshes and Ponds, Harbinger Marshes, Church Island Marsh, Bell Point Marsh, Currituck Banks, Corolla Natural Area, Swan Island Natural Area, CNWR, and the Pine Island/Currituck Club Natural Area which are all present in the vicinity of the project area (see Figure 7 in Appendix A). Primary threats to these communities include Common reed encroachment and the resulting reduction of plant and animal diversity, reduced fire regime allowing succession to other communities, and swamp drainage for development and mosquito control; all of which have reduced the size of these areas. Salt intrusion from storm surge events can also negatively affect these communities. Few old growth cypress-gum swamps remain. This community provides refuge for a diversity of avian, reptile, and amphibian species. Current protection efforts include a large area of tidal freshwater marsh that is partly owned by the National Audubon Society-Pine Island Audubon Sanctuary, but the remainder is privately owned (NCNHP, 1990).

4.1.2 Impacts to Terrestrial Habitat

Permanent impacts to biotic communities include losses because of fill, bridge pilings, drainage easements, and cleared maintenance corridors. Temporary impacts would result from temporary fill and clearing during construction, but would likely return to natural conditions over time. The estimated amounts of temporary impacts to biotic communities for each detailed study alternative, including the Preferred Alternative, are shown in Table 7 and Table 8. The estimated amounts of permanent impacts to biotic communities for each detailed study alternative, including the Preferred Alternative, are shown in Table 9 and Table 10. Forested wetland communities have been updated to reflect logging in Maple Swamp since 2006, so some communities differ from the DEIS. Forested wetland communities that were logged are now mapped as wetland shrub/scrub.

Openings in forested communities created by vegetation removal and/or filling would lead to adverse effects including community fragmentation, introduction of shade intolerant weedy species, and alteration of other environmental factors that affect biotic community dynamics. These “edge effects” would be most prominent in forest and swamp communities of Maple Swamp and the Outer Banks with MCB2, MCB4, and the Preferred Alternative. Impacts to Great Swamp and roadside communities associated with ER2 and the road-widening portions of MCB2, MCB4, and the Preferred Alternative would be less severe since these areas are near existing road corridors.

All of the detailed study alternatives with a Mid-Currituck Bridge, including the Preferred Alternative, would affect less than one acre of Great Swamp along its eastern fringe where it borders US 158. For MCB2/A and MCB4/A, this impact would consist of

Table 7. Temporary Impacts to Biotic Communities by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

Biotic Community	ER2 (acres)	MCB2/A/C1 (acres)	MCB2/A/C2 (acres)	MCB4/A/C1 (acres)	MCB4/A/C2 (acres)
Upland man-dominated land	75.0 (1.7)	7.4 (1.5)	7.9 (2.0)	8.2 (0.0)	8.2 (0.0)
Upland agricultural land	29.9 (0.0)	1.7 (0.0)	1.7 (0.0)	1.7 (0.0)	1.7 (0.0)
Upland pine forest	1.1	0.0	0.0	0.0	0.0
Upland shrub/scrub	1.3	0.0	0.0	0.0	0.0
Upland mixed-pine/ hardwood forest	4.5 (0.0)	0.1 (0.0)	0.1 (0.0)	0.1 (0.0)	0.1 (0.0)
Upland hardwood forest	1.3 (0.0)	0.0	0.0	0.0	0.0
Upland maritime shrub/grassland	0.1	0.1	0.1	0.0	0.0
Upland maritime forest	0.0	0.0	0.0	0.0	0.0
Wetland man-dominated land	0.5 (0.0)	0.3 (0.0)	0.3 (0.0)	0.7 (0.0)	0.7 (0.0)
Wetland pine forest	0.0	0.0	0.0	0.0	0.0
Wetland shrub/scrub	0.0	0.0	0.0	0.0	0.0
Wetland mixed-pine/ hardwood forest	0.0	0.0	0.0	0.0	0.0
Wetland hardwood forest	0.6 (0.0)	0.3 (0.0)	0.3 (0.0)	0.3 (0.0)	0.3 (0.0)
Wetland bay forest	0.0	0.0	0.0	0.0	0.0
Wetland swamp forest	1.1 (0.0)	1.1 (0.0)	1.1 (0.0)	1.1 (0.0)	1.1 (0.0)
Wetland maritime shrub/grassland	0.0	0.0	0.0	0.0	0.0
Wetland maritime forest	0.0	0.0	0.0	0.0	0.0
Wetland maritime swamp	0.0	0.0	0.0	0.0	0.0
Wetland freshwater marsh	0.0	0.0	0.0	0.0	0.0

Table 7 (concluded). Temporary Impacts to Biotic Communities by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

Biotic Community	ER2 (acres)	MCB2/A/C1 (acres)	MCB2/A/C2 (acres)	MCB4/A/C1 (acres)	MCB4/A/C2 (acres)
Pond	0.0	0.0	0.0	0.0	0.0
Open water (total)	0.1 (0.0)	0.0	0.0	0.0	0.0
SAV beds (existing)	0.0	0.0	0.0	0.0	0.0
Aquatic bottom	0.0	0.0	0.0	0.0	0.0
Stream (acreage)	0.0	0.0	0.0	0.0	0.0
Stream (linear feet)	171.7 (clearing)	0.0	0.0	0.0	0.0
Total	115.5 (4.2)	11.1 (1.6)	11.6 (2.1)	12.2 (0.0)	12.2 (0.0)

Note: Temporary impact calculations only include areas contained within temporary construction easements and do not include temporary impacts to the waters of Currituck Sound. The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

Table 8. Temporary Impacts to Biotic Communities by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

Biotic Community	MCB2/B/C1 (acres)	MCB2/B/C2 (acres)	MCB4/B/C1 (acres)	MCB4/B/C2 (acres)	Preferred Alternative (acres)	Preferred Alternative PUE (acres)[1]
Upland man-dominated land	7.9	7.9	8.7	8.7	2.1	0.5
	(1.5)	(1.5)	(0.0)	(0.0)		
Upland agricultural land	1.8	1.8	1.8	1.8	0.0	0.0
	(0.1)	(0.1)	(0.1)	(0.1)		
Upland pine forest	0.0	0.0	0.0	0.0	0.0	0.0
Upland shrub/scrub	0.0	0.0	0.0	0.0	0.0	0.0
Upland mixed-pine/ hardwood forest	0.1	0.1	0.1	0.1	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)		
Upland hardwood forest	0.0	0.0	0.0	0.0	0.0	0.0
Upland maritime shrub/grassland	0.1	0.1	0.0	0.0	0.0	0.5
Upland maritime forest	0.0	0.0	0.0	0.0	0.0	0.1
Wetland man-dominated land	0.3	0.3	0.7	0.7	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)		
Wetland pine forest	0.0	0.0	0.0	0.0	0.0	0.0
Wetland shrub/scrub	0.0	0.0	0.0	0.0	0.0	0.0
Wetland mixed-pine/ hardwood forest	0.0	0.0	0.0	0.0	0.0	0.0
Wetland hardwood forest	0.3	0.3	0.3	0.3	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)		
Wetland bay forest	0.0	0.0	0.0	0.0	0.0	0.0
Wetland swamp forest	1.1	1.1	1.1	1.1	0.0	0.0
	(0.0)	(0.0)	(0.0)	(0.0)		
Wetland maritime shrub/grassland	0.0	0.0	0.0	0.0	0.0	0.0

Table 8 (concluded). Temporary Impacts to Biotic Communities by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

Biotic Community	MCB2/B/C1 (acres)	MCB2/B/C2 (acres)	MCB4/B/C1 (acres)	MCB4/B/C2 (acres)	Preferred Alternative (acres)	Preferred Alternative PUE (acres)[1]
Wetland maritime forest	0.0	0.0	0.0	0.0	0.0	0.0
Wetland maritime swamp	0.0	0.0	0.0	0.0	0.0	0.0
Wetland freshwater marsh	0.0	0.0	0.0	0.0	0.0	0.0
Pond	0.0	0.0	0.0	0.0	0.0	0.0
Open water (total)	0.0	0.0	0.0	0.0	0.0	0.0
• SAV beds (existing)	0.0	0.0	0.0	0.0	0.0	0.0
• Aquatic bottom	0.0	0.0	0.0	0.0	0.0	0.0
• Stream (acreage)	0.0	0.0	0.0	0.0	0.0	0.0
• Stream (linear feet)	0.0	0.0	0.0	0.0	0.0	0.0
Total	11.7	11.7	12.9	12.9	2.1	1.1
	(1.7)	(1.7)	(0.1)	(0.1)		

Note: Temporary impact calculations only include areas contained within temporary construction easements and do not include temporary impacts to the waters of Currituck Sound. The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

[1] PUE – Permanent Utility Easement; this column reflects the area of a permanent utility easement. Impacts in the easement would occur when utilities are relocated and the easement would be restored. This number reflects a detail added to the preliminary design of the Preferred Alternative that was not included in the impact calculations for the DEIS detailed study alternatives.

Table 9. Permanent Impacts to Biotic Communities by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

Biotic Community	ER2 (acres)				MCB2/A/C1 (acres)				MCB2/A/C2 (acres)				MCB4/A/C1 (acres)				MCB4/A/C2 (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Upland man-dominated land	35.7 (33.9)	0.0	0.0	0.0	78.0 (76.3)	0.0	0.1	0.1	74.5 (72.8)	0.0	0.2	0.3	49.0 (47.3)	0.0	0.1	0.1	45.5 (43.8)	0.0	0.2	0.3
Upland agricultural land	0.2 (0.0)	0.0	0.0	0.0	16.3 (16.1)	0.0	0.0	0.0	16.3 (16.1)	0.0	0.0	0.0	16.3 (16.1)	0.0	0.0	0.0	16.3 (16.1)	0.0	0.0	0.0
Upland pine forest	0.0	0.0	0.0	0.0	9.5	0.0	0.6	2.1	9.5	0.0	0.6	2.1	9.5	0.0	0.6	2.1	9.5	0.0	0.6	2.1
Upland shrub/scrub	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0
Upland mixed-pine/hardwood forest	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.1	2.0	0.0	0.0	0.1	2.0	0.0	0.0	0.1	2.0	0.0	0.0	0.1
Upland hardwood forest	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0
Upland maritime shrub/grassland	54.2	0.0	0.0	0.0	61.8	0.0	0.3	0.4	54.1	0.0	0.0	0.1	22.5	0.0	0.3	0.4	14.8	0.0	0.0	0.1
Upland maritime forest	31.1	0.0	0.0	0.0	32.5	0.0	0.0	0.1	36.8	0.0	0.8	0.3	2.5	0.0	0.0	0.1	6.8	0.0	0.8	0.3
Wetland man-dominated land	0.2	0.0	0.0	0.0	1.2	0.0	0.0	0.1	1.2	0.0	0.0	0.1	1.0	0.0	0.0	0.1	1.0	0.0	0.0	0.1
Wetland pine forest	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.0	0.0	0.3	0.4	0.0	0.0	0.3	0.4	0.0	0.0	0.3	0.4
Wetland shrub/scrub	0.0	0.0	0.0	0.0	0.0	0.0	5.7	15.6	0.0	0.0	5.7	15.6	0.0	0.0	5.7	15.6	0.0	0.0	5.7	15.6
Wetland mixed-pine/hardwood forest	0.2 (0.0)	0.0	0.0	0.0	0.6 (0.4)	0.0	0.4	1.7	0.6 (0.4)	0.0	0.4	1.7	0.6 (0.4)	0.0	0.4	1.7	0.6 (0.4)	0.0	0.4	1.7
Wetland hardwood forest	0.0	0.0	0.0	0.0	2.7	0.0	3.1	5.9	2.7	0.0	3.1	5.9	2.7	0.0	3.1	5.9	2.7	0.0	3.1	5.9

Table 9 (continued). Permanent Impacts to Biotic Communities by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

Biotic Community	ER2 (acres)				MCB2/A/C1 (acres)				MCB2/A/C2 (acres)				MCB4/A/C1 (acres)				MCB4/A/C2 (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Wetland bay forest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wetland swamp forest	0.2 (0.0)	0.0	0.0	0.0	0.7 (0.5)	0.0	0.6	1.1	0.7 (0.5)	0.0	0.6	1.1	0.7 (0.5)	0.0	0.6	1.1	0.7 (0.5)	0.0	0.6	1.1
Wetland maritime shrub/grassland	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wetland maritime forest	1.7	0.0	0.0	0.0	4.2	0.0	0.1	0.3	2.3	0.0	0.9	1.9	2.8	0.0	0.1	0.3	0.9	0.0	0.9	1.9
Wetland maritime swamp	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.8
Wetland freshwater marsh	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4
Pond	0.3	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0

Table 9 (concluded). Permanent Impacts to Biotic Communities by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

Biotic Community	ER2 (acres)				MCB2/A/C1 (acres)				MCB2/A/C2 (acres)				MCB4/A/C1 (acres)				MCB4/A/C2 (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Open water (total)*	0.1	0.0	0.2	0.0	0.1	0.1	28.2	0.0	0.1	0.1	29.2	0.0	0.0	0.1	28.1	0.0	0.0	0.1	29.1	0.0
SAV beds (existing)	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0
Aquatic bottom Total/ depths < 6ft	0.1/ 0.1	0.0/ 0.0	0.1/ 0.1	0.0/ 0.0	0.1/ 0.1	0.1/ 0.0	28.1/ 12.3	0.0/ 0.0	0.1/ 0.1	0.1/ 0.0	29.1/ 13.3	0.0/ 0.0	0.0/ 0.0	0.1/ 0.0	28.1/ 12.3	0.0/ 0.0	0.0/ 0.0	0.1/ 0.0	29.1/ 13.3	0.0/ 0.0
Stream (acreage)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (linear feet)	0.0	0.0	36.0	0.0	0.0	0.0	36.0	0.0	0.0	0.0	136.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	118.0	0.0
Total	126.6 (124,2)	0.0	0.2	0.0	221.9 (219.7)	0.1	39.4	27.9	211.4 (209.1)	0.1	43.3	32.8	119.1 (116.8)	0.1	39.3	27.9	108.6 (106.3)	0.1	43.2	32.8

*Open water subcategory (i.e., existing SAV beds, aquatic bottom, and stream) amounts are included in total open water, but subcategory amounts do not add up to total because of the overlapping nature of these communities.

The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals

Table 10. Permanent Impacts to Biotic Communities by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

Biotic Community	MCB2/B/C1 (acres)				MCB2/B/C2 (acres)				MCB4/B/C1 (acres)				MCB4/B/C2 (acres)				Preferred Alternative (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Upland man-dominated land	79.2 (77.4)	0.0	0.7	0.0	75.7 (74.0)	0.0	0.7	0.3	50.1 (48.3)	0.0	0.7	0.0	46.6 (44.8)	0.0	0.0	0.3	38.9	0.0	0.1	0.4
Upland agricultural land	35.7 (35.5)	0.0	0.0	0.0	35.7 (35.5)	0.0	0.0	0.0	35.7 (35.5)	0.0	0.0	0.0	35.7 (35.5)	0.0	0.0	0.0	15.3	0.0	0.0	0.0
Upland pine forest	16.5	0.0	0.3	0.0	16.5	0.0	0.3	0.0	16.5	0.0	0.3	0.0	16.5	0.0	0.0	0.0	10.9	0.0	0.3	1.1
Upland shrub/scrub	2.8	0.0	0.0	0.0	2.8	0.0	0.0	0.0	2.8	0.0	0.0	0.0	2.8	0.0	0.0	0.0	2.7	0.0	0.0	0.0
Upland mixed-pine/hardwood forest	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.2	0.0	2.0	0.0	0.0	0.0
Upland hardwood forest	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0	4.8	0.0	0.0	0.0
Upland maritime shrub/grassland	61.8	0.0	0.3	0.4	54.1	0.0	0.0	0.1	22.5	0.0	0.3	0.4	14.8	0.0	0.2	0.1	10.9	0.0	0.0	0.0
Upland maritime forest	32.5	0.0	0.0	0.1	36.8	0.0	0.1	0.3	2.5	0.0	0.0	0.1	6.8	0.0	0.0	0.3	2.3	0.0	0.1	0.2
Wetland man-dominated land	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.2	0.0	0.0	0.0	2.2	0.0	0.0	0.0	1.1	0.0	0.0	0.1
Wetland pine forest	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.3	1.1
Wetland shrub/scrub	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0	0.0	0.0	5.7	15.6
Wetland mixed-pine/hardwood forest	3.4 (3.2)	0.0	0.0	0.0	3.4 (3.2)	0.0	0.0	0.0	3.4 (3.2)	0.0	0.0	0.0	3.4 (3.2)	0.0	0.0	0.0	1.1	0.0	0.4	1.7

Table 10 (continued). Permanent Impacts to Biotic Communities by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

Biotic Community	MCB2/B/C1 (acres)				MCB2/B/C2 (acres)				MCB4/B/C1 (acres)				MCB4/B/C2 (acres)				Preferred Alternative (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Wetland hardwood forest	7.6	0.0	0.2	0.0	7.6	0.0	0.2	0.0	7.6	0.0	0.2	0.0	7.6	0.0	0.2	0.0	2.8	0.0	3.1	5.9
Wetland bay forest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wetland swamp forest	1.2 (0.9)	0.0	0.2	0.0	1.2 (0.9)	0.0	0.2	0.0	1.2 (0.9)	0.0	0.2	0.0	1.2 (0.9)	0.0	0.2	0.0	0.4	0.0	0.6	1.1
Wetland maritime shrub/grassland	1.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wetland maritime forest	4.2	0.0	0.1	0.3	2.3	0.0	0.8	1.9	2.8	0.0	0.1	0.3	0.9	0.0	0.8	1.9	0.7	0.0	0.0	0.0
Wetland maritime swamp	1.8	0.0	0.0	0.0	1.8	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.8	0.0	0.0	0.0	0.0
Wetland freshwater marsh	0.7	0.0	0.0	0.0	0.7	0.0	0.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4	0.0	0.0	0.0	0.0

Table 10 (concluded). Permanent Impacts to Biotic Communities by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

Biotic Community	MCB2/B/C1 (acres)				MCB2/B/C2 (acres)				MCB4/B/C1 (acres)				MCB4/B/C2 (acres)				Preferred Alternative (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Pond	1.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open water (total)*	0.1	0.1	28.2	0.0	0.1	0.1	29.2	0.0	0.0	0.1	28.1	0.0	0.0	0.1	29.1	0.0	0.0	0.1	27.8	0.0
• SAV beds (existing)	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0	0.0	0.0	3.8	0.0
• Aquatic bottom Total/ depths ≤6ft	0.1/0.1	0.1/0.0	28.1/12.3	0.0/0.0	0.1/0.1	0.1/0.0	29.1/13.3	0.0/0.0	0.0/0.0	0.1/0.0	28.1/12.3	0.0/0.0	0.0/0.0	0.1/0.0	29.1/13.3	0.0/0.0	0.0/0.0	0.1/0.0	27.8/8.7	0.0/0.0
• Stream (acreage)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
• Stream (linear feet)	0.0	0.0	36.0	0.0	0.0	0.0	136.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	118.0	0.0	0.0	0.0	0.0	0.0
Total	281.0 (278.5)	0.1	30.0	0.8	270.4 (268.0)	0.1	33.0	5.8	178.0 (175.5)	0.1	29.9	0.8	167.5 (165.0)	0.1	32.2	5.8	93.9	0.1	38.4	27.2

*Open water subcategory (i.e., existing SAV beds, aquatic bottom, and stream) amounts are included in total open water, but subcategory amounts do not add up to total because of the overlapping nature of these communities.

The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

approximately 0.1 acre of wetland mixed-pine/hardwood forest in the US 158/Waterlily Road intersection area. For MCB2/B and MCB4/B, this impact would consist of a total of approximately 0.6 acre in the US 158/Waterlily Road intersection area, including 0.5 acre of wetland mixed-pine/hardwood forest and 0.1 acre of wetland hardwood forest. For both MCB2 and MCB4 with the addition of a third outbound lane for hurricane evacuation, there would be an additional approximately 0.1 acre of impact to wetland mixed-pine/hardwood forest. The Preferred Alternative also would impact a total of approximately 0.6 acre of Great Swamp in the US 158/Waterlily Road intersection area, consisting of 0.4 acre of wetland hardwood forest, 0.1 acre of wetland mixed-pine/ hardwood forest, and less than 0.1 acre of upland man-dominated land. There would be no impacts to Great Swamp with ER2.

Drainage improvements along NC 12 with ER2 and MCB2 would affect a total of approximately 7.1 acres of the Pine Island/Currituck Club Natural Area along the fringe where it borders NC 12. This impact would consist of approximately 0.4 acre of upland man-dominated land, 4.1 acres of upland maritime shrub/grassland, and 2.6 acres of upland maritime forest. The Preferred Alternative would not impact the Pine Island/ Currituck Club Natural Area. Impacts resulting from these SNHA encroachments are discussed throughout the natural resource impact assessment in the FEIS.

4.1.2.1 Temporary Impacts

For all of the detailed study alternatives, including the Preferred Alternative, the use of temporary construction easements would involve impacts to terrestrial habitat through the removal of vegetation and ground disturbance; however, ground conditions would be returned to their original state after construction and natural revegetation would occur. Most impacts associated with temporary construction easements would occur in man-dominated and agricultural areas for all of the detailed study alternatives, except for the Preferred Alternative, which would mainly affect man-dominated areas and upland maritime shrub grassland. Table 7 and Table 8 indicate that, in general, temporary impacts to biotic communities would be greatest with ER2 (115.5 acres) with construction of a third outbound lane for hurricane evacuation. Temporary impacts are primarily associated with the third outbound hurricane evacuation lane, so these impacts would be minor for any detailed study alternative, including the Preferred Alternative, which does not include the lane. Temporary impacts to biotic communities with MCB2 and MCB4 would range from 11.1 to 12.9 acres with construction of a third outbound lane for hurricane evacuation, and from 0.0 to 4.2 acres without the third outbound lane. Temporary impacts to upland maritime communities are less than 1.0 acre for all of the detailed study alternatives (with or without the hurricane evacuation lane), with no easements proposed for MCB4 in these areas. The Preferred Alternative would have less total upland impacts, but more impact to upland maritime communities than the other detailed study alternatives. The detailed study alternatives using Option B would have slightly more temporary impacts to upland man-dominated and agricultural lands than their Option A equivalents, except for MCB2/C2 which is the same for both for upland man-dominated land.

Temporary impacts to forested wetland habitats would be slightly greater for ER2, with easements proposed in several wetland communities. Without a third outbound lane on US 158 for improving hurricane evacuation times, no temporary impacts to wetland habitats would occur with any of the detailed study alternatives, including the Preferred Alternative. Overall differences in temporary wetland impacts with a third outbound lane would be minimal (1.7 to 2.2 acres). None of the detailed study alternatives, including the Preferred Alternative, would involve the use of temporary construction easements in wetland bay forest or wetland maritime and marsh communities. ER2 would have the most substantial temporary impacts to terrestrial habitat because ER2 construction activities would be entirely on land, and also would involve the greatest distance of road widening along US 158 and NC 12 of the detailed study alternatives. Without the hurricane evacuation lane, temporary impacts to terrestrial habitat with ER2 would be substantially less, but still would be greater than the other detailed study alternatives. MCB2, MCB4, and the Preferred Alternative would have more substantial temporary impacts to aquatic habitat because of the associated bridge construction across Currituck Sound (see Sections 3.2.3 and 4.2.3).

4.1.2.2 Permanent Impacts

As shown in Table 9 and Table 10, for ER2, MCB2/A, and MCB4/A, permanent impacts would be primarily associated with alteration of upland communities, particularly unnatural, man-dominated land. Most of the remaining impacts would occur in upland maritime communities, followed by upland agricultural land. Without the hurricane evacuation lane on mainland US 158, impacts would be reduced by approximately 2 to 3 acres, depending upon the alternative. For the Preferred Alternative, permanent impacts would be primarily associated with alteration of upland communities, particularly man-dominated land, and most of the remaining impacts would occur in agricultural lands, followed by pine forest and maritime shrub/grassland.

For MCB2/B and MCB4/B, the most permanent impacts would occur in upland communities, primarily man-dominated land and maritime shrub/grassland followed by agricultural land and maritime forest. Prior to recent logging in Maple Swamp, with MCB2/B and MCB4/B three wetland communities were also notably affected (mixed pine/hardwood forest, hardwood forest, and swamp). However, logging since 2006 has reduced those communities by 62, 15, and 90 percent, respectively. The logged portions of those three communities are now considered wetland shrub/scrub and in the early stages of succession. Without the hurricane evacuation lane on mainland US 158, impacts would be reduced by 3 or less acres, depending on the alternative, for only a few of the communities. The Preferred Alternative further reduces the amount of impact by eliminating the hurricane evacuation lane.

The most substantial alteration of natural upland habitat would be associated with ER2 and MCB2 (with either bridge option or approach road option), which would involve removal of large amounts of maritime shrub/grassland and maritime forest communities. MCB4 and the Preferred Alternative would also involve removal of these areas, but to a lesser extent, particularly with the Preferred Alternative which would have the least impact to maritime forest. Of all of the detailed study alternatives, the Preferred Alternative would remove the least amount of upland communities. MCB2/A and MCB4/A would remove equal amounts of upland hardwood and upland mixed-pine/hardwood forest communities, but this impact would be less than with their Option B equivalents. ER2 would essentially not affect these areas.

Terrestrial wetland habitat would be most substantially altered with MCB2, MCB4, and the Preferred Alternative which would involve permanent clearing, shading, and fill (primarily with MCB2/B and MCB4/B) of wetland swamp and forest communities associated with Maple Swamp and the eastern banks of Currituck Sound. There would be no permanent loss or alteration of the wetland bay forest found within Maple Swamp. If fill is placed within Maple Swamp for Option B, equalizer pipes would be installed underneath the fill to facilitate north-south water movement through the swamp to prevent a dam effect. Another effect of the loss of wetland habitat would be the loss of a source of detritus, which is the base of several food chains and serves as an energy source for micro-organisms, algae, plants, and small animals in the water and soil (Magee, 1993). However, any wetland impacts would be mitigated, most likely in the vicinity of the impacts, so the impact of this loss would be lessened. Option A would not substantially affect the amount of detritus available to the system because no fill would be placed in the wetland and it would not affect the overland transport of detrital material. Option B would result in direct loss of a source of detritus because of fill in the wetland, but the loss would be mitigated. Transport of detritus within the swamp would still occur through the wildlife crossings (described in Section 4.1.4.2) and equalizer pipes.

Wetland communities on the mainland would be least affected by the Preferred Alternative. Mainland wetland impacts would differ between Option A and Option B for MCB2 and MCB4, with Maple Swamp being bridged by MCB2/A and MCB4/A, and MCB2/B and MCB4/B crossing Maple Swamp primarily on fill. Thus, MCB2/B and MCB4/B would result in substantially more fill impacts to wetland communities.

Currently, Maple Swamp is fragmented by a maintained power line corridor and Aydlett Road. The integrity of Maple Swamp’s forest trees/canopy was substantially altered by logging activity between 2006 and July 2010. During this time approximately 1,253 acres of forest were removed. These logging activities created a large break in the forest canopy that extends across most of the east-west orientation of the swamp. The opening in the forest canopy from logging has created an edge/fragmentation effect that will be temporarily much greater than the combined effect from a power line and road corridor. With time (many decades) and no additional human alteration, these logged areas are expected to re-vegetate with similar forest communities and provide habitat for species that prefer large tracts of unbroken forest. The proposed bridge/road corridor through Maple Swamp is adjacent to the existing power line corridor for a large portion of its length and would not create an additional fragmentation or break in the forest since the forest is already fragmented and the bridge corridor would only have increased the width of the break in the forest if logging had not occurred. Now, the forest would grow up around the road/bridge and powerline corridors, leaving an opening for the two corridors. The proposed road or bridge corridor would not likely affect the recovery of the forested communities in Maple Swamp other than what is directly in the footprint of the project. With MCB2/B and MCB4/B, Aydlett Road would be removed and the footprint restored as wetland, reducing the future, long-term effects of fragmentation by reducing the number of potential non-forested corridors across the swamp from two to one. With MCB2/A, MCB4/A, and the Preferred Alternative, Aydlett Road and its non-forested corridor would remain.

The C1 and C2 bridge corridors would affect maritime wetland communities differently. The DEIS C1 bridge corridor landing on the Outer Banks would not shade or clear as much freshwater marsh, wetland maritime swamp, or wetland maritime forest (if any) as the C2 bridge corridor landing. The revised C1 bridge corridor with the Preferred Alternative would not affect any wetland areas at either landing site. Construction of permanent drainage easements along NC 12 and widening of US 158 east of the Wright Memorial Bridge would alter maritime wetland communities. The permanent loss and alteration of these communities would be similar for ER2 and MCB2, but both would have greater impacts on these communities than MCB4 because they would have larger areas of road widening on the Outer Banks and would widen the bridge over Jean Guite Creek.

It is difficult to determine which specific detailed study alternative would most substantially affect the Outer Banks wetland communities. Unless specified, conclusions are the same for Option A and Option B. The amount of fill in wetland maritime shrub/ grassland communities would be least for the Preferred Alternative (0.0 acre) and greatest for MCB2/C1. The Preferred Alternative would also result in the least amount of fill (0.7 acre compared to the highest amount of 4.2 acres) in wetland maritime forest and would not fill any other wetland maritime community or freshwater marsh. MCB2/C1 also would result in the most permanent loss to wetland maritime forest, but would avoid permanent clearing and shading of the wetland maritime swamp and freshwater marsh communities. Compared to the other detailed study alternatives, the Preferred Alternative would have the least amount of impacts to maritime wetland communities. The impacts with ER2 would be moderate in comparison to MCB2 and MCB4/C1 and would result from fill for widening US 158 west of the Wright Memorial Bridge and the construction of several permanent drainage easements along NC 12.

4.1.3 Terrestrial Wildlife

The project area encompasses a wide diversity of natural habitat types that support a great diversity of wildlife, including black bear. The Pasquotank River Basin contains more wildlife refuges than any other drainage basin in North Carolina; however, none of these areas occur within the project area. The closest refuge to the project area is CNWR, which is north of Corolla on the Outer Banks. The southern boundary of the refuge is over two miles north of the project area. There are also several SNHAs in the region that are recognized for high animal diversity (see Section 3.2.1). Scientific and common names of animals referenced in this report and documented from the project area are found in Appendix B.

4.1.3.1 Waterfowl

The Mid-Atlantic region of the United States is extremely important wintering habitat for waterfowl and Currituck Sound has a long history of attracting large concentrations of wintering waterfowl (North American Waterfowl Management Plan, Plan Committee, 2004). However, there have been substantial declines in waterfowl numbers since the 1980s and likely since the 1940s (USACE, 2010). The wintering population of ducks and geese in the sound has historically represented up to 15 percent of the entire Atlantic flyway population; however, numbers decreased in the early 1990s, with only approximately 0.4 percent of the total Atlantic flyway population wintering in Currituck Sound (Earley, 1993). Up to 50 percent of the state's wintering waterfowl could be found in Currituck Sound during the 1970s; however, only 4 percent wintered there in 1993 (Earley, 1993). Between 2001 and 2009, about 5 percent (annual average of 18,577 birds) of North Carolina's waterfowl have wintered throughout Currituck Sound (USFWS, 2011). Data from 2001 through 2009 also indicate that more than 50 percent of Currituck Sound's waterfowl winter in the southern portion of the sound (USFWS Unit 8), about 40 percent winter in the northern portion (USFWS Unit 9), and less than 10 percent winter in the mid-portion (USFWS Unit 10).

USFWS mid-winter waterfowl survey data (2001 to 2009) indicate that the trend of declining waterfowl usage of Currituck Sound is similar to the trend for the entire Outer Banks, except around Pea Island National Wildlife Refuge, which has been generally increasing. Much of the Outer Banks between Rodanthe and the Core Banks have remained relatively natural and undeveloped and still exhibit a trend similar to the Currituck Sound area. Overall waterfowl numbers for the state of North Carolina from this same time-frame have generally increased, suggesting that other areas of North Carolina have become more important to wintering waterfowl in recent years. The sound still provides important and valuable habitat to waterfowl, but to far fewer birds compared to previous decades. However, although waterfowl usage is often variable year to year and over time, the sound could easily become more important to waterfowl in the future, as long as the habitat does not deteriorate.

Many factors appear to be important in affecting waterfowl populations nationwide, including factors in non-wintering areas, which makes it difficult to pinpoint specific causes for the changes in waterfowl abundance in North Carolina (USACE, 2010). Some waterfowl species appear to be wintering further north than traditionally. Human disturbance, fluctuating sea grass abundances, and rising salinity levels have been suggested as important factors affecting wintering waterfowl in Currituck Sound (Rideout, 1990; USACE, 2010). Other factors include the erosion of some marsh islands in the sound, local food abundance, and an overall decline in the quality of habitat (USACE, 2010). According to Settle and Schwab (1991), it appears that, at least since 1958, winter waterfowl use and autumn SAV abundance are related. The decline may be as a result of, or may have been exacerbated by, hunting pressure (USACE, 2010).

Potential disturbances to wintering waterfowl currently include hunters, recreational boaters, and shoreline development, all of which reduce favorable conditions for foraging and resting birds. Many individual water bird species (in particular ducks, geese, swans, coots, rails, bitterns, herons, egrets, and ibis), as well as larger aggregations of water birds, favor marshy shallow areas in the vicinity of old inlet tidal deltas. The Preferred Alternative would avoid dissecting and fragmenting these marshy old tidal deltas. Most areas noted for attracting and harboring a diversity of water birds, and those preserved natural resource areas, are found in the vicinity of these marshy areas.

A review of annual midwinter waterfowl surveys conducted by the US Fish and Wildlife Service (USFWS) found American black ducks, mallards, northern pintails, American wigeon, green-winged teals, ring-necked ducks, and American coot to be more abundant in Currituck Sound during the period of infestation by Eurasian water-milfoil in the 1960s (Wicker and Endres, 1995). Numbers of wintering snow geese, Canada geese, and canvasbacks in the sound have declined throughout the period between 1968 and 1990 (Wicker and Endres, 1995). General trends of wintering waterfowl from recent USFWS aerial flights of CNWR are found in Table 11. These data show that the three most abundant species typically comprise at least 70 percent of the total number of waterfowl present. The tundra swan has frequently been the most abundant species during these surveys and the American black duck is also frequently one of the more common species. Since 1999, snow geese have infrequently been very abundant, but did appear in larger numbers during surveys with lower total abundance (e.g., 2,000 individuals, or 65 percent of 3,072 total, on March 10, 2000). Numbers of Canada geese have fluctuated, but have typically been less than 1,000 individuals per survey. Canvasbacks have not been observed by aerial survey since 1999 (USFWS, 2008). Waterfowl are not likely to be affected by any impacts to terrestrial habitat; potential project impacts to these species resulting from the proposed bridge over the sound are described in Section 4.2.3.

Table 11. Summary of USFWS Aerial Waterfowl Surveys of Currituck National Wildlife Refuge from 1999-2007

Winter	Survey Date of Greatest Abundance	Total Number of Waterfowl Observed	Three Most Abundant Species (percent of total)	Total Percentage of Three Most Abundant Species
1999-2000	12-4-1999	16,853	Gadwall (43) American coot (31) American black duck (10)	84
2000-2001	2-27-2001	2,014	Tundra swan (19) Mallard (17) American black duck (16)	52
2001-2002	12-6-2001	2,976	Northern pintail (34) Tundra swan (29) American black duck (11)	73
2002-2003	2-5-2003	2,034	Tundra swan (35) Gadwall (29) Northern pintail (15)	79
2003-2004	2-9-2004	6,472	Tundra swan (36) Green-winged teal (30) American black duck (13)	79
2004-2005	2-2-2005	15,796	Tundra swan (39) Snow goose (22) Northern pintail (9)	71
2005-2006	3-8-2006	8,733	Tundra swan (45) Green-winged teal (27) American black duck (7)	78
2006-2007	12-6-2006	2,466	American coot (59) Tundra swan (22) Gadwall (8)	89

Source: USFWS, 2008

4.1.3.2 Important Bird Nesting Areas

The project area includes habitats used for nesting by a variety of birds. Bald eagle nesting sites are discussed in Section 5.8. According to NCNHP (1990), the closest known location of a water bird nesting colony to the project area is the rookery at Monkey Island (an SNHA and a portion of CNWR) approximately 4 miles north of the project area (see Figure 7 in Appendix A). A variety of water birds, including glossy ibis, egrets, and herons, use this island for nesting and roosting. It has been one of the most important nesting sites for great egrets, little-blue herons, and snowy egrets in the state (NCWRC, 2007-08 annual report). Least terns also nest at the Currituck Banks and Corolla Natural Area SNHAs (personal communication, Sue Cameron, NCWRC, October 30, 2007), which are portions of CNWR. Maritime habitats that normally support nesting of colonial water birds are only present on the Outer Banks side of the project area, and no evidence of water bird colonies was found in this area during community mapping or wetland delineation work.

Some colonial nesting water birds, such as great blue herons, are known to nest at inland locations. Maple Swamp, Deep Creek Swamp, and Great Swamp are areas near foraging habitat (shallow water) that could accommodate inland water bird rookeries. Although potential habitat exists in Maple Swamp, no signs of inland-nesting, colonial water birds were seen in the project area while conducting wetland delineations or during an extensive tree survey in Maple Swamp.

Although not included on the USFWS or NCWRC threatened and endangered species lists, black rails and yellow rails are rare species documented from Currituck County (NCNHP, 2006). Yellow rails are primarily winter residents, and black rails are rare residents that nest primarily in brackish marshes (NCNHP, 2006). Black rails are known to occur at the Pine Island/Currituck Club Natural Area (NCNHP, 1990). Waterfowl known to breed in this area include Canada geese, mallard, black duck, and wood duck.

Several areas of large trees are present in the project area. The proposed widening of US 158 for the hurricane evacuation lane on the mainland of Currituck County could impact the edges, at most, of Great Swamp and the North River/Deep Creek Marshes and Forest SNHA. However, the project area includes a substantial amount of area in Maple Swamp, another SNHA that is noted for its large loblolly bays, swamp tupelo, and bald cypress (NCNHP, 1990), although a large portion of that has been logged since 2006.

The only cavity nesting bird on the NCNHP list of rare animals that is known to occur in Currituck County is the red-cockaded woodpecker. Although red-cockaded woodpecker nesting colonies exist in other types of pine communities, red-cockaded woodpeckers prefer longleaf pine savannahs with a sparse to non-existent hardwood understory (USFWS, 2003). No longleaf pine savannahs occur in the project area. There are some areas of mixed-pine/hardwood forest, but these are mainly wetland communities consisting of hardwoods with scattered loblolly pines. This type of habitat is not typically used for nesting by red-cockaded woodpeckers (USFWS, 2003).

Although not listed by NCNHP, USFWS, or NCWRC, other cavity-nesting species potentially occurring in bottomland habitats such as Maple Swamp include prothonotary warblers, wood ducks, barred owls, and several species of woodpeckers (Scott et al., 1977).

Neotropical migrants are avian species that winter in tropical areas and breed in the United States and Canada. This group includes many passerine families, several species of waterfowl, many shorebirds, and some raptor species. Many neotropical migrants are declining because of fragmentation of forests in their breeding range. Many of the passerine neotropical migrants require large blocks of unbroken habitat in order to breed successfully (Terborgh, 1989; Martin and Finch, 1995). These neotropical species are negatively affected by forest-dividing corridors as narrow as eight meters in width, but are more adversely affected by wider corridors (Rich et al., 1994).

No species of passerine neotropical migrants are listed on the NCNHP list of rare animal occurrences for Currituck County. However, appropriate breeding habitat for rare species such as black-throated green warbler is present in the project area. Avoiding fragmentation of large blocks of forest in the project area by building along existing, cleared corridors would reduce impacts to neotropical migrant species.

4.1.3.3 Terrestrial Wildlife

The diversity of plant communities in the project area supports a wide variety of wildlife. The geographic setting of the area supports some species at the southern end of their range and other species near the northern edge of their range. Many amphibian and reptile species are found in association with the variety of wetland communities. Mammalian diversity is generally higher on the mainland compared to the Outer Banks. The Outer Banks are an important bird corridor that is heavily used by migrating birds along the Atlantic flyway.

The extensive, relatively undisturbed areas of natural communities found in association with Maple Swamp and Great Swamp support many species that are sensitive to “edge” effects, and require large, unfragmented blocks of habitat (e.g., black bears). The majority of wildlife species in the area are not restricted to one habitat type and are known to range through a variety of plant communities. The ecotones between terrestrial and aquatic communities provide complex habitats that are used by many species for foraging, breeding, and refuge.

A variety of factors affect the distribution and diversity of wildlife along the Outer Banks. The fragmented nature of the limited natural communities on the Outer Banks creates islands of favorable habitat for some terrestrial animals. Increased human development and the presence of some introduced species have created additional pressures on the native fauna along the Outer Banks. Grazing of plant communities by feral hogs and horses has altered the vegetation and species composition in some areas. Predation on wildlife by feral and domesticated cats creates additional pressure on native species.

Characteristic reptiles and amphibians of the project area vary with respect to plant communities. A review of selected literature revealed at least 85 species documented from the area that could occur in the project area (see Appendix B). A herpetological study of the Coinjock vicinity by Platania and Lee (1978a) found the most common frogs to be the spring peeper, green frog, and bullfrog; the most common turtles to be the stinkpot and eastern mud turtle; the most common lizards to be the fence lizard, ground skink, and broad-headed skink; and the most common snakes to be the black racer, red-bellied watersnake, and brown watersnake. These species represent characteristic species of the mainland communities. Along the Outer Banks, Parnell et al. (1987) found the most common reptiles and amphibians to include the green treefrog, squirrel treefrog, Fowler's toad, snapping turtle, eastern mud turtle, southeastern five-lined skink, six-lined racerunner, and cottonmouth.

The variety of natural habitats along a coastal setting within the Atlantic flyway supports and attracts a diverse and abundant avian population. The extensive natural forested communities found in association with Maple Swamp support such resident species as red-shouldered hawk, barred owl, red-bellied woodpecker, American crow, Carolina chickadee, tufted titmouse, Carolina wren, and northern cardinal. Other neotropical migrants that breed in the area include yellow-billed cuckoo, red-eyed vireo, prothonotary warbler, northern parula, ovenbird, and hooded warbler.

Bird usage, in general, is high along the Outer Banks, especially during migration for both land and water birds. Regular shorebird use of the area is more common along the oceanfront and irregular along the soundside shoreline. Water levels and exposed mudflats within the sound are primarily influenced by wind speed and direction. The most favorable shorebird conditions exist when winds from an easterly direction expose muddy shorelines along the Outer Banks. Shorebird richness is often higher during these conditions and during migration. Shallow water and marshy shorelines are used by fewer shorebird species, but will harbor some species that favor this habitat (i.e., herons, egrets, osprey, rails, common yellowthroats, yellowlegs, and snipe during appropriate seasons). The most common breeding birds in woody communities along the northern Outer Banks include the Carolina wren, gray catbird, white-eyed vireo, prairie warbler, field sparrow, northern cardinal, and red-winged blackbird. A list of the known and potentially occurring birds in the project area is included in Appendix B.

As mentioned earlier, mammalian diversity is generally higher on the mainland compared to the Outer Banks. Several species and subspecies of mammals that occur in the project area are at the edge of their range (southern or northernmost limit) in northeastern North Carolina. Many mammals also have been recognized as endemic to the Dismal Swamp area. At least 29 mammal species have been documented from the project area, including three introduced species: nutria, Norway rat, and house mouse. Species of socioeconomic value include game and fur-bearing species such as white-tailed deer, black bear, beaver, mink, raccoon, gray fox, gray squirrel, muskrat, and nutria. Many of these mammals are associated with forested wetlands and marshes near the sound. Common small animals on the mainland include marsh rice rat and the white-footed mouse (Platania and Lee, 1978b). A list of the known and potentially occurring mammals in the project area is included in Appendix B.

4.1.4 Impacts to Terrestrial Wildlife

4.1.4.1 Habitat Loss and Alteration

Each of the detailed study alternatives, including the Preferred Alternative, would result in the removal of existing vegetative habitats and the displacement of wildlife within the project construction limits. Wildlife species are dependent upon the available resources in the habitats used. Wildlife inhabiting the construction area would either be temporarily displaced, permanently displaced, or lost. Since construction would occur in primarily man-dominated areas, ER2 would be the least invasive on wildlife habitat. Road widening would increase the role of existing roads as impassable barriers that restrict wildlife movement. Removal and alteration of wildlife habitat would be greatest for MCB2, MCB4, and the Preferred Alternative. These alternatives could permanently alter the wildlife species composition of the impacted forest and swamp communities of Maple Swamp and the Outer Banks. Species requiring large areas of undisturbed habitat (e.g., black bear) would likely disappear from areas near these corridors, whereas species attracted to edge communities would likely become more common. The home range of female black bears in Great Dismal Swamp is 10.9 miles and for males is 18.4 miles (Hellgren and Vaughan, 1987). Bears tend to avoid roads unless their home ranges have been cut by roads, leaving them no choice but to cross roads in search of food, mates, and better habitat, potentially endangering their lives and human lives through vehicle collisions.

By bridging Maple Swamp for MCB2/A, MCB4/A, and the Preferred Alternative, the movement of terrestrial wildlife should not be restricted; although movement of species away from and toward the edge communities of the project corridor could increase competition pressures for limited resources. However, the road on fill through Maple Swamp with MCB2/B and MCB4/B would substantially affect wildlife use of the habitat. Habitat fragmentation can reduce species preferring interior forest and change species composition. Many neotropical bird species have been shown to be negatively affected by increased fragmentation and reduction of habitat. As previously discussed, the type of habitat (large, undisturbed areas versus edge habitat) available would change with both Option A and B, but wildlife movement would be more inhibited and habitat would be less available with Option B. Many terrestrial species would be more likely to attempt, and be successful, crossing under a bridge compared to crossing a road on fill. Additional discussion on wildlife passage is found in Section 4.1.4.2.

While all of the detailed study alternatives are in the vicinity of existing road corridors and are under the influence of associated edge effects, these alternatives would amplify those effects. This would be especially detrimental to maritime wildlife habitat on the Outer Banks, where existing habitat is already extremely sparse and fragmented. A description of the temporary and permanent impacts to terrestrial wildlife habitat with the detailed study alternatives is found in Section 4.1.2.

Although the exact effects of the bridge on wintering water birds are difficult to quantify, waterfowl and other birds associated with the water/shore can become accustomed to some disturbances and roadways. Large aggregations of waterfowl and shorebirds frequently use areas near and under Bonner Bridge, as well as along and in the vicinity of public roads that traverse through both Pea Island and Lake Mattamuskeet National Wildlife Refuges. It is anticipated that some water birds may be disrupted in the vicinity of the bridge during construction, mostly during winter months, but the primary feeding/foraging, resting, and nesting sites for waterfowl and water birds throughout the year are associated with marshy and shallow water areas to the north and south of the proposed bridge corridors with the detailed study alternatives. The average foraging distance from nesting sites of snowy egrets in North Carolina was found to be less than 3.1 miles (USFWS, 2002), and the average distance for four species of herons and egrets were all well below 3.1 miles (Erwin et al., 1987; Erwin and Spendelow, 1991). The bridge alignments of the detailed study alternatives are over 4 miles south of Monkey Island, the closest rookery. Foraging water birds from Monkey Island could range through the sound, but are more likely to be found in association with shallow waters around marsh islands/shorelines north and south of the detailed study alternatives. Therefore, it is unlikely that the detailed study alternatives would pose a significant threat to foraging birds using Monkey Island.

Although waterfowl usage of the sound is often variable from year to year and over time, and seems to be declining, the sound could easily become more important to waterfowl in the future. However, the presence of a bridge in the mid-portion of the sound is unlikely to alter substantially the existing or future number of waterfowl that may use Currituck Sound. The Preferred Alternative would result in the loss of the following potential waterfowl habitat: 3.8 acres of existing SAV beds; 0.1 acre of open water from pilings; 4.8 acres of SAV habitat (including the 3.8 acres of existing SAV beds) from shading; and 4.9 acres of potential SAV habitat (see Section 4.2.1.2) from shading. No coastal, brackish, or freshwater marsh would be directly lost with the Preferred Alternative. Potential impacts to waterfowl are discussed further in Section 4.2.3.

4.1.4.2 Roadkill

With ER2 and the road widening portions of MCB2, MCB4, and the Preferred Alternative, mammals, reptiles, amphibians, and avian species would be subjected to an increase in the distance required to cross the road corridor. Safe passage of wildlife across roadways increases vehicular safety and reduces animal roadkills. However, except for some species with already low numbers, road mortality has a minimal effect on most bird and mammal populations despite it being a leading cause of mortality for some species in some areas (Forman and Alexander, 1998). Some species seem to be capable of learning to avoid road mortality; however, in many instances the wildlife populations gradually decline after road construction and the full effect may not be evident for several years after construction (Brandenburg, 1996; Mumme et al., 2000; Findlay and Bourdages, 2000; Coffin, 2007). The road widening associated with all of the detailed study alternatives, including the Preferred Alternative, may not result in changes to traffic volumes, but the reduced congestion and resulting increased speeds could contribute to increased road mortality.

MCB2/B and MCB4/B would likely result in increased mammal, reptile, and amphibian mortality and potential wildlife-vehicle collisions because this corridor passes through higher quality wildlife habitat in an area that previously did not have a traffic corridor. Potential effects of roadways on wildlife include: population reduction, reduction of habitat and genetic diversity, and impediments to wildlife migrations and daily travel (Jones, 2008 [includes a review of several studies that support this statement]; Cramer and Bissonette, 2009). Road mortalities have substantially affected black bear populations in the southern Appalachians and can significantly reduce or eliminate populations of amphibians (Donaldson, 2005). In addition to concerns for wildlife populations, there is increasing concern for public safety. Over one million wildlife-vehicle collisions occur each year within the United States (Cramer and Bissonette, 2009). In 2007, there were 223 human deaths from wildlife-vehicle collisions in the United States, including nine in North Carolina, and millions of dollars worth of property damage (Cramer and Bissonette, 2009; Insurance Institute for Highway Safety, 2009). One insurance company estimated that there were 1.2 million claims for property damage from wildlife-vehicle collisions in fiscal year 2008 (Insurance Institute for Highway Safety, 2009).

Highways with fencing and wildlife under/overpasses are highly effective at reducing wildlife-vehicle collisions (Huijser et al., 2008) and cost analyses indicate the benefits outweigh the costs (Donaldson, 2005; Huijser et al., 2008). One study estimated that if a minimum of 2.6 to 10.2 (depending on the type of structure that was built) deer-vehicle collisions were prevented each year, the savings in damages associated with collisions would far exceed the cost of building the structure (including fencing) (Donaldson, 2005). Clevenger and Waltho (2005) recommend using several types of wildlife crossings to maximize the ability of wildlife to cross the road safely. Wildlife species affected by roads include a broad range of sizes and behaviors, so one type of non-bridge passageway would not be adequate for all species.

Wildlife crossings targeting a wide size range of wildlife would be incorporated in Maple Swamp if MCB2/B or MCB4/B is selected. The preliminary design developed to assess impacts and estimate project cost for MCB2/B or MCB4/B includes the following for wildlife passage: two bridges with 180-foot spans (120-foot by 10-foot clear opening) at the eastern and western sides of the swamp; a 12-foot by 8-foot box culvert at the center of the swamp; and two 43-inch by 68-inch pipes for passage of reptiles and amphibians. Two wildlife bridges were proposed for the edges of the swamp because that is where the majority of wildlife movement is expected to occur. Many species tend to travel in the ecotone between habitats, so by putting the bridges on the edge of wetland/upland habitat, both upland and wetland species would benefit. Furthermore, wildlife would have a large crossing structure (i.e., a bridge) on each side of the swamp, so it would not be necessary to traverse to the other side of the swamp to find a crossing. Attempts would be made to avoid placing the other crossing structures (i.e., the two pipes and the culvert) at the lowest points in the swamp to reduce the chance of these structures flooding. However, if they flood, most likely the swamp is flooded and wildlife activity would already be limited. Also, many species (e.g., turtles and some snakes for the pipes, and raccoons and deer for the box culvert) would still be able to use these structures even with water in them.

Exclusionary fencing along the road also is assumed. The majority of literature on wildlife crossing structures has found that fencing substantially increases the effectiveness of crossing structures and further reduces the amount of wildlife-vehicle collisions. Wildlife need to be funneled to the crossing structures; otherwise, it will be more difficult for them to find the bridge spans or culverts.

There is a potential for increased avian roadkills on a new bridge structure across Currituck Sound. Avian species potentially affected include those that commonly perch on bridges such as gulls, terns, wading birds, pelicans, and possibly some raptors. Substantial bridge mortality has been documented in purple martins (Coastal Carolina Purple Martin Society, 2011), royal terns (Bard et al., 2001) and brown pelicans (Owens and James, 1991). Several species of gulls were commonly observed dead on the Wright Memorial Bridge while conducting field work. Although most studies concerning birds killed on transportation corridors dealt with roads, depending on the location of the proposed bridge, the effects would likely be similar, but the species involved would likely be different. In studies collecting roadkill data, birds were the most abundant taxa, and it is estimated that death by vehicle is the fourth or fifth leading cause of death for birds, with estimates of mortality ranging from 10 to 380 million deaths each year (Jacobson, 2005). Lower estimates of bird mortality are typically underestimates because it is difficult to estimate the numbers of deaths related to highways since many bird carcasses are either scavenged soon after death, disappear into water, or simply are not noticed (Jacobson, 2005). Other birds are also attracted to the carcasses, increasing the amount of deaths if they are hit while attempting to feed on the carcass (Jacobson, 2005). NCTA would use standard details for installed features used to discourage roosting/ perching birds. During final design, NCTA would investigate proven methods of reducing collisions between vehicles operating on the bridge and flying birds and incorporate them as appropriate.

4.1.4.3 Noise Disturbance

Although evidence of wildlife population declines as a result of roadway mortality has persisted for years, the long-term effects of road avoidance resulting from traffic noise have only recently been studied. Traffic noise is a potential threat to an animal's health, reproductive success, physiology, and behavior (Forman and Alexander, 1998; Radle, 2006). Road avoidance because of noise/human activity has been extensively documented for wildlife species such as black bears (Brody and Pelton, 1989), bobcats (Lovallo and Anderson, 1996), wolves (Thurber et al., 1994), and songbirds (Reijnen et al., 1995; Reijnen et al., 1996; Forman and Alexander, 1998). Some species may become habituated to noise disturbances, but many species display reduced nesting and activity near areas of traffic noise (Fernández-Juricic, 2001), and wildlife populations may become isolated as a result of restricted movement (Donaldson, 2005). For example, black bears frequently avoid habitat within 300 feet of roads (Jones, 2008). Even though road noise has a varying effect on wildlife, it seems to affect substantially avian communities that utilize sound in their basic behaviors (Coffin, 2007). Noise levels as low as those found in a library reading room (42 to 48 decibels) have been found to affect negatively some avian species (reviewed in Forman and Alexander, 1998).

A synthesis of studies on the effects of roads on wildlife found that more information is needed on the relation between road noise and wildlife (Kaseloo and Tyson, 2004). Many studies did not quantify noise levels or left out factors, such as landscape variables, that may have also contributed to wildlife behavior. However, after their analysis of the publications, Kaseloo and Tyson (2004) concluded that traffic noise does have an effect on wildlife. The effect is variable depending on the species and other factors such as surrounding landscape and type of disturbance. It is unclear in many of the studies if noise is a significant effect, predictor variable, or just a contributing factor. Traffic noise has been shown to interrupt aestivation in spadefoot toads. In addition, some waterfowl species, such as wood ducks, did not become habituated to noise but other species, such as black ducks, became habituated to noise (Kaseloo and Tyson, 2004).

4.1.4.4 Bridge Lighting

The current design does not include the placement of lights on the bridge structure across Currituck Sound. However, there would be a possibility that a pedestrian path on the bridge would be considered in the final design that could include low (i.e., close to the bridge deck) lighting. A potential option for lighting the bridge and its approaches appears to be the use of LED sources mounted at low level on the bridge structure (integrated or adjacent to the handrail or guardrail for lighting the pedestrian walkway) and on low height poles (approximately 12 feet to 14 feet) for walkways adjacent to bridge approach roads (on land). Lighting of this type offers source variability, including spectral selection, dimming capabilities, and optical control. Low level lighting is desirable because it would not include lighting structures on the bridge, would minimize potential light spill (e.g., lighting trespass, sky glow, and glare) and would minimize associated environmental impacts.

A low level lighting system such as the one described above would not likely adversely affect wildlife over Maple Swamp or Currituck Sound. The most substantial effect of this type of bridge lighting would likely involve the attraction of insects into a traffic area. At night, lights are known to attract insects in large concentrations that could also attract flying insectivorous predators (small birds and bats) into the vicinity of bridge traffic. This could increase the possibility of vehicle collisions for these species.

However, USFWS recommends low-level, low wavelength lights (such as turquoise, blue, or green) to help reduce direct bird strikes with bridges (Manville, 2005). This type of lighting is also better because it would reduce the impairment of night-time navigation by birds. Most concern with lighted structures in the vicinity of coastal areas is the potential to disrupt nesting sea turtles, hatchlings, and migratory shorebirds. However, this would not be a concern with the proposed project since appropriate sea turtle nesting habitat is not present in the project area and lighting systems would be low level and low-voltage. The urban glow currently produced by the nearby communities of Duck and Coinjock is substantially greater than what would be produced by the proposed lighting system. In addition, adverse impacts from lighting are usually associated with high-voltage lighting systems on high-mast bridges, both of which are not being considered for the detailed study alternatives.

4.2 Aquatic Communities and Wildlife

4.2.1 Aquatic Communities

Aquatic communities found in the project area include ponds and open water. These communities are shown on Figure 6 in Appendix A and discussed in the following sections.

4.2.1.1 Ponds

Several freshwater ponds occur within the project area. Some of these are naturally-occurring open waters located on the Outer Banks. These ponds may be subject to flooding from the waters of Currituck Sound. Other ponds have been excavated wholly or partially in wetlands and are surrounded by naturalized riparian zones. Ponds are not considered to be "wetlands" by USACE (1987); however, these communities are Section 404 jurisdictional waters. In the Cowardin et al. (1979) system of classification these communities can be identified as "Palustrine Unconsolidated Bottom Deepwater Habitats" (codes PUB2/3/4H/x). Ponds that have been excavated wholly in uplands and are not naturalized, such as stormwater retention ponds, are included in the man-dominated lands category and are not mapped as ponds.

4.2.1.2 Open Water

Open water of the project area is found primarily in association with the surface water of Currituck Sound. In addition, a canal (which acts as a portion of the AIWW) crosses the project area on the mainland and connects Coinjock Bay to the North River. Using the Cowardin et al. (1979) system of wetland classification, there are several types of deepwater habitats that occur in these water bodies. "Estuarine Subtidal Unconsolidated Bottom Deepwater Habitats" (codes E1UB2/3/4L/M6/x) include the following subtypes: estuarine water column, aquatic bed (tidal freshwater), and intertidal flats. "Estuarine Subtidal Rooted Vascular Aquatic Bed Deepwater Habitats" (code E1AB3L6) are also found within this community and are more commonly referred to as submerged aquatic vegetation (SAV). These open water subtypes are considered to be essential fish habitat (EFH) for certain fish species managed by the Mid-Atlantic Fisheries Management Council (MAFMC) and the South Atlantic Fisheries Management Council (SAFMC). A more detailed discussion of EFH and the potential for impact is presented in the *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009) and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011).

The shallow waters (6 feet deep or less) of Currituck Sound provide habitat and potential habitat for extensive beds of SAV. Habitat for SAV as defined by NCMFC is currently vegetated with one or more appropriate SAV species, or has been vegetated by one or more species within the past 10 annual growing seasons, and meets the average growing conditions needed (water depth of six feet or less, average light availability [Secchi depth of one foot or more], and limited wave exposure). For many juvenile and adult fish, the structural complexity of SAV habitat provides refuge from predators. These habitats are also rich in invertebrates and, therefore, serve as important foraging areas. Other roles include stabilization of sediment, nutrient cycling, reduction of wave energy, and provision of organic matter that supports complex food webs (NCWRC, 2005). For these reasons, SAV habitat is considered Habitat Areas of Particular Concern (HAPC) for several managed fish species. The distribution and composition of SAV habitat is influenced by several factors; among the most important factors are light, salinity, wave action, and nutrient levels. Recent studies have referenced these systems as submersed rooted vascular beds (SRV), which distinguishes rooted vegetation from primarily algae (Ferguson and Wood, 1994). Areas of the sound 6 feet deep or less and have a suitable substrate are considered potential SAV habitat.

Species composition and biomass of SAV beds in Currituck Sound have varied greatly over the past 70 years (USACE, 2010; Davis and Carey, 1981; Davis and Brinson, 1983). The abundance of many native SAV species declined in the 1960s, likely a result of increased salinity and/or dredging, while Eurasian water milfoil increased. In the late 1970s, SAV beds also decreased again. Possible causes for the decline were changes in salinity and inorganic nutrients, epiphytic growth and siltation on plants, and storms that increased turbidity and turbulence, and caused unusual temperatures and damage to plants (USACE, 2010). No exact cause for the decline could be determined, but it is likely a combination of the above factors.

The reduced amount of SAV beds has generally continued into this century with occasional scattered episodes of increased growth in localized areas (Deaton et al., 2010). Highly sensitive to changes in water quality, SAV is affected by weather, site conditions, and human activity (Deaton et al., 2010). The erosion of some marsh islands in the sound has increased the wind fetch, creating more wave energy that can re-suspend particles in the water, increasing turbidity (USACE, 2010). Recent trends indicate a decrease in Eurasian water milfoil and an increase in formerly more common, native species such as widgeon grass and wild celery (USACE, 2010; Ferguson and Wood, 1994; Davis and Brinson, 1989). This trend mainly reflects a change in species composition, not necessarily an increase in abundance. Other submersed rooted vascular species occurring in the sound include sago pondweed, redhead grass, and bushy pondweed. Stoneworts, a type of macroscopic algae, have also been important components of SAV communities. Based on a recent survey conducted by USACE (2007), there are approximately 711 acres of existing SAV beds within the project area in Currituck Sound.

In addition to the open waters of Currituck Sound, several jurisdictional drainages are found in the project area. On the mainland two minor, unnamed drainages are found along US 158 in association with Maple Swamp and Great Swamp (S1 and S2), and two more minor drainages are found in association with Currituck Sound (S3 and S4). On the Outer Banks, the project area crosses Jean Guite Creek in the southern portion of the project area and another stream (S5) in the vicinity of the C2 bridge corridor landing. These features are classified by Cowardin et al. (1979) as "Estuarine Subtidal Unconsolidated Bottom Deepwater Habitats." Open water habitats are not considered to be "wetlands" by USACE (1987); however, these communities are Section 404 jurisdictional waters. The types of aquatic habitat present in open water areas of the project area (including EFH areas and SAV habitat), as well as historical and present conditions, are discussed in greater detail in the *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009) and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011).

4.2.2 Aquatic Wildlife

4.2.2.1 Invertebrates

Macroinvertebrate populations of Currituck Sound are composed primarily of burrowing amphipods near the shore, but there is a more diverse population in deeper areas. Oligochaetes, chironomids, and brackish water clams were the most commonly sampled species (Matta, 1977). A more recent study by the NCDEHNR-Division of Environmental Management (DEM) in July 1993 found primarily freshwater taxa in the northern portions of the sound and more crustaceans in the more saline, southern areas of the sound. Insects were predominant in the northern portions of the sound and contributed to the higher diversity of invertebrates found in association with SAV beds. Commercially important invertebrates of the sound consist primarily of blue crab and shrimp. These two species were documented from only the southern portions of the sound during invertebrate sampling in July 1993 (NCDEHNR-DEM, 1993). The lack of saline waters and suitable substrate limit the growth of most commercially important shellfish (i.e., oysters and clams). Currently, commercial shellfish harvesting is prohibited in the northern portion of the sound (including the project area) and Jean

Guite Creek. A list of the known and potentially occurring macroinvertebrates in the Currituck Sound area is included in Appendix B.

4.2.2.2 Fish

Currituck Sound provides habitat for a variety of fish and shellfish. It is used by freshwater species, estuarine species, and juvenile marine fishes. Although shellfish harvesting is prohibited in Currituck Sound because of high levels of fecal coliform bacteria, this area provides an important fishery for many other species that are harvested. Appendix B includes a list of the fish species that have been caught in Currituck Sound during sampling by the NCDENR, Division of Marine Fisheries (DMF) (personal communication, Sara Winslow, NCDENR-DMF, May 15, 2008), NCWRC, and commercial fishing vessels (NCDENR-DMF and NCWRC, unpublished data).

Sport and commercial fishing has been an important part of Currituck County's economy and history. Currituck Sound is an important nursery area for migratory and resident fish. Migratory fish that use the sound include saltwater species that use the sound for spawning and juvenile stages of life, such as red drum, spot, Atlantic croaker, summer flounder, and southern flounder; saltwater species that pass through the sound to spawn in freshwater areas, such as American shad, blueback herring, alewife, and striped bass; and freshwater species that migrate to the sound as adults, such as white perch and catfishes. The total annual economic value of fisheries in Currituck Sound has ranged between $0.9 and $3.2 million during the past 14 years. Crab (primarily blue crab) is the most economically important fishery in the sound. Flounder is a relatively close second, but most other species fall far behind in terms of economic value (NCDENR-DMF, unpublished data).

In the past, nursery areas for two anadromous fish species, the blueback herring and alewife, were known to occur within Currituck Sound. Nursery areas for these species, including Whale Head Bay and Sanders Bay, were identified in the sound from 1980 to 1983. Catch per unit of effort was highest for these two species during the months of June through August (Winslow et al., 1983). However, the status of the populations of these two species was identified as declining in the sound during 1980 (Copeland and Gray, 1989), and these areas (Whale Head Bay and Sanders Bay) are no longer officially recognized as anadromous fish spawning areas or PNAs. Section 3.2.2 contains current descriptions of these areas.

A 1977 fish survey in the sound found the most numerous species per hectare were yellow perch, tidewater silverside, pumpkinseed, and bluespotted sunfish (Borawa et al., 1978). This same study found the most important species, in terms of weight per hectare, to be carp, pumpkinseed, yellow perch, largemouth bass, and golden shiner. A 1989 fish survey of the same areas sampled in 1977 found the most important species, in terms of weight per hectare, to be carp, white perch, striped mullet, and pumpkinseed.

This study also estimated the mean standing crop for Currituck Sound at 101.1 kilograms per hectare (89.4 pounds per acre) (Kornegay, 1989).

Current fish community structure within Currituck Sound was determined during a survey by NCWRC in 1994 (personal communication, Kevin Dockendorf, NCWRC, June 13, 2008). This survey found the most abundant species to be spot, with estuarine species comprising slightly less than half of the total species observed. Common estuarine species also included killifish, bay anchovy, and white perch. Freshwater species observed during this survey included pumpkinseed, bluegill, largemouth bass, and yellow perch. Freshwater taxa were more abundant at sampling stations towards the northern half of the sound, with estuarine taxa becoming more common towards the southern half of the sound, corresponding with the higher salinity levels to the south (NCWRC, unpublished data). Detailed information on fish species found within the project area is included in the *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009) and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011).

4.2.3 Impacts to Aquatic Communities and Aquatic Wildlife

Historic and present stresses to aquatic flora and fauna in Currituck Sound have occurred as a result of increased fishing pressure and practices, as well as natural and anthropogenic fluctuations in nutrient loading, turbidity, and salinity (NCDEHNR, 1994; Caldwell, 2001; USACE, 2010), so it is important to NCTA to minimize project-related impacts to the sound so as not to compound existing problems. The proposed construction of the Mid-Currituck Bridge is not anticipated to affect the salinity of Currituck Sound. The *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009), and for the Preferred Alternative the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011), has more details on these stressors.

Turbidity is an important factor affecting the distribution and abundance of SAV (Davis and Carey, 1981; Davis and Brinson, 1983; Ferguson and Wood, 1994). Increased turbidity from bottom-disturbing fishing gear, construction of docks/piers/marinas, storms, shoreline erosion, dredging, boating, sedimentation, and runoff all can create unfavorable conditions for SAV survival (Sincock, 1966; Davis and Brinson, 1983; Riggs et al., 1993; USACE, 2010), which would then affect those species that are dependent upon, or utilize, SAV beds. Construction of a new bridge structure over Currituck Sound would produce some short-term noise, turbidity, and siltation, thereby creating localized, short-term impacts to aquatic habitat and wildlife. Runoff during and after construction could contain varying amounts of particulates, organic compounds, nutrients, and heavy metals, all of which could temporarily degrade water quality and impact aquatic organisms.

Fill, pile placement, shading, and clearing would result directly in the permanent loss or alteration of aquatic habitat within the project area, as summarized in the following sections (presented in further detail in the *Essential Fish Habitat Technical Report* [CZR Incorporated, 2009] and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* [CZR Incorporated, 2011]). In addition to permanent loss of habitat resulting from pile placement, the bridge corridors for MCB2, MCB4, and the Preferred Alternative could generate several other impacts, including changes in water quality, water flow, and light levels of the areas both underneath the bridge and for some distance surrounding the bridge.

4.2.3.1 Temporary Impacts

Road construction with all of the detailed study alternatives, including the Preferred Alternative, could result in temporary water quality impacts and landscape alteration. Bridge construction associated with the bridge corridors for MCB2, MCB4, and the Preferred Alternative would take place over Currituck Sound and could produce noise, turbidity, and siltation, thereby creating localized, short-term impacts to aquatic habitat and species. Because the C2 bridge corridor would be longer (5.3 miles) than the C1 corridor, including the Preferred Alternative, (4.7 miles), these impacts would likely be more substantial for MCB2/C2 and MCB4/C2. Additional important factors in the level of temporary construction impacts would be the number of active bridge construction sites and the method of construction.

Several temporary construction easements would be located along the sections of NC 12 and US 158 that would be widened with all of the detailed study alternatives, including the Preferred Alternative. In addition, the detailed study alternatives would involve temporary ground disturbance associated with actual road widening and construction of drainage easements. Increased turbidity and sedimentation could occur within Currituck Sound as a result of runoff from these areas. Runoff may contain varying amounts of particulates, organic compounds, nutrients, and heavy metals, all of which could degrade water quality and impact aquatic organisms. However, these effects would cease after natural revegetation and these areas would be expected to return to previous conditions. To minimize sedimentation, BMPs would be used. The amount of road widening was substantially reduced with the Preferred Alternative, so associated impacts also would be reduced. A minor bridge replacement over Jean Guite Creek also is proposed for all of the detailed study alternatives except for the Preferred Alternative.

The temporary effects of pile placement would include short-term increases in noise, turbidity, and siltation. Noise from open water construction activity would be a temporary, localized disturbance to fish and birds associated with the water and shoreline. Construction-related noise generated during pile driving can be of sufficient intensity to kill or injure marine organisms (reviewed in Hanson et al., 2004). However, many of the mobile organisms would be able to escape the area during construction. Furthermore, pile driving would not occur in SAV habitat (including existing beds) as defined by NCMFC during the time period the managed species would be most active and at most risk of being affected as a result of an anticipated agency-required moratorium from approximately February 15 through September 30. The dates of the moratorium could be adjusted to reflect water temperatures.

At the ecosystem level, increased turbidity would result in a reduction in ecosystem productivity (i.e., ability of the system to produce and export energy) and nursery value by elimination of organisms that cannot readily move, and displacement of mobile organisms. For individual organisms, turbidity can impair visual predation success, impair predator avoidance, and impair oxygen uptake by clogging respiratory structures. Siltation could generate increased water column turbidity, as well as smother or alter benthic vegetative and animal communities. These impacts could be prolonged because of poor water circulation in the sound. Because of the degraded habitat value, most mobile animals would avoid the area of construction for the duration of the construction phase, while non-mobile shellfish, such as clams, and SAV habitat could suffer long-term impacts from construction-related siltation if minimization techniques failed or from direct impacts of pile driving. Benthic organisms are expected to recover rapidly after construction ceases, as most soft bottom benthic communities are resilient and likely to recolonize quickly after short-term impacts. The impact to non-mobile organisms would be minimal, based on the small amount of piling impact and the expanse of the sound. For SAV habitat affected by these temporary construction impacts, recovery is anticipated. Assuming that the area of effect of each temporary pile driven to support the spans of the planned construction trestle is 1.5 times the diameter of each pile (e.g., 45 inches for a 30-inch pile), the area of temporary affect of piles associated with the planned construction trestle over SAV habitat would be approximately 0.1 acre with the Preferred Alternative. A study of a 4-acre dredged and overburden area in Whalehead Bay found that five years after the disturbance and restoration of dredged bottom, the area was 98 percent covered by SAV beds in the early fall (Ellis, 2009). Even just one year after the disturbance, the percent cover of SAV beds in the area had already increased from 0 percent to 69 percent. NCDOT would utilize practicable measures to minimize turbidity generated during bridge construction such as turbidity curtains and shrouds in areas of SAV habitat (including existing beds) as defined by NCMFC, as well as when necessary in potential SAV habitat (see Section 4.2.1.2).

The Mid-Currituck Bridge would be erected from a temporary construction trestle in parts of Currituck Sound 6 feet deep or less (see Section 1.3). The pilings used for the temporary trestle would not be as substantial as those used for the bridge. Also, an open trestle (i.e., beams only to support a crane) would be used on the eastern side in SAV habitat (including existing beds) to minimize shading impacts while the trestle is in place. Pans would be placed under construction equipment operating on the open trestle to prevent oil and lubricants from dripping into the sound.

It is recognized that some temporary impacts might become permanent if the environment could not recover from the disturbance. If surveys following construction operations reveal that additional permanent impacts to SAV habitat (including existing beds) have occurred, additional permanent impact mitigation would be provided. Furthermore, in anticipation of an agency-required moratorium, pile driving would not occur in SAV habitat (including existing beds) from approximately February 15 to September 30, which is the most active time for SAV and organisms using the sound.

Overall, ER2 would result in minor temporary impacts to aquatic habitat because ER2 only involves NC 12 and US 158 widening. Temporary construction easements on the mainland with ER2 are located over four jurisdictional streams (S001 to S004) along US 158 on the mainland. These easements would result in 171.7 linear feet of temporary clearing impacts to streams. Runoff from active construction areas could result in temporary increases in turbidity, siltation, and sedimentation in aquatic habitat areas, but these affects are expected to be minimal and cease after natural revegetation. In summary, although some small adverse impacts to aquatic habitat would occur during the construction phases, the impacts would be temporary and are not expected to result in substantial short-term or long-term adverse effects.

4.2.3.2 Permanent Impacts

Fill, pile placement, shading, and clearing would result directly in the permanent loss or alteration of aquatic habitat within the project area, as summarized in Table 9 and Table 10. Impacts to aquatic habitat are the same with Option A and Option B given that the only difference between the two options occurs in Maple Swamp, where there is no aquatic habitat. The greatest amount of fill to wetland freshwater marsh and open water areas would occur with the permanent drainage easements associated with ER2 and MCB2 (both bridge options and with or without the hurricane evacuation lane on mainland US 158). The greatest amount of permanent alteration (shading and clearing) to marsh and open water areas also would occur with MCB2/C2 and MCB4/C2 because of the longer bridge deck with the C2 bridge corridor, as well as because the C2 bridge corridor would be located in close proximity to extensive freshwater marsh areas. The Preferred Alternative would not directly affect wetland freshwater marsh.

Based on a recent survey mapping of existing SAV beds within the project area (USACE, 2007), the greatest impacts to existing SAV beds within the project area would be associated with MCB2/C2 and MCB4/C2 (with or without the hurricane evacuation land on mainland US 158). Both of these detailed study alternatives would remove less than 0.1 acre of existing SAV beds because of pile placement, and shade 5.5 acres of existing SAV beds. MCB2/C1 and MCB4/C1 would remove and shade less than 0.1 acre and 4.3 acres of existing SAV beds, respectively. The Preferred Alternative would remove less than 0.1 acre of SAV because of pile placement and shade 3.8 acres of existing SAV beds. The only state-designated fish nursery/spawning area (primary, secondary, or anadromous spawning area) crossed by any of the detailed study alternatives is Jean Guite Creek, which is a PNA and would be crossed by the widening of US 158 with ER2 and MCB2, as well as the third outbound lane hurricane evacuation improvements with MCB4. Bridge widening would only include pile placement within the creek if the hurricane evacuation lane is added with MCB4. The Preferred Alternative would not affect the creek.

In addition to permanent loss of habitat resulting from pile placement, the C1 and C2 bridge corridors could generate several other impacts, including changes in water quality, water flow, and light levels of the areas both underneath the bridge and for some distance surrounding the bridge. Runoff from the bridge would introduce a new source of pollution in the sound. Pollutants discharged into the sound may not dissipate quickly because of poor water circulation. NCTA would comply with NC Session Law 2008-211 (An Act to Provide for Improvements in the Management of Stormwater in the Coastal Counties in Order to Protect Water Quality) to the maximum extent practicable for the additional impervious surface area that would be created by the construction of the Preferred Alternative if it is selected for implementation. NCTA’s proposed program is presented in Section 1.6. A final stormwater management plan for minimizing the potential impact of project pollutants would be developed in association with NCDENR-DWQ, as well as other appropriate state and federal environmental resource and regulatory agencies, during final design and permitting of the Preferred Alternative.

The presence of bridge pilings would not be expected to alter substantially existing water flow. The piles would have a minimal impact on turbulence and bed shear stress (when wind has produced a noticeable current), with a maximum upstream effect on flow of 6.25 feet and downstream effect on flow of 10 feet. Piles would be approximately 130 feet apart, leaving adequate space for normal flow conditions. Altered light levels and the introduction of piles as a hard substrate previously unavailable in the area would have multiple effects, thereby resulting in changes to the existing food web structure. Decreased autotrophic productivity (phytoplankton and aquatic vegetation) resulting from lower light levels could result in decreased abundances of aquatic vegetative habitat (including SAV), heterotrophic grazers (e.g., waterfowl), and predators (zooplankton, benthic invertebrates, waterfowl, and fish). On the other hand, organisms could be attracted to bridge pilings as a shallow reef-like structure. A Mid-Currituck Bridge would likely provide currently present species, such as sessile invertebrates, with additional habitat and may help to increase the populations of structure-oriented species already present within, or utilizing, the project area. However, the piles would not function as a typical reef in open water because of the shallow depths and low salinity.

There has been some recent interest in the potential effects of bridges on aquatic systems by NCDOT. However, preliminary investigations on this issue conducted by NCDOT in 2010, as well as additional data from collections of benthic invertebrates associated with the Wright Memorial Bridge and Virginia Dare Bridge (CZR Incorporated, 2010), did not detect substantial differences in benthic invertebrate communities between areas under the influence of the bridge and nearby areas apparently not under the influence of the bridge.

Loss of habitat as a result of pilings and shading from the bridge deck would be mitigated. A mitigation plan is described in Section 5.6.2 and included in Appendix E. More detailed summaries of indirect and long-term impacts to aquatic habitat also are included in Section 5.10.2, in the *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009), and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011).

4.2.3.3 Impacts to Commercial Fisheries

Ongoing commercial fishing activity exists in the project area. The bridge corridors with MCB2, MCB4, and the Preferred Alternative should have little impact on commercial fishing operations because the navigation span of the proposed bridge would be designed in coordination with the US Coast Guard to provide reasonable accommodation for boats operating in the area. In addition, it is anticipated that many boats would be able to pass under the other portions of the bridge. However, the presence of a bridge structure across Currituck Sound could potentially disrupt fishing operations by reducing trawling area and restricting net and crab pot deployment. While potential fishing areas could be eliminated in the vicinity of the bridge, impacts to commercial fishing in general would not be substantial since only a small portion of fishing area would be removed. In addition, commercial shellfish harvesting is currently prohibited in the vicinity of the C1 and C2 bridge corridors. There are no impacts to commercial fisheries expected with ER2.

4.3 Invasive Species

The diversity, abundance, and health of natural communities can be negatively affected by the introduction of exotic species. There were five species from the NCDOT Invasive Exotic Plant List for North Carolina (Smith, 2008) observed within the project area. Common reed (Threat Level 1) was observed in the project area within wetland freshwater marsh and wetland maritime shrub/grassland communities, as well as in man-dominated depressional areas and ditches. Japanese honeysuckle (Threat Level 2) was observed along the borders of mixed-pine/hardwood forest communities, as well as within man-dominated and shrub/scrub areas. Chinese privet (Threat Level 1) was found within mixed-pine/hardwood forest and shrub/scrub communities. Nepalese browntop (Threat Level 1) was observed in all terrestrial communities except maritime shrub/grassland and wetland freshwater marsh. Mimosa (Threat Level 2) was observed along the borders of mixed-pine/hardwood forest communities, as well as within man-dominated and shrub/scrub areas. Eurasian milfoil (watch list) was observed during a 2010 survey for SAV in the portions of Currituck Sound within the project area (Luczkovich, 2010).

NCDOT will follow its BMPs for the management of invasive plant species. NCDOT's vegetative management programs include guidance to control invasive species for:

noxious and aquatic vegetation, woody vegetation, weed, and wildflower weed control. These programs include a combination of mechanical and chemical efforts to prevent and control invasive species and protect rare species within roadside management areas (NCDOT, 2011). David Harris with NCDOT, Roadside Environmental Unit (personal communication, September 23, 2011) confirmed that all identified invasive species populations in the area affected by the project would be treated with the appropriate USEPA approved herbicides by a licensed pesticide applicator with the NC Department of Agriculture and Consumer Services. Furthermore, the plant material and soil with root mass of any invasive species populations disturbed by construction activities would be buried 3 feet under fill or removed and placed in waste areas.

Harris (personal communication, October 21, 2010) commented that NCDOT has not had long-term success with controlling common reed because most projects only treat for the species for a certain amount of years (typically 3 to 5 years as part of the monitoring program for the project) and within the right-of-way. However, once the treatment period ends, typically common reed will either expand into the right-of-way from outside areas that were not treated, recover within the treated area, or do both. This can also be the case with other invasive species. However, the Mid-Currituck Bridge project is not anticipated to encourage growth of any of these species.

5.0 Jurisdictional Issues

5.1 Clean Water Act Waters of the US

5.1.1 Characteristics

Six jurisdictional streams were identified within the project area (see Table 12). The locations of these streams are shown on Figure 5 in Appendix A. USACE and NCDENR-DWQ stream forms are included in Appendix C. The physical characteristics and water usage classifications of each stream are detailed in Section 3.2. All streams have been designated as warm water streams for the purpose of stream mitigation.

Table 12. Characteristics of Jurisdictional Streams in the Project Area

Map ID	Total Length (feet)[1]	Culverted Length (feet)	Total Length Subject to Mitigation (feet)[2]	Classification	Compensatory Mitigation Required	River Basin Buffers
S001	533.7	99.9	433.8	Intermittent	Yes	NA
S002	235.5	95.6	139.9	Intermittent	No	NA
S003	66.4	NA	66.4	Perennial	Yes	NA
S004	155.4	NA	155.4	Intermittent	Yes	NA
Jean Guite Creek	270.5	NA	270.5	Perennial	Yes	NA
S005	498.4	NA	498.4	Intermittent	Yes	NA

[1] Includes culverted sections.

[2] Culverted sections excluded.

Approximately 4,781 acres of wetlands and waters that are jurisdictional under Section 404 of the Clean Water Act were found in the project area (Table 13). Wetlands within the project area were categorized into the following 11 communities based on the NC Natural Heritage Program's classification system (Schafale and Weakley 1990): mixed herbaceous (in man-dominated area), disturbed shrub/scrub, mixed-pine/hardwood forest, hardwood forest, bay forest, swamp forest, maritime shrub/grassland, maritime forest, maritime swamp, freshwater marsh, and open-water (includes SAV). Descriptions of these wetland communities are found in Sections 4.1.1 and 4.2.1. Table 13 lists the classifications for the wetlands in the project area according to Cowardin and according to the NC Wetland Assessment Method (NCWAM) classification system. The wetlands can be divided into seven NCWAM communities: non-riverine swamp forest, hardwood flat, pine flat, basin wetland, estuarine woody wetland, non-tidal freshwater

Table 13. Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
Wetlands					
W001	PFO1/3F, PEM1/2B	NRSF	Non-riverine	2.24	5(b)
W002	PFO1/3/4B/F	HF & PF	Non-riverine	3.39	5(b)
W002a	PFO1/3/4B/F	HF & PF	Non-riverine	0.08	5(b)
W003	PFO1/3E/F, PEM1/2B	NRSF	Non-riverine	2.21	5(b)
W003a	PFO1/3E/F, PEM1/2B	NRSF	Non-riverine	<0.01	5(b)
W003b	PFO1/3E/F	NRSF	Non-riverine	<0.01	5(b)
W003c	PFO1/3E/F, PEM1/2B	NRSF	Non-riverine	0.04	5(b)
W004	PFO1/3/4B	HF & PF	Non-riverine	0.71	5(b)
W005	PSS1/3/4B	BW	Non-riverine	0.34	5(b)
W006	PFO1/3/4B	HF & PF	Non-riverine	1.01	5(b)
W006a	PFO1/3/4B	HF & PF, EWW	Tidal, Non-riverine	0.04	5(b)
W006b	PFO1/3/4B	HF & PF, EWW	Tidal, Non-riverine	0.24	5(b)
W006c	PFO1/3/4B	HF & PF, EWW	Tidal, Non-riverine	1.46	5(b)
W007	PFO1/3/4B	HF & PF, EWW	Non-riverine	1.27	5(b)
W008	PFO1/3E	HF	Non-riverine	4.44	5(b)
W009	PFO1/3/4B	BW	Non-riverine	4.30	5(b)
W010	PFO1/3/4B/E/F, PEM1/2B, PSS1/3/4B	NRSF & BW	Non-riverine	166.31	5(b), 5(d)
W011	PFO1/3/4B/E, PSS1/3/4B	HF & BW	Non-riverine	1.33	5(b)
W012	PEM1/2B, PSS1/3/4B	BW	Non-riverine	0.02	5(b)
W013	PFO1/3/4B/E/F, PEM1/2B, PSS1/3/4B	NRSF, HF, HF & PF	Non-riverine	396.77	5(b)

Table 13 (continued). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
W014	PFO1/3/4B	NRSF	Non-riverine	0.05	5(c)
W015	PFO1/3/4B/E/F	NRSF, HF, HF & PF	Non-riverine	95.84	5(b), 5(c)
W016	PFO1/3E	HF	Non-riverine	0.39	5(d)
W017	E1UB2/3/4Kx	BW	Non-riverine	0.35	5(d)
W018	PFO1/3E, PEM1/2B, PSS1/3/4B	HF & BW	Non-riverine	21.81	5(d)
W019	PFO1/3E	HF	Non-riverine	0.08	5(d)
W020	PFO1/3E	HF	Non-riverine	0.27	5(d)
W021	PFO1/3E, PSS1/3/4B	HF & BW	Non-riverine	0.23	5(d)
W022	PSS1/3/4B	BW	Non-riverine	0.01	5(d)
W023	PFO1/3/4B, PEM1/2B, PSS1/3/4B	HF & PF	Non-riverine	1.41	5(d)
W024	PEM1/2B	NTFM	Riverine	0.01	5(e)
W025	PEM1/2B	NTFM	Riverine	<0.01	5(e)
W026	PFO1/3E	HF & PF	Non-riverine	0.04	5(e)
W027	PFO1/3E	HF & PF	Non-riverine	0.10	5(e)
W028	PFO1/3E	HF & PF	Non-riverine	0.01	5(e)
W029	PFO1/3E	HF & PF	Non-riverine	0.13	5(e)
W030	PFO1/3E	HF & PF	Non-riverine	0.02	5(e)
W031	PFO1/3E	HF	Non-riverine	<0.01	5(e)
W032	PFO1/3E, PEM1/2B	HF & BW	Non-riverine	0.48	5(g)
W033	PFO1/3E, PEM1/2B	HF & BW	Non-riverine	0.29	5(g)
W034[1]	E2EM1P	BW	Non-riverine	0.12	5(g)
W035	PFO1/3/4F	EWW	Tidal	0.15	5(h)
W036	PFO1/3/4A/B/F	NRSF	Non-riverine	1.29	5(h)
W037	PFO1/3/4F	NRSF	Non-riverine	0.27	5(h)
W038	PFO1/3/4B/F	NRSF	Non-riverine	0.87	5(h)
W038a	PFO1/3/4F	NRSF	Non-riverine	0.47	5(h)

Table 13 (continued). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
W039	PEM1/2B, PSS1/3/4B	NRSF	Non-riverine	0.15	5(h)
W040	PEM1/2B, PSS1/3/4B	NRSF	Non-riverine	0.45	5(h)
W041	PFO1/3/4B	HF	Non-riverine	0.16	5(h)
W042	PFO1/3/4F	NRSF	Non-riverine	0.35	5(h)
W043	PFO1/3/4F	NRSF	Non-riverine	0.13	5(h)
W044	PFO1/3/4A, PEM1/2B, PSS1/3/4B	NRSF	Non-riverine	0.42	5(h)
W045	PFO1/3/4B/F	NRSF	Non-riverine	0.27	5(h)
W046a[1]	E2EM1P, E2SS1/3/4P	TFM & EWW	Tidal	0.40	5(i)
W046b[1]	E2EM1P	TFM	Tidal	0.08	5(i)
W046c[1]	E2EM1P, E2SS/FO1/3/4P, PFO1/3/4B	TFM, EWW, HF	Tidal	0.56	5(i)
W047[1]	E2EM1P, E2SS/FO1/3/4P	TFM, EWW	Tidal	0.51	5(i)
W047a[1]	E2EM1P	TFM	Tidal	<0.01	5(i)
W048[1]	E2EM1P	TFM	Tidal	0.13	5(i)
W049[1]	E2EM1P	TFM	Tidal	0.07	5(j)
W050[1]	E2EM1P, E2FO1/3/4P	TFM, EWW	Tidal	0.12	5(j)
W051	PSS1/3/4B	BW	Non-riverine	0.04	5(j)
W051a[1]	E2EM1P	TFM	Tidal	0.02	5(j)
W051b[1]	E2SS1/3/4P	EWW	Tidal	0.02	5(j)
W051c[1]	E2EM1P	TFM	Tidal	0.01	5(j)
W051d[1]	E2EM1P	TFM	Tidal	0.01	5(j)
W051e	PFO1/2/3/4P	NRSF	Non-riverine	0.02	5(j)

Table 13 (continued). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
W051f	PFO1/2/3/4P	NRSF	Non-riverine	0.05	5(j)
W051g	PFO1/2/3/4P	NRSF	Non-riverine	0.02	5(j)
W052	PFO1/3/4B	BW	Non-riverine	0.05	5(j)
W052a	PFO1/3/4B	BW	Non-riverine	0.01	5(j)
W052b	PFO1/3/4B	BW	Non-riverine	0.01	5(j)
W052c	PFO1/3/4B	BW	Non-riverine	0.24	5(j)
W053	PFO1/3/4B	BW	Non-riverine	0.08	5(j)
W054	PSS1/3/4B	BW & TFM	Non-riverine & tidal	0.13	5(j)
W055[1]	E2EM1P	TFM	Tidal	0.08	5(j)
W056	E2EM1P	TFM	Tidal	0.04	5(j)
W057	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.27	5(j)
W058	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.17	5(j)
W058a	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.08	5(j)
W059	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.20	5(k)
W060	PFO1/3/4B	BW	Non-riverine	0.66	5(k)
W060a	PFO1/3/4B	BW	Non-riverine	<0.01	5(k)
W061	PFO1/3/4B	BW	Non-riverine	0.28	5(k)
W062	PFO1/3/4B	BW	Non-riverine	0.17	5(k)
W063	PFO1/3/4B	BW	Non-riverine	0.24	5(k)
W063a	PFO1/3/4B	BW	Non-riverine	0.02	5(k)
W064	PFO1/3/4B	BW	Non-riverine	0.16	5(k)
W065	PFO1/3/4B	BW	Non-riverine	0.05	5(k)
W066	PFO1/3/4B	BW	Non-riverine	0.42	5(k)
W066a	PFO1/3/4B	BW	Non-riverine	0.14	5(k)
W067	PFO1/3/4B	BW	Non-riverine	<0.01	5(k)
W068	PSS1B, PEM2B	BW	Non-riverine	0.02	5(k)
W069	PFO1/3/4B	BW	Non-riverine	0.07	5(l)

Table 13 (continued). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
W070[1]	E2EM1P, E2SS/FO1/3/4P, PFO1/3/4B/F	NRSF, EWW, NTFM	Tidal, Non-riverine	74.93	5(l)
W071	PEM1/SS4/J	NTFM	Non-riverine	0.51	5(l)
W072	PSS2A	EWW	Non-riverine	<0.01	5(l)
W073	PFO1/3/4B	NRSF	Non-riverine	0.05	5(l)
W074	PFO1/3/4B	NRSF	Non-riverine	0.01	5(l)
W075	PSS2B	BW	Non-riverine	<0.01	5(l)
W076	PSS1/3B, PEM2B	BW	Non-riverine	<0.01	5(l)
W076a	PSS1/3B, PEM2B	BW	Non-riverine	0.04	5(l)
W077	PSS1/3/4B, PEM2B	BW	Non-riverine	0.10	5(l)
W078	PSS1/3/4B, PEM2B	BW	Non-riverine	<0.01	5(l)
W078a	PSS1/3/4B, PEM2B	BW	Non-riverine	<0.01	5(l)
W079	PSS1/3/4B, PEM2B	BW	Non-riverine	0.01	5(l)
W080	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.27	5(l)
W081	PSS1/3/4B, PEM1/2B	BW	Non-riverine	0.67	5(l)
W082	PSS1/3/4B, PEM2B	BW	Non-riverine	0.14	5(l)
W083	PSS1/3/4B, PEM2B	BW	Non-riverine	0.14	5(l)
W084	PSS1/3/4B, PEM2B	BW	Non-riverine	0.15	5(l)
W085	PFO1/3/4B	NRSF	Non-riverine	<0.01	5(l)
W086	PFO1/3/4B	NRSF	Non-riverine	0.42	5(l)
W086a	PFO1/3/4B	NRSF	Non-riverine	0.26	5(l)
W087	PFO1/3/4A/B	NRSF	Non-riverine	0.24	5(l)
W088	PFO1/3/4A/B	NRSF	Non-riverine	0.14	5(l)
W089	PFO1/3/4A/B	NRSF	Non-riverine	0.01	5(l)

Table 13 (continued). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
W090	PFO1/3/4A/B	NRSF	Non-riverine	1.60	5(l)
W091	PEM2B	BW	Non-riverine	0.03	5(l)
W092	PEM2B	BW	Non-riverine	0.05	5(l)
W093	PFO1/3/4A/B	BW	Non-riverine	0.05	5(l)
W094	PFO1/3/4A/B	BW	Non-riverine	0.62	5(l)
W095	PFO1/3/4A/B	BW	Non-riverine	0.06	5(l)
W096	PFO1/3/4A/B	BW	Non-riverine	0.51	5(l)
W097	PFO1/3/4A/B	BW	Non-riverine	0.03	5(l)
W098	PEM2B	BW	Non-riverine	0.10	5(l)
W099[1]	E2EM1A, PFO1B	TFM & EWW	Tidal	11.30	5(l)
W100[2]	PFO1/3/4B	BW	Non-riverine	0.36	5(l)
W101[2]	PFO1/3/4B	BW	Non-riverine	0.29	5(l)
W102[2]	PFO1/3/4B	BW	Non-riverine	0.11	5(l)
W103[1]	E2EM1A	TFM	Tidal	11.23	5(l)
W104[1]	E2EM1A	TFM	Tidal	47.30	5(l)
W105[1]	E2EM1A	TFM	Tidal	1.07	5(l)
Total Wetland Acreage				**871.40**	
Waters					
Currituck Sound	E1UB2/3/4L/M	NA	Tidal	3,896.99	5(c), 5(g), 5(i), 5(j), 5(l)
AIWW	E1UB2/3/4Lx	NA	Tidal	1.85	5(b)
Jean Guite Creek	E1UB2/3/4Lx	NA	Tidal	0.45	5(h)
S001	E1UB2/3/4Lx	NA	Riverine	0.11	5(d)
S002	E1UB2/3/4Lx	NA	Riverine	0.03	5(d)
S003	E1UB2/3/4Lx	NA	Riverine	0.02	5(e)
S004	E1UB2/3/4Lx	NA	Riverine	0.02	5(e)
S005	E1UB2/3/4Lx	NA	Riverine	0.06	5(l)
P001	PUB2/3/4Hx	NA	Non-riverine	0.18	5(c)
P002	PUB2/3/4H	NA	Non-riverine	<0.01	5(h)
P004	PUB2/3/4Hx	NA	Non-riverine	0.04	5(h)

Table 13 (concluded). Characteristics of Jurisdictional Wetlands and Waters in the Project Area

Map ID	Cowardin Classification	NCWAM Classification	Hydrologic Classification	Area (acres)	Appendix A Figure Where Illustrated
P005	PUB2/3/4H	NA	Non-riverine	<0.01	5(i)
P006	PUB2/3/4H	NA	Non-riverine	0.22	5(i)
P007	PUB2/3/4Hx	NA	Non-riverine	0.07	5(j)
P008	PUB2/3/4Hx	NA	Non-riverine	0.06	5(j)
P009	PUB2/3/4Hx	NA	Non-riverine	0.13	5(j)
P010	PUB2/3/4Hx	NA	Non-riverine	0.02	5(k)
P011	PUB2/3/4Hx	NA	Non-riverine	0.44	5(k)
P012	PUB2/3/4Hx	NA	Non-riverine	0.17	5(k)
P013	PUB2/3/4Hx	NA	Non-riverine	0.15	5(l)
P014	PUB2/3/4Hx	NA	Non-riverine	0.18	5(l)
P015	PUB2/3/4Hx	NA	Non-riverine	0.56	5(l)
P016	E1UB2/3/4Lx	NA	Non-riverine	0.99	5(l)
P017	PUB2/3/4Hx	NA	Non-riverine	4.85	5(l)
P018	PUB2/3/4Hx	NA	Non-riverine	0.67	5(l)
P019	PUB2/3/4H	NA	Non-riverine	0.71	5(l)
P020	PUB2/3/4H	NA	Non-riverine	0.20	5(l)
Total Water Acreage				**3,909.29**	
Total Jurisdictional Wetland and Waters Acreage				**4,780.69**	

[1] Portions of these polygons contain CAMA coastal wetlands (wetland freshwater marsh).

[2] Determined to be isolated wetlands during previous delineation.

NA=Not Applicable

Key to abbreviations for NCWAM Classifications:
NRSF – Non-riverine swamp forest
HF – Hardwood flat
PF – Pine flat
BW – Basin wetland
EWW – Estuarine woody wetland
NTFM – Non-tidal freshwater marsh
TFM – Tidal freshwater marsh

marsh, and tidal freshwater marsh. The majority of this acreage (approximately 3,900 acres) is Currituck Sound. Delineation of wetlands in the project area occurred from September to December 2007; during May, July, and October 2008; and in January 2009. Jurisdictional areas identified in the project area were verified in the field by Bill Biddlecome with USACE on November 1, 2007, December 6, 2007, January 8, 2008, and October 22, 2008. A jurisdictional determination was signed by Bill Biddlecome in August 2009 for the entire project area. David Wainwright with NCDENR-DWQ verified jurisdictional areas in the field on December 19, 2007 and October 22, 2008. Stephen Lane with NCDENR-DCM verified all CAMA AEC within the project area in the field on November 30 and December 1, 2010. Wetland boundaries approved by USACE are depicted on Figure 5 in Appendix A.

5.1.2 Impacts

Summaries of the approximate amount of jurisdictional and non-jurisdictional impacts by impact type that would occur for each detailed study alternative, including the Preferred Alternative, are shown in Table 14 and Table 15, respectively. The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane on mainland US 158. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option.

Temporary impacts to jurisdictional areas include areas that are contained within temporary construction easements that would be disturbed during construction activities, but should return to their natural state after construction is completed. Without construction of a third outbound lane for hurricane evacuation on mainland US 158, there would be no temporary impacts to jurisdictional streams, except for 171.7 feet of temporary clearing to streams with ER2. With construction of a third outbound lane, there would be no more than 2.1 acres total temporary impacts to jurisdictional areas under any detailed study alternative, except for the Preferred Alternative, which would not include any temporary impacts to wetlands.

Permanent impacts include fill and piling placement, shading (not calculated in this section), drainage easements, and permanently cleared areas under proposed bridge structures. Fill in wetland areas would be greatest for MCB2/B and MCB4/B (amounts range from 36.0 to 42.9 acres versus 5.9 to 12.8 acres for their Option A version). Fill in wetlands would be the least for ER2 and MCB4/A/C2, followed by the Preferred Alternative. Open water impacts would be least for ER2 and the Preferred Alternative and greatest for MCB2/A/C1, MCB2/B/C1, and MCB2/A/C2.

A separate permanent impact calculation is included that calculates the fill area within the slope-stake line (edge of earth moving during construction), and within wetland areas includes an additional 25-foot buffer. This calculation is included to provide a conservative estimate of impacts to wetlands resulting from topographical changes during construction. A similar pattern emerges with MCB2/B and MCB4/B having the greatest impact, with C1 having a lower impact than C2. Fill in wetlands again would be the least for the Preferred Alternative, followed by ER2 and MCB4/A/C2.

Clearing of wetlands would be greatest with MCB2, MCB4, and the Preferred Alternative because of the inclusion of a Mid-Currituck Bridge that would include a new approach road or bridge. Temporary construction easements on US 158 on the

Table 14. Summary of Jurisdictional Impacts by Detailed Study Alternative for ER2, MCB2/A, and MCB4/A

	ER2 (acres)	MCB2/A/C1 (acres)	MCB2/A/C2 (acres)	MCB4/A/C1 (acres)	MCB4/A/C2 (acres)
Wetlands					
Fill	5.0 (4.6)	12.8 (12.5)	10.2 (9.8)	8.5 (8.1)	5.9 (5.5)
Pilings	0.0	0.0	0.0	0.0	0.0
Clearing	0.0	25.7	30.6	25.8	30.6
Total Permanent Impacts	5.0 (4.6)	38.5 (38.2)	40.7 (40.3)	34.4 (34.0)	36.5 (36.1)
Temporary	2.1	1.7	1.7	2.1	2.1
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Total Wetland Impacts	7.1 (4.6)	40.2 (38.2)	42.4 (40.3)	36.6 (34.0)	38.7 (36.1)
Open Water					
Fill	0.1	0.1	0.1	0.0	0.0
Pilings	0.0	0.1	0.1	0.1	0.1
Clearing	0.0	0.0	0.0	0.0	0.0
Total Permanent Impacts	0.1	0.2	0.2	0.1	0.1
Temporary	0.1 (0.0)	0.0	0.0	0.0	0.0
Total Open Water Impacts	0.2 (0.0)	0.2	0.2	0.1	0.1
Total Stream Impacts[1] (acres/feet)	0.0/171.7 in temporary clearing (0.0/0.0)	0.0/0.0	0.0/0.0	0.0/0.0	0.0/0.0
Total Pond Impacts (Fill)	0.3	1.2	0.2	1.1	0.1
Total Jurisdictional Impacts	7.6 (5.1)	41.6 (39.6)	42.8 (40.7)	37.8 (35.2)	38.9 (36.3)
Wetland within Slope-Stake Line, plus Additional 25-foot buffer					
Total Impact	12.6 (8.6)	21.1 (17.1)	16.5 (12.5)	15.4 (10.6)	10.9 (6.0)

The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

[1] If a third outbound lane is added for hurricane evacuation on US 158 over Jean Guite Creek with MCB4, a single piling would be installed in the creek and the existing bridge over the creek would be widened by 18 feet (shade impact). With ER2 and MCB2, the bridge over Jean Guite Creek would be widened by 36 feet for the widening of US 158 (shade impact). MCB2/C2 and MCB4/C2 also would result in a small amount of shading over a single stream on the Outer Banks.

Table 15. Summary of Jurisdictional Impacts by Detailed Study Alternative for MCB2/B, MCB4/B, and the Preferred Alternative

	MCB2/B/C1 (acres)	MCB2/B/C2 (acres)	MCB4/B/C1 (acres)	MCB4/B/C2 (acres)	Preferred Alternative
Wetlands					
Fill	43.0 (42.5)	40.3 (39.8)	38.6 (38.1)	36.0 (35.5)	6.1
Pilings	0.0	0.0	0.0	0.0	0.0
Clearing	0.3	5.1	0.3	5.1	25.5
Total Permanent Impacts	43.3 (42.8)	45.3 (44.9)	38.9 (38.4)	41.1 (40.6)	31.6
Temporary	1.7 (0.0)	1.7 (0.0)	2.1 (0.0)	2.1 (0.0)	0.0
Total Wetland Impacts	45.0 (42.8)	47.0 (44.9)	41.1 (38.4)	43.2 (40.6)	31.6
Open Water					
Fill	0.1	0.1	0.0	0.0	0.0
Pilings	0.1	0.1	0.1	0.1	0.1
Clearing	0.0	0.0	0.0	0.0	0.0
Total Permanent Impacts	0.2	0.2	0.1	0.1	0.1
Temporary	0.0	0.0	0.0	0.0	0.0
Total Open Water Impacts	0.2	0.2	0.1	0.1	0.1
Total Stream Impacts[1] (acres/feet)	0.0/0.0	0.0/0.0	0.0/0.0	0.0/0.0	0.0/0.0
Total Pond Impacts (Fill)	1.2	0.2	1.1	0.1	0.0
Total Jurisdictional Impacts	46.4 (44.2)	47.4 (45.3)	42.3 (39.6)	43.4 (40.8)	31.7
Wetland within Slope-Stake Line, plus Additional 25-foot buffer					
Total Impact	47.1 (43.1)	42.5 (38.5)	41.4 (36.6)	36.9 (32.0)	7.9

The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

[1] If a third outbound lane is added for hurricane evacuation on US 158 over Jean Guite Creek with MCB4, a single piling would be installed in the creek and the existing bridge over the creek would be widened by 18 feet (shade impact). With ER2 and MCB2, the bridge over Jean Guite Creek would be widened by 36 feet for the widening of US 158 (shade impact). MCB2/C2 and MCB4/C2 also would result in a small amount of shading over a single stream on the Outer Banks.

mainland with ER2 would result in 171.7 linear feet of temporary clearing impacts to streams.

5.2 Clean Water Act Permits

An Individual Permit from USACE for the entire project would be required pursuant to Section 404 of the Clean Water Act (33 CFR, Part 323) for discharges of dredged or fill material into waters of the United States. The Clean Water Act provides for public notice and review of Section 404 permit applications, as well as review by USFWS and approval by the US Environmental Protection Agency (USEPA).

A Water Quality Certification pursuant to Section 401 of the Clean Water Act would be needed from NCDENR-DWQ. This permit is required in association with the USACE Section 404 permitting process. A CAMA permit from NCDENR-DCM would also be required and is discussed further in Section 5.10.1. Additionally, the NCDENR, Division of Land Resources enforces the Sedimentation Pollution Control Act of 1973, which regulates all land-disturbing activities except agriculture and mining.

5.3 Construction Moratorium

There is no specific statute or regulation that designates or references the waters of Currituck Sound as subject to a construction moratorium. However, there is a possibility that a moratorium could be imposed on the project related to bottom disturbing in-water work in SAV habitat (including existing beds), as defined by NCMFC, via a permit condition during the USACE Section 404 and CAMA permitting review processes. The only state designated fish nursery/spawning area (primary, secondary, or anadromous spawning area) crossed by any of the detailed study alternatives is Jean Guite Creek, which is a PNA and would be crossed by the widening of US 158 with ER2 and MCB2, as well as third outbound hurricane evacuation lane improvements with MCB4. However, the Preferred Alternative would not affect the creek. Although each project is reviewed on a case-by-case basis and coordinated with NCDENR-DMF, the dates for a moratorium could range from February 15 through September 30 and could slightly vary depending on water temperatures.

5.4 North Carolina River Basin Buffer Rules

The waters of the project area are located entirely within the Pasquotank River Basin. There are currently no Riparian Buffer rules being administered by NCDENR-DWQ in this river basin.

5.5 Rivers and Harbors Act Section 10 Navigable Waters

Within the project area, Currituck Sound, the AIWW, and Jean Guite Creek have been designated by USACE as Navigable Waters under Section 10 of the Rivers and Harbors Act.

5.6 Wetland and Stream Mitigation

Applications for USACE dredge and fill permits under Section 404 must meet mitigation requirements found in the "Memorandum of Agreement (MOA) Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines" (February 1990). This MOA requires the applicant to utilize a sequencing process that includes avoidance of impacts, minimization of impacts, and, finally, compensation of unavoidable impacts to aquatic resource values. Executive Order 11990 requires action to be taken to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. If there is no practicable alternative to construction in wetlands and all practicable measures to minimize harm to wetlands have been provided, compensation of wetland impacts is required.

5.6.1 Avoidance and Minimization

Avoidance and minimization of considerable wetland impacts occurred with the elimination of some bridge corridors proposed and analyzed during the preliminary alternatives study. NCTA has attempted to avoid and minimize impacts to streams and wetlands to the greatest extent practicable with the selection of the Preferred Alternative and will continue to do so during final project design. The bridge and roadway improvements associated with NCTA's Preferred Alternative, as well as the construction techniques and mitigation efforts that are associated with the Preferred Alternative, are described in Section 1.0. Substantial wetland impacts in northern Maple Swamp were avoided by the selection of Option A for the Preferred Alternative, which includes a bridge over the swamp as opposed to road construction on fill through the swamp. Impacts to the more pristine loblolly bay forest in Maple Swamp and other areas of wetland forest were also avoided by shifting the bridge crossing to the north in the vicinity of an actively cleared and maintained utility corridor.

The Preferred Alternative's revised C1 bridge corridor over Currituck Sound is straighter and shorter than the DEIS C1 and C2 bridge corridors, which would result in less shade and pile impacts to EFH. In addition, the Outer Banks bridge corridor landing site with the Preferred Alternative would avoid all wetlands. The method of bridge construction also has been chosen to reduce negative impacts to wetlands. NCTA is not proposing to dredge in Currituck Sound. The bridge would be built from barges in waters 6 feet or deeper and from temporary trestles. Turbidity curtains and shrouds also would be used in SAV habitat (including existing beds) as defined by NCMFC, as well as when necessary potential SAV habitat, and piles would be driven, not jetted. No bottom disturbing in-water work would occur in SAV habitat (including existing beds) as defined by NCMFC from approximately February 15 through September 30.

In the design of the road-widening portions for the Preferred Alternative, steps were taken to avoid and minimize impacts to wetland areas. In addition, road widening was reduced and is concentrated in three areas: the bridge terminus, the commercial area surrounding Albacore Street, and Currituck Clubhouse Drive. Where practicable, road widening would occur on the non-jurisdictional upland sides of existing roads. Impacts to Great Swamp were avoided and minimized in this manner. However, symmetrical road widening would occur when wetland impacts and business and/or home displacement would be unbalanced if the widening occurred entirely on one side of the existing road. In addition, utilizing the existing center turn lane to provide a third outbound hurricane evacuation lane, rather than construction of a third outbound lane, was assumed with the Preferred Alternative.

During final design, NCTA would coordinate with environmental resource and regulatory agencies on finalizing the construction techniques to be used with the goal of further reducing potential temporary impacts to water quality and aquatic habitat to the extent practicable.

5.6.2 Compensatory Mitigation of Impacts

Compensatory mitigation options to offset wetland impacts could include the following: preservation of unique wetland communities; enhancement of existing wetlands; restoration of wetland areas. Considerations for candidate sites for wetlands mitigation include: proximity to impacted wetlands; proximity to the drainage basin of impacted wetlands; topographic and hydrological characteristics; and chance of successful mitigation for lost wetland functions.

NCTA would mitigate permanent impacts to SAV habitat (including existing beds), as defined by NCMFC, resulting from Mid-Currituck Bridge shading and pile placement with the Preferred Alternative. Available options for this mitigation include:

- In-kind restoration in the project area at a suitable site at a 2:1 ratio (if feasible). This restoration activity would follow the currently adopted SAV protocols in North Carolina and best practices from recent successful SAV restoration efforts. This option is preferred by NCTA.

- Efforts to improve conditions for SAV propagation and survival within Currituck Sound. This option would involve: protection and establishment of riparian buffers; contribution of funds to promote agricultural BMPs; stormwater management improvement projects; acquisition of properties identified as important for the protection of water quality (as reported in the November 2006 *Countywide Land Parcel Prioritization Strategy for Water Quality Enhancement*); and other measures that would reduce the turbidity of water in Currituck Sound.

- Construction of hard clam habitat and restoration of eroded dredge spoil islands.
- Support for SAV research.
- Participation in the Currituck Sound Ecosystem Restoration Project coordinated by USACE.

Efforts to improve conditions for SAV propagation and survival within Currituck Sound, support for SAV research, and participation in the Currituck Sound Ecosystem Restoration Project also are options for mitigating the shading of portions of Currituck Sound 6 feet deep or less that do not contain existing SAV beds or meet NCMFC's definition of SAV habitat.

NCTA would investigate potential on-site wetland mitigation opportunities once a final decision is developed for the Preferred Alternative. NCTA currently proposes the Ballance Farm Wetlands Mitigation Site, which is in Currituck County approximately 5 miles southeast of Moyock, for mitigating the approximately 7.9 acres of wetland fill impact with the Preferred Alternative. The 430-acre property was purchased by NCDOT to mitigate for wetland impacts associated with the widening of NC 168 (STIP Project No. R-2228), as well as for future impacts in the Pasquotank River Basin (High Unit Cost Grant Program [HUC] 03010205). The site originally consisted of 297 acres of prior converted agricultural fields, along with existing tidal freshwater marsh and nonriverine forested wetlands.

According to the Ballance Farm Mitigation Plan, implementation of the site was to provide marsh creation, marsh preservation, nonriverine wetland restoration, nonriverine wetland preservation, and upland habitat preservation. After five years of monitoring, the nonriverine wetland restoration portion of the site (including nonriverine forested wetlands) was deemed successful and closed out in 2004. Mitigation credit available from the Ballance Farm Wetlands Mitigation Site could potentially provide for all, or at least a portion of, the mitigation required for the Preferred Alternative. The amount of nonriverine forested wetlands mitigation credit currently available from the site would provide for all the mitigation required for the Preferred Alternative.

With the Preferred Alternative, approximately 160 acres of landlocked parcels in Maple Swamp and Great Swamp would be purchased and preserved (assuming successful negotiations with willing sellers). None of this area was logged during logging operations carried out in Maple Swamp between 2006 and July 2010. Additional details on the logged land in Maple Swamp and the landlocked parcels are found in Sections 4.1.1.20 and 4.1.1.21, respectively.

A conceptual mitigation plan for the project is included in Appendix E.

5.7 Endangered Species Act Protected Species

As of February 2011, USFWS and the National Marine Fisheries Service (NMFS) identified 13 federally-protected species occurring in Currituck and Dare counties (NMFS, 2011; USFWS, 2011). These protected species, along with information on the presence of habitat in the project area and a Biological Conclusion for each species, are listed in Table 16. Information is based on the current best available information from referenced literature and agency correspondence. Conclusions are based on direct and indirect effects. Indirect effects are caused by actions taken because of the presence of the project and occur later in time after the action is completed.

Two determinations are needed for sea turtles, one for impacts occurring on the beach under USFWS jurisdiction, and one for impacts occurring in the water under NMFS jurisdiction. Impacts occurring on beach habitat for the Mid-Currituck Bridge project are considered indirect because the potentially affected area is the 10-mile stretch of beach from north of Corolla to the Virginia Line. This section of beach is north of the project's direct impact area, but could experience increased beach driving traffic with the construction of the proposed Mid-Currituck Bridge. There is no suitable turtle or bird nesting habitat crossed by any of the detailed study alternatives, including the Preferred Alternative, or within Currituck Sound, so there would be no direct impacts to nesting sea turtles or birds or their nesting habitat. More detailed information for protected species can be found in the *Biological Assessment Report* (CZR Incorporated, 2011). The report details the potential for each protected species to occur in the project area, as well as the potential direct and indirect impacts to each species and their habitat. An expanded list of protected species, which also includes federal species of concern, state-listed species, and likelihood of occurrence in the project area, is included in Appendix B.

USFWS concurred with the Biological Conclusions for protected species under their jurisdiction in a letter dated July 8, 2011 and formal consultation was not needed. NMFS concurred with the Biological Conclusions for species under their jurisdiction in a letter dated October 18, 2011 and formal consultation was not needed. These letters are included in Appendix F. Consultation has been completed unless a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

Construction contracts would require compliance with USFWS's *Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters* (USFWS, 2003) and NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* (March 23, 2006) with exceptions and clarifications provided by USFWS, and NMFS, respectively. In a letter dated December 2, 2011 addressed to the NMFS and USFWS, NCTA requested relief on conditions related to maintaining a "no

Table 16. Federally-Protected Species Listed for Currituck and Dare Counties

Scientific Name	Common Name	Federal Status[1]	Habitat Present	Biological Conclusion[2]		
				USFWS Jurisdictional Species		NMFS Jurisdictional Species
				MCB2, MCB4, and Preferred Alternative	ER2	MCB2, MCB4, and Preferred Alternative
Canis rufus	Red wolf	E-EXP	Yes	No Effect	No Effect	NA
Trichechus manatus	West Indian manatee	E	Yes	MA-NLAA	No Effect	NA
Charadrius melodus	Piping plover	T	Yes	MA-NLAA	No Effect	NA
Picoides borealis	Red-cockaded woodpecker	E	No	No Effect	No Effect	NA
Sterna dougallii dougallii	Roseate tern	E	Yes	No Effect	No Effect	NA
Alligator mississippiensis	American alligator	T(S/A)	Yes	NA	NA	NA
Chelonia mydas	Green sea turtle	T	Yes	No Effect	No Effect	MA-NLAA
Eretmochelys imbricata	Hawksbill sea turtle	E	No	No Effect	No Effect	No Effect
Lepidochelys kempii	Kemp's ridley sea turtle	E	Yes	No Effect	No Effect	MA-NLAA
Dermochelys coriacea	Leatherback sea turtle	E	No	No Effect	No Effect	No Effect
Caretta caretta	Loggerhead sea turtle	T	Yes	MA-NLAA	No Effect	MA-NLAA
Acipenser brevirostrum	Shortnose sturgeon	E	Yes	NA	NA	MA-NLAA
Amaranthus pumilus	Seabeach amaranth	T	Yes	No Effect	No Effect	NA

Source: USFWS, 2011; NMFS, 2011.

[1] T – Threatened
T(S/A) – Threatened because of similarity of appearance to American crocodile
E – Endangered
E-EXP – Endangered and population is experimental

[2] MA-NLAA – May Affect, Not Likely to Adversely Affect
NA-Not applicable; no biological conclusion required

wake/idle" speed during construction. This requirement would significantly affect the construction schedule of the Preferred Alternative and construction costs. In addition, the no wake/idle speed requirement does not take into account that sea turtles and manatees are highly unlikely to be present in waterways adjacent to the Mid-Currituck Bridge Project. With the no wake/idle speed constraint, construction vessels would have to operate at a speed of 1 knot (1.15 miles per hour) as opposed to the planned approximately 3 knots (3.45 miles per hour). In a December 8, 2011 letter USFWS agreed to delete from their requirements for this project the two guidelines that specify the use of no wake/idle speeds. NMFS in an e-mail dated December 16, 2011 agreed that the condition relating to no wake/idle speeds would not apply to this project.

The paragraphs that follow list each species, describes its habitat, and indicates the biological conclusion(s).

Red wolf

USFWS optimal survey window: year round

Habitat Description: Red wolves were extirpated from North Carolina and most other southeastern states by the 1920s. In the mid-1980s, USFWS reintroduced the species to the Alligator River National Wildlife Refuge (ARNWR) in eastern North Carolina. Since that time, the wolves have expanded their range outside the refuge. Red wolves are generally crepuscular predators, preying on deer, nutria, raccoon, rabbits, and other small mammals. Any area that provides sufficient size, adequate food and water, and the basic cover requirement of heavy vegetation should be suitable habitat for the red wolf. Telemetry studies indicate that red wolf home range requirements vary from about 25 to 50 square miles (NatureServe, 2007; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

- While potential habitat exists within the project area (Great Swamp and Maple Swamp), there are no published records of this species in the project area (NCNHP, 2008). In addition, it is unlikely that the reintroduced population in ARNWR will cross vast water bodies (Albemarle, Roanoke, and/or Croatan sounds) and reach the project area.
- Experimental population is closely managed by USFWS.

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

West Indian manatee

USFWS optimal survey window: year round

Habitat Description: Manatees have been observed in all the North Carolina coastal counties. Manatees are found in canals, sluggish rivers, estuarine habitats, salt water bays, and as far off shore as 3.7 miles. They utilize freshwater and marine habitats at shallow depths of 5 to 20 feet. In the winter, between October and April, manatees concentrate in areas with warm water. During other times of the year habitats appropriate for the manatee are those with sufficient water depth, an adequate food supply, and proximity to freshwater. Manatees require a source of freshwater to drink. Manatees are primarily herbivorous, feeding on any aquatic vegetation present, but they may occasionally feed on fish.

USFWS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT; ER2 – NO EFFECT

The project may affect the West Indian manatee because:

- The shallow waters of Currituck Sound and the extensive SAV beds found in the area provide potential foraging habitat for manatees. NCNHP records show sporadic occurrences of manatee near Currituck Sound over the past several decades (NCNHP, 2008).

- In-water work such as pile placement may cause turbidity and siltation which could cause manatees to avoid these areas of the sound during construction, thereby leading to a reduction in foraging habitat; however, minimization measures to reduce these impacts to the sound would be in place (see Section 1.3 for a list of these measures).

The project is not likely to adversely affect the West Indian manatee because:

- The northern limit of the manatee’s range extends to North Carolina, but low temperatures prevent this species from commonly occurring in the action area.

- The rarity of occurrence near the project area makes impacts to this species unlikely (personal communication, Gary Jordan, Fish and Wildlife Biologist, USFWS, November 8, 2010).

- Construction contracts would require compliance with the USFWS’s *Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters* (USFWS, 2003).

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

Piping plover

USFWS optimal survey window: year round

Habitat Description: The piping plover breeds along the entire eastern coast of the United States. North Carolina is uniquely positioned in the species' range, being the only state where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. They nest most commonly where there is little or no vegetation, but some may nest in stands of beachgrass. The nest is a shallow depression in the sand that is usually lined with shell fragments and light colored pebbles (NatureServe, 2007; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT; ER2 – NO EFFECT

The project may affect the piping plover because:

- Potential foraging habitat occurs in the direct impact action area when irregular wind tides expose mud flats within Currituck Sound. Open sandy beach areas that serve as nesting, foraging, and resting habitat exist in the action area.

The project is not likely to adversely affect the piping plover because:

- No nests have been recorded in the CNWR in 10 or more years (personal communication, Mike Hoff, CNWR Manager, USFWS, March 30, 2011).
- Piping plovers have not been documented within the direct impact action area, but there are sightings from the action area (i.e., the CNWR) approximately 4 miles to the north (NCNHP, 2008).

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

Red-cockaded woodpecker

USFWS optimal survey window: November through early March (present year round)

Habitat Description: The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine, for foraging and nesting/roosting habitat. The RCW excavates cavities for nesting and roosting in living pine trees, aged 60 years or older, which are contiguous with pine stands at least 30 years of age to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 mile (USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

- The closest active red-cockaded woodpecker colony is over 2.5 miles west of the project area, making the presence of a bridge or other road improvements, as well as related construction activities, associated with the Mid-Currituck Bridge project not likely to result in an effect on this species.
- There are no mature stands of pine forests present in the project area or surrounding areas, therefore no suitable nesting/roosting habitat exists in the action area.

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

Roseate tern

USFWS optimal survey window: June through August

Habitat Description: In North Carolina, the roseate tern is most likely to be seen on barrier islands as it passes through the area to and from northern breeding grounds. March through May and August through October are the most likely times to see these birds. Although sight records of this species exist for June, July, and August, these are likely non-breeding males. Only one nesting record for this species has been documented for the state within the past 20 years. However, if this species expands its range, it is likely to choose coastal areas of the state for nesting. The roseate tern nests on isolated, less disturbed coastal islands in areas characterized by sandy, rocky, or clayey substrates with either sparse or thick vegetation. Eggs are usually laid such that grasses or overhanging objects provide shelter. They may also nest in marshes, but it is an uncommon occurrence (NatureServe, 2007; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

- There are no USFWS or NCNHP records from Currituck County.
- There is only one documented nest of this species from North Carolina in Carteret County (Lee and Parnell, 1990).

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

American alligator

USFWS optimal survey window: year round (only warm days in winter)

Habitat Description: In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found in rivers, streams, canals, lakes, swamps, and coastal marshes. Adult animals are highly tolerant of salt water, but the young are apparently more sensitive, with salinities greater than 5 parts per thousand considered harmful. The American alligator remains on the protected species list because of its similarity in appearance to the Endangered American crocodile (NatureServe, 2007; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NOT APPLICABLE – NO BIOLOGICAL CONCLUSION REQUIRED

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

- The American alligator remains on the protected species list because of its similarity in appearance to the endangered American crocodile (NatureServe, 2007; USFWS, 2008a).

Green sea turtle

USFWS optimal survey window: April through August

Habitat Description: The green sea turtle is found in temperate and tropical oceans and seas. Nesting in North America is limited to small communities on the east coast requiring beaches with minimal disturbances and a sloping platform for nesting. The green sea turtle can be found in shallow waters. They are attracted to lagoons, reefs, bays, mangrove swamps and inlets where an abundance of marine grasses can be found, as this is the principal food source for the green sea turtle (NatureServe, 2007; National Oceanic and Atmospheric Administration [NOAA], 2008; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

- Beaches within the action area are not used for nesting by the green sea turtle (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).

- The occurrence of green sea turtles is rare on the beaches north of Corolla; however, two strandings have been recorded since 2006 (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative –MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT

The project may affect the green sea turtle because:

- Currituck Sound provides potential foraging habitat for the green sea turtle because of the abundance of SAV found in the action area.

- In-water work such as pile placement may cause turbidity and siltation which could cause green sea turtles to avoid these areas of the sound during construction, thereby leading to a reduction in foraging habitat; however, minimization measures to reduce these impacts to the sound would be in place (see Section 1.3 for a list of these measures).

The project is not likely to adversely affect the green sea turtle because:

- No nesting, mating, or critical habitat occurs within the action area.
- The occurrence of all sea turtles, including the green sea turtle, in Currituck Sound is rare, and there are no published records of living individuals in the action area (NCNHP). However, unpublished NCWRC stranding data shows three sea turtle carcasses have been found in Currituck Sound over the past 10 years. One of these was an unidentified skeleton found September 23, 2005 and could possibly have been a green sea turtle (personal communication, Wendy Cluse, Assistant Sea Turtle Biologist, NCWRC, December 18, 2008).
- Sea turtles are unlikely to be found in the action area and are more commonly found in the higher salinity waters of Albemarle Sound. Currituck Sound also is relatively isolated, with the nearest inlet located over 25 miles away (Oregon Inlet).
- Currituck Sound was exempted from recent gill net restrictions for internal coastal waters (rule 15A NCAC 03J.0103). Details of exempt waters are in proclamation M-2-2011 issued by NCDENR-DMF. This rule was implemented to reduce or eliminate incidental take of endangered species, primarily sea turtles. Currituck Sound was exempted from these new restrictions because of lack of interaction of sea turtles based on NCDENR-DMF observer data and fisheries independent gill net surveys (personal communication, Red Mundin, Assistant to the NCDENR-DMF Director and Protected Species Specialist, NCDENR-DMF, January 13, 2011).
- If present, the response to construction and operation-related impacts would be avoidance.

Hawksbill sea turtle

USFWS optimal survey window: April through August

Habitat Description: Hawksbill sea turtles are found in tropical and subtropical oceans. Sightings have been reported on the east coast of the United States as far north as Massachusetts, although rarely north of Florida. Sightings have been recorded from a handful of counties in North Carolina, but the turtle is not known to breed in the state. Adult hawksbills are found in coastal waters, especially around coral reefs, rocky outcrops, shoals, mangrove bays, and estuaries. Juveniles are often seen offshore in floating mats of seaweed. This species nests on a wide range of beach types and substrates, using both low- and high-energy beaches on islands and mainland sites. The nest is typically placed near or under vegetation of some sort (NatureServe, 2007; NOAA, 2008; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NO EFFECT

The project would not affect the hawksbill sea turtle because:

- There are no known occurrences of this species recorded in Currituck County or in the vicinity of the action area (NCNHP, 2008; NCWRC, unpublished data).
- It prefers tropical open-ocean and beach habitats.

Kemp's ridley sea turtle

USFWS optimal survey window: April through August

Habitat Description: Kemp's ridley sea turtle is the smallest of the sea turtles that visit North Carolina's coast. The majority of this sea turtle's nesting occurs in Mexico. Sightings of the species exist for most coastal counties in North Carolina. Kemp's ridley sea turtle can lay eggs as many as three times during the April to June breeding season. Kemp's ridley sea turtles prefer beach sections that are backed up by extensive swamps or large bodies of open water with seasonal narrow ocean connections and a well defined, elevated dune area. The species prefers neritic (nearshore) areas with sandy or muddy bottoms (NatureServe, 2008; NCNHP, 2008; NOAA, 2008; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

The project would not affect the Kemp's ridley sea turtle because:

- Beaches within the action area are not used for nesting by the Kemp's ridley sea turtle (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).
- The occurrence of Kemp's ridley sea turtles is rare on the beaches north of Corolla; however, four strandings have been recorded here since 2006 (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT

The project may affect the Kemp's ridley sea turtle because:

- Currituck Sound provides potential foraging habitat for the Kemp's ridley sea turtle because of the abundance of SAV found in the action area.
- In-water work such as pile placement may cause turbidity and siltation which could cause Kemp's ridley sea turtles to avoid these areas of the sound during construction, thereby leading to a reduction in foraging habitat; however, minimization measures to reduce these impacts to the sound would be in place (see Section 1.3 for a list of these measures).

The project is not likely to adversely affect the Kemp's ridley sea turtle because:

- No nesting, mating, or critical habitat occurs within the action area
- The occurrence of all sea turtles, including the Kemp's ridley sea turtle, in Currituck Sound is rare, and there are no published records of living individuals from Currituck County or the action area (NCNHP). However, unpublished NCWRC stranding data indicates there was one Kemp's ridley sea turtle stranding in the Currituck Sound area in the last ten years (2000 to 2010) (personal communication, Matthew Godfrey, Sea Turtle Biologist, NCWRC, December 8, 2010).
- These turtles are primarily a tropical and sub-tropical species that prefer low wind and low wave habitats.
- Currituck Sound was exempted from recent gill net restrictions for internal coastal waters (rule 15A NCAC 03J.0103). Details of exempt waters are in proclamation M-2-2011 issued by NCDENR-DMF. This rule was implemented to reduce or eliminate incidental take of endangered species, primarily sea turtles. Currituck Sound was exempted from these new restrictions because of lack of interaction of sea turtles based on NCDENR-DMF observer data and fisheries independent gill net surveys (personal communication, Red Mundin, Assistant to the NCDENR-DMF Director and Protected Species Specialist, NCDENR-DMF, January 13, 2011).
- If present, the response to construction and operation-related impacts would be avoidance.

Leatherback sea turtle

USFWS optimal survey window: April through August

Habitat Description: Leatherbacks are distributed world-wide in tropical waters of the Atlantic, Pacific, and Indian oceans. They are generally open-ocean species, and may be common off the North Carolina coast during certain times of the year. However, in northern waters leatherbacks are reported to enter into bays, estuaries, and other inland bodies of water. Major nesting areas occur mainly in tropical regions. In the United States, primary nesting areas are in Florida; however, nests are known from Georgia, South Carolina, and North Carolina as well. Nesting occurs from April to August. Leatherbacks need sandy beaches backed with vegetation in the proximity of deep water and generally with rough seas. Beaches with a relatively steep slope are usually preferred (NatureServe, 2007; NOAA, 2008; USFWS; 2008).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NO EFFECT

The project would not affect the leatherback sea turtle because:

- There are no known occurrences of this species recorded near the action area (NCNHP, 2008; NCWRC, unpublished data).
- It prefers tropical open-ocean and beach habitats.

Loggerhead sea turtle

USFWS optimal survey window: April through August

Habitat Description: The loggerhead is widely distributed within its range, and is found in three distinct habitats during their lives. These turtles may be found hundreds of miles out in the open-ocean, in neritic (nearshore) areas, or on coastal beaches. In North Carolina, this species has been observed in every coastal county. Loggerheads occasionally nest on North Carolina beaches, and are the most common of all the sea turtles that visit the North Carolina coast. They nest nocturnally, at two to three year intervals, between May and September on isolated beaches that are characterized by fine-grained sediments. In nearshore areas, loggerheads have been observed in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and shipwrecks are often used as foraging areas (NatureServe, 2007; NOAA, 2008; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT; ER2 – NO EFFECT

The project may affect the loggerhead sea turtle because:

- Beaches within the action area are used for nesting habitat. No nests were found during 2010; however, there have been five nests recorded between 2006 and 2009 (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).

- Of the sea turtles occurring in the action area, the occurrence of the loggerhead sea turtle is the most likely. Since 2006, 47 strandings have been recorded from the stretch of beach north of Corolla to the Virginia Line, three of which were still alive (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, March 31, 2010).

The project is not likely to adversely affect the loggerhead sea turtle because:

- All sea turtle nests found north of Corolla are roped off to mark locations and offer protection from vehicular traffic on the beach. Nests are also moved (up the beach slope) if in danger of washing out or at risk from other reasonable dangers (personal communication, Karen Clark, Program Coordinator, Outer Banks Center for Wildlife Education, NCWRC, April 18, 2010).

- Potential increases in beach driving cannot be quantified because there is no prior or existing enumeration of beach driving in this area. However, no expansion of the area used for beach driving would occur in the action area as a result of the Preferred Alternative because all beaches that could be affected by increased beach driving are currently open for vehicle use, and are used between the foreshore and the dune line whether for driving or parking. Given this and that current beach driving volumes are considered notable, as opposed to minor, by those concerned with the impact of beach driving, the potential increases in beach driving would not likely create a new or increased danger for sea turtle nests.

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT

The project may affect the loggerhead sea turtle because:

- Currituck Sound provides potential foraging habitat for the loggerhead sea turtle because of the abundance of SAV found in the action area.

- In-water work such as pile placement may cause turbidity and siltation which could cause loggerhead sea turtles to avoid these areas of the sound during construction, thereby leading to a reduction in foraging habitat; however, minimization measures to reduce these impacts to the sound would be in place (see Section 1.3 for a list of these measures).

The project is not likely to adversely affect the loggerhead sea turtle because:

- No nesting, mating, or critical habitat occurs within the action area.
- The occurrence of all sea turtles, including the loggerhead sea turtle, in Currituck Sound is rare, and there are no published records of living individuals from these waters within the action area (NCNHP). However, there is one known unofficial sighting of a loggerhead sea turtle in Currituck Sound (personal communication, Joanne McNeill, Fisheries Biologist, NMFS, December 8, 2010). In addition, unpublished NCWRC stranding data indicates there have been three loggerhead sea turtle strandings in the Currituck Sound area in the last ten years (2000 to 2010) (personal communication, Matthew Godfrey, Sea Turtle Biologist, NCWRC, December 8, 2010).
- Loggerhead sea turtles exhibit a mostly pelagic life history; however, when utilizing bays or sounds for foraging, a viable entry point is needed. Currituck Sound is a significant distance from ocean entry points, the closest being Oregon Inlet (25 miles).
- Currituck Sound was exempted from recent gill net restrictions for internal coastal waters (rule 15A NCAC 03J.0103). Details of exempt waters are in proclamation M-2-2011 issued by NCDENR-DMF. This rule was implemented to reduce or eliminate incidental take of endangered species, primarily sea turtles. Currituck Sound was exempted from these new restrictions because of lack of interaction of sea turtles based on NCDENR-DMF observer data and fisheries independent gill net surveys (personal communication, Red Mundin, Assistant to the NCDENR-DMF Director and Protected Species Specialist, NCDENR-DMF, January 13, 2011).
- If present, the response to construction and operation-related impacts would be avoidance.

Shortnose sturgeon

USFWS optimal survey window: surveys not required; assume presence in appropriate waters

Habitat Description: Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. The species prefers the nearshore marine, estuarine, and riverine habitats of large river systems. It is an anadromous species that migrates to faster-moving freshwater areas to spawn in the spring, but spends most of its life within close proximity of the river’s mouth. Large freshwater rivers that are unobstructed by dams or pollutants are imperative to successful reproduction. Distribution information by river/waterbody is lacking for the rivers of North Carolina; however, records are known from most coastal counties (NatureServe, 2007; NOAA; 2008; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NA

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT

The project may affect the shortnose sturgeon because:

- The estuarine waters, soft-bottom substrate, and extensive SAV beds in Currituck Sound provide potential foraging habitat for the shortnose sturgeon.
- The presence of a bridge across the sound could result in a decrease in benthic invertebrate food sources near the bridge structure.

The project is not likely to adversely affect the shortnose sturgeon because:

- No spawning or critical habitat occurs within the action area.
- This species was most recently observed in the area of Batchelor Bay in Albemarle Sound in 1998 (NCNHP, 2008); however, there are no known records of this species occurring within Currituck Sound.
- Any occurrence of this species within the action area would likely be short-term and in conjunction with annual spring migrations.
- If present, the response to construction and operation-related impacts would be avoidance.

Seabeach amaranth

USFWS optimal survey window: July through October

Habitat Description: Seabeach amaranth occurs on barrier island beaches where its primary habitats consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of noneroding beaches (landward of the wrack line). In rare situations, this annual is found on sand spits 160 feet or more from the base of the nearest foredune. It occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, interdunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. The plant's habitat is sparsely vegetated with annual herbs (forbs) and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. It is intolerant of vegetative competition and does not occur on well-vegetated sites. The species usually is found growing on a nearly pure silica sand substrate, occasionally with shell fragments mixed-in. Seabeach amaranth appears to require extensive areas of barrier island beaches and inlets that function in a relatively natural and dynamic manner. These characteristics allow it to move around in the landscape, occupying suitable habitat as it becomes available (NCNHP, 2001; Schafale and Weakley, 1990; USFWS, 1996; USFWS, 2006; USFWS, 2008a).

USFWS Biological Conclusion: MCB2, MCB4, Preferred Alternative, and ER2 – NO EFFECT

The project would not affect the seabeach amaranth because:

- No records of this species have been identified in ten or more years within the CNWR (personal communication, Mike Hoff, CNWR Manager, USFWS, March 30, 2011).
- The last record of this species was in 1988 in the Swan Island Natural Area, near the southern boundary of the northern unit of CNWR on the Outer Banks (NCNHP, 2008).
- This species requires extensive areas of barrier island beaches and inlets that function in a relatively natural and dynamic manner, allowing it to move around and colonize sparsely vegetated sand.

NMFS Biological Conclusion: MCB2, MCB4, and Preferred Alternative – NA

5.8 Bald Eagle and Golden Eagle Protection Act

The bald eagle was removed from the endangered species list in 2007, but it remains protected under the Bald Eagle and Golden Eagle Protection Act and the Migratory Bird Treaty. Habitat for nesting bald eagles primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are utilized for nesting sites, typically within 1.0 mile of open water. Suitable nesting habitat exists throughout the area, but primarily in association with the shorelines of Currituck Sound and North River, as well as within Maple Swamp. Surveys conducted by NCWRC show three nests within 2.5 miles of the project area (personal communication, David Allen, Coastal Wildlife Diversity Supervisor, NCWRC, February 4, 2009, and January 26, 2011).

One bald eagle nest occurs approximately 2.3 miles south of the proposed bridge corridor on the western shore of Currituck Sound, near the Poplar Branch community. This nest was last active in 2007. It is possible the nesting pair built a new nest in the same vicinity in 2008 and may have been active in 2010, but this has not been verified. Data show that nesting eagle pairs often build new nests in proximity to old nests. The second nest is an active nest located approximately 1.8 miles south of the project area in Dare County on the northern side of Kitty Hawk Bay (see Figure 7 in Appendix A). In 2006 and 2007, a pair of eagles also had a nest located in the same area, but approximately 0.5 mile further to the south (personal communication, David Allen, Coastal Wildlife Diversity Supervisor, NCWRC, February 4, 2009). The third nest is approximately two miles north of the proposed Outer Banks landing site for the Preferred Alternative's revised C1 bridge corridor, near the Corolla Lighthouse (personal communication, David Allen, Coastal Wildlife Diversity Supervisor, NCWRC, January 26, 2011).

Several eagles were observed foraging within the project area over Currituck Sound during field work; however, the presence of vast waterbodies throughout the area and the lack of significant impacts to fishery food sources make disturbance to foraging eagles unlikely. Because nest sites vary from year to year and the potential for nesting eagles is present throughout the area, construction and/or clearing activity for the detailed study alternatives, including the Preferred Alternative, would have the potential to disturb future nest sites if they occur in close proximity to these activities. However, provided future nest locations are similar to recent nest sites, the presence of the detailed study alternatives, including construction activities, would be unlikely to adversely affect this species. All construction will follow USFWS guidelines for the protection of eagles as described in the *National Bald Eagle Management Guidelines* (USFWS, 2007).

5.9 Endangered Species Act Candidate Species

Seven species occurring in North Carolina are identified by USFWS as "candidate" species (USFWS, 2009). These species are not protected by federal law, but may be elevated to listed status in the near future.

The only candidate species with the potential to occur in the project area is the red knot (*Calidris canutus rufa*). The red knot is a highly migratory shorebird that regularly uses coastal beaches, inlets, and mudflats for foraging and nesting. Although they strongly prefer coastal surf and tidal areas, this species could visit soundside mudflats when the habitat is available during spring and fall migration. The red knot frequents coastal beaches of Currituck and Dare counties during spring and fall migrations and has been documented in the vicinity of the project area (Parnell et al., 1987). Because of the irregular occurrence of appropriate habitat (exposed mudflats) within the project area, the presence of the detailed study alternatives, including the Preferred Alternative, including construction activities, would be unlikely to affect the red knot. None of the remaining candidate species have been documented in Currituck or Dare counties.

5.10 Coastal Zone Issues

5.10.1 Coastal Area Management Act Areas of Environmental Concern

The North Carolina Coastal Resources Commission, through its staff at NCDENR-DCM, regulates the state's Coastal Area Management Act (CAMA), Dredge and Fill Law, and the federal Coastal Zone Management Act of 1972. It issues CAMA permits for development in Areas of Environmental Concern (AEC). Four types of AEC occur within the project area: coastal wetlands, estuarine waters, coastal shorelines, and public trust waters. The shorelines and waters of Currituck Sound, as well as the wetland freshwater marsh communities found within the project area, are all considered AEC under CAMA. This also includes Jean Guite Creek, which is a PNA. In addition, Jean Guite Creek, Currituck Sound, and the AIWW are considered public trust waters that fall under CAMA jurisdiction. Within the project area, Currituck Sound comprises approximately 3,900 acres, Jean Guite Creek comprises approximately 0.5 acre, and the AIWW approximately 1.9 acres.

While a formal CAMA delineation has not been conducted for the Preferred Alternative, CAMA coastal wetlands occur within the approximately 100 acres of wetland freshwater marsh community within the project area. All mapped communities were mapped via aerial photographs and confirmed during field investigations (see Appendix A, Figure 6). Stephen Lane with NCDENR-DCM verified all CAMA AEC within the project area in the field on November 30 and December 1, 2010. The estuarine shorelines within the project area are considered coastal and not inland shorelines because they fall under joint responsibility of NCDENR-DMF and NCWRC. Coastal shoreline areas (including a 75-foot offset from the normal high water level of estuarine waters and a 30-foot offset from the normal high water level of inland public trust waters) have not been quantified in the project area and are not included in the impact analysis. A CAMA major permit would be required for all of the detailed study alternatives, including the Preferred Alternative. A summary of impacts to CAMA areas (excluding coastal shorelines) that would occur for each detailed study alternative, including the Preferred Alternative, is shown in Table 17. Option A and B would result in the same CAMA impacts given that the differences in the options occur in Maple Swamp where there are no impacts to CAMA AEC. The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane on mainland US 158. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. There is no difference, or less than an acre of difference, in CAMA wetlands impacts with or without including construction of a third outbound lane on mainland US 158 for hurricane evacuation.

No CAMA wetlands would be affected by shading with ER2, MCB2/C1, MCB4/C1, or the Preferred Alternative. With bridge corridor C2 for both MCB2 and MCB4, 0.6 acre of CAMA wetland (also a CAMA AEC) would be shaded. This is part of the 1.4 acres

Table 17. Summary of Impacts to CAMA Jurisdictional Areas by Detailed Study Alternative

Type of Impact[1]	ER2 (acres)	MCB2/C1 (acres)	MCB2/C2 (acres)	MCB4/C1 (acres)	MCB4/C2 (acres)	Preferred Alternative (acres)
CAMA Wetlands[2]						
Fill	0.7	0.7	0.7	0.0	0.0	0.0
Pilings	0.0	0.0	0.0	0.0	0.0	0.0
Clearing	0.0	0.0	1.4	0.0	1.4	0.0
Total Permanent Impacts	0.7	0.7	2.2	0.0	0.0	0.0
Temporary	0.0	0.0	0.0	0.0	0.0	0.0
Total Wetland Impacts	0.7	0.7	2.2	0.0	1.4	0.0
CAMA AEC[3]						
Fill	0.9 (0.8)	0.9	0.9	0.0	0.0	0.0
Pilings	0.0	0.1	0.2	0.1	0.2	0.1
Clearing	0.0	0.0	1.5	0.0	1.5	0.0
Total Permanent Impacts	0.9 (0.8)	1.0	2.5	0.1	1.6	0.1
Temporary	0.0	0.0	0.0	0.0	0.0	0.0
Total CAMA AEC Impacts	0.9 (0.8)	1.0	2.5	0.1	1.6	0.1

Note: The numbers in parentheses reflect the impact if reversing the center turn lane is used to reduce hurricane evacuation clearance times rather than constructing a third outbound lane. When there is no number in parentheses, the impact would be identical for either hurricane evacuation option. Also, the numbers in this table were rounded to the nearest tenth, so minor rounding error exists when adding the individual numbers to get the totals.

[1] Coastal shoreline impacts are not included in these totals.

[2] Equivalent to the wetland freshwater marsh biotic community.

[3] Includes CAMA wetlands, Currituck Sound, and Jean Guite Creek.

indicated as cleared. In terms of shading impacts on CAMA AEC, ER2 and MCB2 would shade 0.1 acre of Jean Guite Creek, and MCB2, MCB4, and the Preferred Alternative would shade 27.8 to 29.1 acres of Currituck Sound.

The greatest impacts to CAMA wetlands and CAMA AEC would occur with MCB2/C2, followed by MCB4/C2, with and without the hurricane evacuation lane on mainland US 158. The Preferred Alternative would not impact any CAMA wetlands (freshwater marsh).

5.10.2 Essential Fish Habitat (EFH)

The Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq.) requires the US Secretary of Commerce to develop guidelines assisting regional fisheries management councils in the identification and creation of management and conservation plans for EFH. Each council is required to amend existing fisheries management plans (FMPs) to include EFH designations and conservation requirements. NMFS, SAFMC, and MAFMC currently manage eight fish species that are known to occur within the project area (MAFMC, 2008; SAFMC, 2008), as shown in Table 18. These agencies have identified the SAV beds, intertidal flats, palustrine emergent and forested wetlands, aquatic bed (tidal freshwater), and estuarine water column of Currituck Sound as EFH for these species. However, the palustrine emergent and forested wetlands affected by MCB4/C1 and the Preferred Alternative are not accessible by fish and so are not considered EFH. Jean Guite Creek (a PNA) is also designated as EFH. Table 18 also lists the life stages for the managed fish species known to occur in the project area. A summary of the approximate amount of permanent impacts to EFH that would occur with each of the DEIS detailed study alternatives is shown in Table 19, and the same information is shown for the Preferred Alternative in Table 20. Removal of the hurricane evacuation lane on US 158 and differences between Option A and B do not affect impacts to EFH areas. A more detailed analysis of EFH and managed species in the project area can be found in the *Essential Fish Habitat Technical Report* (CZR Incorporated, 2009), and for the Preferred Alternative in the revised *Essential Fish Habitat Technical Report* (CZR Incorporated, 2011).

Table 18. Managed Fish Species Known to Occur in the Project Area

Species	Life Stages Present in Project Area
Black sea bass[1] (*Centropristis striata*)	Larvae, juveniles, adults
Bluefish (*Pomatomus saltatrix*)	Juveniles, adults
Butterfish (*Peprilus triacanthus*)	Eggs, larvae, juveniles, adults
Summer flounder (*Paralichthys dentatus*)	Larvae, juveniles, adults
Penaeid and rock shrimp (*Penaeus* sp. & *Sicyonia* sp.)	Larvae, juveniles, adults
Spanish mackerel[2] (*Scomberomorus maculatus*)	Larvae, juveniles, adults
Red grouper[1] (*Epinephelus morio*)	Larvae, juveniles, adults
Atlantic spadefish[1] (*Chaetodipterus faber*)	Larvae, juveniles, adults

Source: MAFMC, 2008; SAFMC, 2008

[1] Included in the Snapper Grouper Management Unit by the SAFMC.

[2] Included in the Coastal Migratory Pelagic Unit by the SAFMC.

Table 19. Permanent Impacts to Essential Fish Habitat by DEIS Detailed Study Alternative

Community[1]	ER2 (acres)				MCB2/C1 (acres)				MCB2/C2 (acres)				MCB4/C1 (acres)				MCB4/C2 (acres)			
	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing	Fill	Pilings	Shading	Clearing
Palustrine forested wetland	1.0	0.0	0.0	0.0	1.0	0.0	0.2	0.0	1.0	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.8
Palustrine emergent wetland	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4
Aquatic bottom (tidal freshwater) (total[2]/≤6 feet)	0.1/0.1	0.0/0.0	0.1/0.1	0.0/0.0	0.1/0.1	0.1/0.0	28.1/12.3	0.0/0.0	0.1/0.1	0.1/0.0	29.1/13.3	0.0/0.0	0.0/0.0	0.1/0.0	28.1/12.3	0.0/0.0	0.0/0.0	0.1/0.0	29.1/13.3	0.0/0.0
TOTAL EFH IMPACT[3]	1.8	0.0	0.1	0.0	1.8	0.1	28.3	0.0	1.8	0.1	30.6	3.2	0.0	0.1	28.1	0.0	0.0	0.1	30.6	3.2
Primary nursery areas[4] (acres/linear ft)	0.0/0.0	0.0/0.0	0.0 36.0	0.0/0.0	0.0/0.0	0.0/0.0	0.0/36.0	0.0/0.0	0.0/0.0	0.0/0.0	0.0/36.0	0.0/0.0	0.0/0.0	0.0/5.0	0.0/18	0.0/0.0	0.0/0.0	0.0/5.0	0.0/18	0.0/0.0
• SAV beds (existing)	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0	0.0	0.0	4.3	0.0	0.0	0.0	5.5	0.0
• Areas <4 feet deep (potential SAV habitat) (acres)	0.1	0.0	0.1	0.0	0.1	0.0	3.1	0.0	0.1	0.0	6.4	0.0	0.0	0.0	3.1	0.0	0.0	0.0	6.4	0.0
• Areas 4-6 feet deep (potential SAV habitat) (acres)	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	1.4	0.0	0.0	0.0	4.9	0.0	0.0	0.0	1.4	0.0
• Areas >6 feet deep (unsuitable SAV habitat) (acres)	0.0	0.0	0.0	0.0	0.0	0.1	15.7	0.0	0.0	0.1	15.8	0.0	0.0	0.1	15.7	0.0	0.0	0.1	15.8	0.0
SAV Habitat[5]	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	6.5	0.0	0.0	0.0	4.9	0.0	0.0	0.0	6.5	0.0

Note: Impacts are the same with and without construction of a third outbound land on mainland US 158 for hurricane evacuation.

[1] Communities that have not been mapped include intertidal flats and oyster reef/shell bank.

[2] Includes all SAV sub-categories and is equivalent to estuarine water column (volume not calculated).

[3] Includes palustrine forested wetland, palustrine emergent wetland, and aquatic bottom.

[4] Area in association with Jean Guite Creek (<0.05 acre) and already included in areas <4 feet deep (potential SAV habitat) totals, which are included in Total EFH Impact.

[5] SAV habitat as defined by NCMFC is currently vegetated with one or more appropriate SAV species, or has been vegetated by one or more species within the past 10 annual growing seasons, and meets the average growing conditions needed (water depth of 6 feet or less, average light availability [Secchi depth of 1 foot or more], and limited wave exposure). Available data for 2000 to 2010 is from 2003, 2006, 2007, and 2010 (see Figure 8 in Appendix A).

Table 20. Permanent Impacts to Essential Fish Habitat by the Preferred Alternative

Community[1]	Fill	Pilings	Shading	Clearing
Palustrine forested wetland (acres)	0.0	0.0	0.0	0.0
Palustrine emergent wetland (acres)	0.0	0.0	0.0	0.0
Aquatic bottom (tidal freshwater) (total[2]/≤6 feet) (acres)	0.0/0.0	0.1/0.0	27.8/8.7	0.0/0.0
TOTAL EFH IMPACT[3] (acres)	0.0	0.1	27.8	0.0
Primary nursery areas[4] (acres/linear feet)	0.0/0.0	0.0/0.0	0.0/0.0	0.0/0.0
SAV Communities				
• SAV beds (existing)[5] (acres)	0.0	0.0	3.8	0.0
• Areas <4 feet deep (potential SAV habitat) (acres)	0.0	0.0	2.0	0.0
• Areas 4-6 feet deep (potential SAV habitat) (acres)	0.0	0.0	2.9	0.0
• Areas >6 feet deep (unsuitable SAV habitat) (acres)	0.0	0.1	19.1	0.0
SAV Habitat[6]	0.0	0.0	4.8	0.0

[1] Communities that have not been mapped include intertidal flats and oyster reef/shell bank.

[2] Includes all SAV community sub-categories and is equivalent to estuarine water column (volume not calculated).

[3] Includes palustrine forested wetland, palustrine emergent wetland, and aquatic bottom.

[4] Jean Guite Creek is the only state-designated fish nursery/spawning area (primary, secondary, or anadromous spawning area) in the project area, but it is not crossed by the Preferred Alternative.

[5] Based on Luczkovich, 2010.

[6] SAV habitat as defined by NCMFC is currently vegetated with one or more appropriate SAV species, or has been vegetated by one or more species within the past 10 annual growing seasons, and meets the average growing conditions needed (water depth of 6 feet or less, average light availability [Secchi depth of 1 foot or more], and limited wave exposure). Available data for 2000 to 2010 is from 2003, 2006, 2007, and 2010 (see Figure 8 in Appendix A).

5.10.2.1 Findings

MCB4 and the Preferred Alternative would avoid the construction of drainage easements in several EFH areas that are associated with road widening for ER2 and MCB2. The Preferred Alternative's revised C1 bridge corridor avoids all wetlands at the Outer Banks and mainland landing sites. The temporary negative impacts to water quality associated with bridge construction would be somewhat reduced by the shorter length of the Preferred Alternative's revised C1 bridge corridor over the sound when compared to the C2 bridge corridor (and the DEIS C1 corridor). When considering permanent loss (fill and pile impacts) of EFH with all of the detailed study alternatives, the area affected from greatest to least would be: MCB2/C2 (2.0 acres), MCB2/C1 (1.9

acres), ER2 (1.8 acres), MCB4/C2 (0.2 acre), and MCB4/C1 and the Preferred Alternative (0.1 acre). The C1 bridge corridor with the Preferred Alternative would shade 3.8 acres of existing SAV beds and 4.8 acres of SAV habitat (including the 3.8 acres of existing beds), compared to shading 5.5 acres of existing SAV beds and 6.5 acres of SAV habitat (including the 5.5 acres of existing beds) with the C2 bridge corridor. For these reasons, the Preferred Alternative would have the least potential for affecting EFH.

Permanent loss or alteration of palustrine emergent and forested areas, SAV habitat (including existing beds), intertidal flats, and tidal freshwater aquatic bed would result directly from shading and pile placement with the bridge structure associated with MCB2, MCB4/C2, and, except for palustrine emergent and forested areas, MCB4/C1, and the Preferred Alternative. In addition, ER2 and MCB2 would involve permanent loss of palustrine emergent and forested areas through the construction of permanent drainage easements at scattered locations on the Outer Banks between NC 12 and Currituck Sound, and also result in increased shading of Jean Guite Creek (a PNA and potential SAV habitat).

Addition of a hurricane evacuation lane to the existing bridge across Jean Guite Creek with MCB4 would result in less than 0.1 acre of shading and piling impact. However, with the Preferred Alternative, no work is proposed over the creek. If US 158 is widened across Jean Guite Creek with ER2 or MCB2, an even smaller amount of additional shading would occur.

The presence of the bridge and pile placement also could result in several additional impacts, including changes to water flow, light levels, habitat structure, and water quality of the area below the bridge and for some distance surrounding the bridge. The effect on water flow would be minimal and insignificant. Shading likely would have less of an effect on EFH with the Preferred Alternative’s revised C1 bridge corridor than with the C1 and C2 bridge corridors because it is shorter. Altered light levels and the introduction of piles as a hard substrate previously unavailable in the area would have multiple effects, thereby resulting in changes to the existing food web structure. Decreased autotrophic productivity (phytoplankton and aquatic vegetation) resulting from lower light levels could result in decreased abundances of aquatic vegetative habitat (including SAV beds), heterotrophic grazers, and predators (zooplankton, benthic invertebrates, and fish) near the Mid-Currituck Bridge.

On the other hand, organisms could be attracted to bridge pilings as a shallow reef-like structure, based on the assumption that the addition of the piles would be similar to the addition of oil platforms and piers (Davis et al., 1982; Stanley and Wilson, 2000; Nelson, 2003; Clynick et al., 2007). In the very least, the piles would likely provide additional habitat for structure-oriented organisms already present in the sound such as sessile invertebrates and red drum. The construction, traffic, operations and maintenance, and runoff associated with the Mid-Currituck Bridge would introduce an additional source of pollution to the sound where none currently exists. These pollutants include, but are not limited to, particulates, organic compounds, nutrients, and heavy metals.

The temporary effects to EFH of bridge pile placement and other bottom disturbance with MCB2, MCB4, and the Preferred Alternative would be a short-term increase in noise, turbidity, benthic disturbance (including sediment removal), and siltation. Suspended fine sediments would settle and could result in burial of organisms and/or sediment drift which, depending on the currents, could spread outside the direct impact area. The result would be short-term adverse effects from bridge construction on biota and managed species that use benthic habitats. Benthic organisms are expected to recover quickly after construction ceases and other organisms also are expected to re-colonize the area afterwards. Construction activities associated with permanent drainage easements and road-widening for all of the detailed study alternatives, including the Preferred Alternative, would result in short-term impacts to water quality if runoff entered the sound.

Preventative measures would be implemented in terrestrial construction areas, thus greatly reducing runoff (and associated increases in turbidity and sedimentation) into EFH areas. Turbidity and siltation would be minimized for in-water work with the planned use of turbidity curtains and shrouds in SAV habitat (including existing beds) as defined by NCMFC, as well as when necessary in potential SAV habitat. Also, piles would be driven, not jetted, which is more precise and generates less disturbance than jetting. Finally, no in-water work (bottom-disturbing activities) in SAV habitat (including existing beds) would occur from approximately February 15 through September 30 as a result of an anticipated agency-required moratorium. See Section 5.6.2 for additional details on SAV mitigation.

5.10.2.2 Conclusion

The detailed study alternatives, including the Preferred Alternative, likely would result in non-substantial short-term and long-term adverse effects to EFH and managed species, but measures under consideration would reduce those impacts to a minimum. Consequently, the detailed study alternatives, including the Preferred Alternative, would not have a *substantia*l long-term adverse impact on EFH or managed species for the following reasons:

- With all of the detailed study alternatives, including the Preferred Alternative, fill and pile impacts resulting in the permanent loss of EFH would be small at 0.1 to 2.0 acres. Clearing impacts also would be small at 0.0 to 3.2 acres. There would be no fill or clearing impacts to EFH with the Preferred Alternative.

- A Mid-Currituck Bridge would shade from 27.8 to 30.6 acres of EFH, depending on the chosen corridor. Most of the shading would occur over Currituck Sound in waters greater than 6 feet deep, which do not provide potential habitat for SAV; furthermore, Currituck Sound is large (97,920 acres) compared to the small area that would be affected by shading. Shading would not affect fish passage. Additionally, mitigation is planned for shading impacts. A conceptual mitigation plan is included in Appendix E. Possible forms of mitigation include: coordinating NCTA efforts with the Currituck Sound Ecosystem Restoration Project led by the USACE Wilmington District; restoring SAV habitat by planting SAV and/or improving habitat; restoring/enhancing/preserving aquatic and terrestrial wetland and upland habitats adjacent to the sound, which function as buffers that help to filter pollutants from runoff before entering the sound; and implementing hard clam restoration/ enhancement projects to help improve water quality of the sound.

- With MCB2, MCB4, and the Preferred Alternative, the bridge pilings would increase habitat complexity and provide some hard structure that would potentially provide additional habitat for some managed species and forage species. Bridge pilings would only minimally affect water flow in a small area surrounding each pile.

- Temporary impacts would occur during construction, but the aquatic substrate generally would be expected to recover quickly after construction. Impacts would result primarily from bottom disturbance and associated suspension of sediments, but most adult fish are mobile and would actively avoid direct impacts. Some impairment of ability of EFH managed species to find prey could occur, but this effect would be temporary and spatially limited to the immediate vicinity of construction activities. Although the direct impact on EFH managed species would be largely temporary, the extent of impact and length of the recovery time would be affected by weather and post-construction conditions. Bridge construction techniques would be evaluated during final design in order to determine the most appropriate technique for constructing structures in Currituck Sound. Final construction methods would be selected as part of the permitting process and would involve measures to reduce turbidity to a non-significant (or much reduced) level, such as driving (not jetting) piles, and in SAV habitat (including existing beds), as defined by NDMFC, and when necessary in potential SAV habitat would involve using turbidity curtains and shrouds. Pile driving and all other bottom-disturbing activities in SAV habitat (including existing beds) would only occur during times of lowered biological activity (October 1 to February 14) to further reduce the impacts of construction.

- The bridge corridor alternatives, including the Preferred Alternative, would introduce a new source of pollution (via bridge runoff) into Currituck Sound. Pollutants discharged into Currituck Sound near the bridge may not dissipate because of poor water circulation and could result in higher sediment pollutant levels and bioaccumulation near the bridge. The stormwater management plan proposed for the Preferred Alternative is described in Section 1.6. NCTA would comply with NC Session Law 2008-211 (An Act to Provide for Improvements in the Management of Stormwater in the Coastal Counties in Order to Protect Water Quality) to the maximum extent practicable for the additional impervious surface area created by this project. A final stormwater management plan for minimizing the potential impact of project pollutants would be developed in association with NCDENR-DWQ and other state and federal environmental resource and regulatory agencies during final design of the alternative selected for implementation and in the process of obtaining related permits.

- Bridge replacement and/or widening of US 158 over Jean Guite Creek (a PNA) is proposed for all of the detailed study alternatives except for the Preferred Alternative. Although some potential adverse impacts to EFH would occur during the construction phases, the impacts would be temporary and are not expected to result in substantial short-term effects on managed species because with ER2 and MCB2, a new US 158 bridge over the creek is expected to not place piles in the creek. The additional hurricane evacuation lane that could be associated with MCB4 is expected to duplicate the existing US 158's single pile foundation in the creek.

6.0 Literature Cited

6.1 Publications and Technical Reports

Bard, A. M., H. T. Smith, T. V. Harber, G. W. Stewart, J. S. Weske, M. M. Browne, and S. D. Emslie. 2001. *International conference on ecology and transportation*. Keystone, Colorado.

Borawa, J. C., J. H. Kerby, M. T. Huish, and A. W. Mullis. 1978. "Currituck Sound Fish Populations Before and After Infestation by Eurasian Water-milfoil." *Proc. An. Conf. S.E. Assoc. Fish and Wildl. Agencies*.

Brandenburg, D. M. 1996. "Effects of roads on behavior and survival of black bears in coastal North Carolina." M.S. Thesis. University of Tennessee, Knoxville.

Brody, A. J., and M. R. Pelton. 1989. "Effects of roads on black bear movements in western North Carolina." *Wildlife Society Bulletin*, 17: 5-10.

Caldwell, William S. 2001. *Hydrologic and Salinity Characteristics of Currituck Sound and Selected Tributaries in North Carolina and Virginia, 1998-1999*. US Geological Survey, Water-Resources Investigations Report 01-4097.

Clevenger, A. P., and N. Waltho. 2005. "Performance indices to identify attributes of highway crossing structures facilitating movement of large animals." Biological Conservation 121:453-464.

Clynick, B. G., M. G. Chapman, and A. J. Underwood. 2007. "Effects of Epibiota on Assemblages of Fish Associated with Urban Structures." *Marine Ecology Progress Series*, 332: 201–210.

Coffin, Alisa W. 2007. "From roadkill to road ecology: a review of the ecological effects of roads." *Journal of Transport Geography*, 15: 396-406.

Copeland, B. J. and J. Gray. 1989. "The Albemarle-Pamlico Estuarine System. A summary of the preliminary status and trends report of the Albemarle-Pamlico Estuarine Study." *Albemarle-Pamlico Estuarine Study Report 89-13B*.

Cowardin, Lewis M., Virginia Carter, Francis C. Golet, and Edward T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United State*s. US Department of the Interior, Fish and Wildlife Service Office of Biological Sciences, Washington, DC.

Cramer, P. C., and J. A. Bissonette. 2009. "Transportation Ecology and Wildlife Passages: The State of the Practice and Science of Making Roads Better for Wildlife." TR News May/June (No. 262), pp 12-19.

CZR Incorporated. 2009. *Essential Fish Habitat Technical Report*. Prepared for Parsons Brinckerhoff and the North Carolina Turnpike Authority.

CZR Incorporated. 2011. *Essential Fish Habitat Technical Report*. Prepared for Parsons Brinckerhoff and the North Carolina Turnpike Authority.

CZR Incorporated. 2010. Taxonomic Identification and General Evaluation of Aquatic Macroinvertebrate Samples associated with: Virginia Dare Bridge - Croatan Sound, Wright Memorial Bridge - Currituck Sound, and Proposed Mid Currituck Bridge Alignments - Currituck Sound. Prepared for: URS Corporation and NC Department of Transportation.

Davis, G. J. and D. F. Carey, Jr. 1981. "Trends in Submersed Macrophyte Communities of the Currituck Sound: 1977-1979." *J. Aquat. Plant Manage*. 19:3-8.

Davis, G. J. and M. M. Brinson. 1983. "Trends in Submersed Macrophyte Communities of the Currituck Sound: 1909-1979." *J. Aquat. Plant Manage*. 21:83-87.

Davis, N., G. R. Van Blaricom, and P. K. Dayton. 1982. "Man-Made Structures on Marine Sediments: Effects on Adjacent Benthic Communities." *Marine Biology*, 70: 295-303.

Donaldson, B. M. 2005. "The use of highway underpasses by large mammals in Virginia and factors influencing their effectiveness." Virginia Transportation Research Council. Final Report for VTRC 06-R2. 34pp.

Earley, L. S. 1993. "End of an Era Part I: Paradise Lost?" *Wildlife in North Carolina.* June.

Ellis, B. O. 2009. Year Five (Final) Submersed Aquatic Vegetation Survey, Currituck Sound, Whalehead Bay-Currituck Heritage Park. Memorandum to John Hennessy, Environmental Supervisor, National Park Service, Assistance and Compliance Oversight Unit.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1.* US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Erwin, M. E., J. E. Spendelow, P. H. Geissler, and B. K. Williams. 1987. Relationships between nesting populations of wading birds and habitat features along the Atlantic coast. In W. R. Whitman and W. H. Meredith (eds): Waterfowl and wetlands symposium; proceedings of a symposium on waterfowl and wetland management in the coastal zone of the Atlantic flyway. Delaware Department of Natural Resources and Environmental Control, Dover, Delaware. 552 pp.

Erwin, M. E. and J. E. Spendelow. 1991. Colonial wading birds; herons and egrets. Pp. 19-1 through 19-14 *in* S. L. Funderburk, S. J. Jordan, J. A. Mihursky, and D. Riley (eds.) Habitat Requirements for Chesapeake Bay Living Resources. Habitat Objectives Workgroup, Chesapeake Bay Research Consortium, Inc. Solomons, Maryland.

Ferguson, R.L., and L.L. Wood. 1994. *Rooted Vascular Beds in the Albemarle-Pamlico Estuarine System*. US Environmental Protection Agency, National Estuary Program, NC Department of Environment, Health, and Natural Resources. Report No. 94-02.

Fernández-Juricic, E. J., M. D. Jimenez, and E. Lucas. 2001. Alert distance as an alternative measure of bird tolerance to human disturbance: implications for park design. *Environmental Conservation* 28:263-269.

Findlay, C.S., and J. Bourdages. 2000. "Response time of wetland biodiversity to road construction on adjacent lands." Conservation Biology 14(1):86-94.

Forman, R.T.T, and L.E. Alexander. 1998. "Roads and their major ecological effects." *Annual Review of Ecology and Systematics*, 29: 207-231.

Frost, Cecil C., Harry E. LeGrand, and Richard E. Schneider. 1990. *Regional Inventory for Critical Natural Areas, Wetland Ecosystems, and Endangered Species Habitats of the Albemarle-Pamlico Estuarine Region: Phase 1.* North Carolina Natural Heritage Program.

Hanson, J., M. Helvey, and Russ Strach. 2004. *Non-Fishing Impacts to Essential Fish Habitat and Recommended Conservation Measures*. National Marine Fisheries Service (NOAA Fisheries), Version 1. Southwest Region, Long Beach, California.

Hellgren, E. C. and M. R. Vaughan. 1987. Home range and movements of winter active black bears in Great Dismal Swamp. Bears: Their Biology and Management. Volume 7:227-234. International Association of Bear Research and Management.

Huijser, M.P., P. McGowen, A.P. Clevenger, and R. Ament. 2008. "Best practices manual: Wildlife-vehicle collision reduction study." Report to Congress, Federal Highway Administration, U.S. Dept. of Transportation, Washington, DC.

Jacobson, S. L. 2005. Mitigation Measures for Highway Impacts to Birds. USDA Forest Service General Technical Report PSW-GTR 191.

Jones, E. R. 2008. "The effectiveness of wildlife crossing structures for black bears in Madison County, NC." Master's thesis, NC State University.

Kaseloo, P. A. and K. O. Tyson. September 2004. *Synthesis of Noise Effects on Wildlife Populations*. Publication No. FHWA-HEP-06-016. Prepared for FHWA.

Kornegay, J. W. 1989. *Currituck Sound Fish Population Survey. Final Report. Federal Aid in Fish Restoration Project F-22-14*. North Carolina Wildlife Resources Commission.

Lee, D. S., and J. F. Parnell. 1990. *Endangered, threatened, and rare fauna of North Carolina, Part III, a re-evaluation of birds*. Occasional papers of the North Carolina Biological Survey.

Lopazanski, M. J., J. P. Evans, and R. E. Shaw. 1988. *An Assessment of Maritime Forest Resources on the North Carolina Coast.* Division of Coastal Management, NC Department of Natural Resources and Community Development.

Lovallo, M. J. and E. M. Anderson. 1996. "Bobcat movements and home ranges relative to roads in Wisconsin." *Wildlife Society Bulletin*, 24: 71-76.

Luczkovich, J. J. 2010. *Survey of the Submerged Aquatic Vegetation in the Proposed Alignment for the Mid-Currituck Bridge*. A report to the North Carolina Turnpike Authority.

Manville, Albert M., II. 2005. Tall Structures: Best Management Practices for Bird-friendly Tall Buildings, Towers, and Bridges – U.S. Fish & Wildlife Service Recommendations to Address the Problems. Presentation at the Conference on Birds and Buildings: Creating a Safer Environment, Illinois Institute of Technology, Chicago. Available: http://www.birdsandbuildings.org/docs /AlManvilleTallStructures.pdf.

Martin, T. E., and D. M. Finch (EDS.). 1995. "Ecology and Management of Neotropical Migratory Birds: a Synthesis and Review of Critical Issues." *Oxford University Press*, New York, New York.

Matta, J. 1977. *Beach Fauna Study of the CERC Field Research Facility, Duck, North Carolina. Miscellaneous Report No. 77-6*. US Army Corps of Engineers. Fort Belvoir, Virginia.

Mumme, L. R., J. S. Schoech, E. G. Woolfenden, and W. J. Fitzpatrick. 2000. "Life and death in the fast lane: demographic consequences of road mortality in the Florida scrub-jay." *Conservation Biology*, 14: 501-512.

National 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, Silver Spring, Maryland. 104 pages.

National Marine Fisheries Service. March 23, 2006. "Sea Turtle and Smalltooth Sawfish Construction Conditions."

Nelson, Peter A. 2003. "Marine fish assemblages associated with fish aggregating devices (FADs): effects of fish removal, FAD size, fouling communities, and prior recruits." *Fishery Bulletin*, 101(4): 835–850.

North American Waterfowl Management Plan, Plan Committee. 2004. *North American Waterfowl Management Plan 2004. Implementation Framework: Strengthening the Biological Foundation*. Canadian Wildlife Service, US Fish and Wildlife Service. Secretaria de Medio Ambiente y Recursos Naturales.

North Carolina Department of Environment, Health, and Natural Resources. 1994. *Currituck Sound Outstanding Resource Water Evaluation.* Division of Environmental Management, Water Quality Section (Now the NC Department of Environment and Natural Resources, Division of Water Quality). Unpublished Report.

North Carolina Department of Environment and Natural Resources, Division of Water Quality. 2006. *North Carolina's 303(d) list.*

North Carolina Department of Environment and Natural Resources, Division of Water Quality. 2008a. *Surface Water Classification*s. North Carolina Department of Environment and Natural Resources.

North Carolina Natural Heritage Program. 2001. *Guide to Federally Listed Endangered and Threatened Species of North Carolina*. Raleigh, North Carolina. 134 pp.

North Carolina Natural Heritage Program. 2005. Biennial Protection Plan: List of Significant Natural Heritage Areas.

North Carolina Watershed Restoration Program. 2002. *Watershed Restoration Plan for the Pasquotank River Basin.* NCDENR-DWQ.

Owens, L. K., and R. W. James. 1991. *Mitigation of traffic mortality of endangered brown pelicans on coastal bridges*. Transportation Research Record No. 1312, Energy and Environmental Issues, pp. 3-12.

Parnell, J. F., P. E. Hosier, D. J. Sieren, W. D. Webster, and S. Cooper. 1987. *Ecological Reconnaissance Currituck Shooting Club Property, Final Report*. September.

Parsons Brinckerhoff. 2009. *Alternatives Screening Report.* Prepared for the North Carolina Turnpike Authority.

Parsons Brinckerhoff. 2009. *Assessment of Alternatives for Treating Bridge Runoff.* Prepared for the North Carolina Turnpike Authority.

Parsons Brinckerhoff. 2010. *Mid-Currituck Bridge Project, Preliminary Assessment of Maple Swamp Groundwater System.* Prepared for the North Carolina Turnpike Authority.

Platania, S. P. and D. Lee. 1978a. *Results of a Four-week Herpetological Survey of the Coinjock Region (NC) of the Great Dismal Swamp*. North Carolina State Museum of Natural History. Raleigh, North Carolina.

Platania, S. P. and D. Lee. 1978b. *Results of a Five-week Mammal Survey of the Coinjock Region (NC) of the Great Dismal Swamp*. North Carolina State Museum of Natural History. Raleigh, North Carolina.

Radle, A. L. 2006. *The effect of noise on wildlife: a literature review*. World Forum for Acoustic Ecology (Master's Thesis), Oregon University.

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

Reijnen, R., R. Foppen, C. T. Braak, and J. Thissen. 1995. "The effects of car traffic on breeding bird populations in woodland III: reduction of density in relation to the proximity of main roads." *The Journal of Applied Ecology*, 32: 187-202.

Rich, A. C., D. S. Dobkin, and L. J. Niles. 1994. "Defining Forest Fragmentation by Corridor Width: the Influence of Narrow Forest-dividing Corridors on Forest-nesting Birds in Southern New Jersey." *Conservation Biology* 8: 1109-1121.

Rideout, R. R. 1990. *A Comprehensive Management Plan for the Currituck Sound Drainage Basin: Background Investigations*. US Environmental Protection Agency.

Riggs, S. R., J. R. Bray, R. A. Wyrick, C. R. Klingman, J. C. Hamilton, D. V. Ames, and J. S. Watson. 1993. *Sedimentation and Sediment Quality in the North Landing River, Currituck County Estuarine System, North Carolina and Virginia.* US Environmental Protection Agency, National Estuary Program, NC Department of Environment, Health, and Natural Resources. Report No. 92-22.

Schafale, M. P. and A. S. Weakley. 1990. *Classification of the Natural Communities of North Carolina, 3rd Approximation*. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program.

Schafale, M. P. 1999. *Non-riverine Hardwood Forests in North Carolina, Status and Trends.* North Carolina Natural Heritage Program.

Scott, V. E., K. E. Evans, D. R. Patton, and C. P. Stone. 1977. *Cavity-nesting Birds of North American Forests*. US Department of Agriculture, Agriculture Handbook 511.

Settle, F. H. and D. J. Schwab. 1991. Waterfowl trends in Back Bay, Virginia from 1954-1990. Pages 188-196 In H.G. Marshal and M.D. Norman (eds.). Proceedings of the Back Bay Ecological Symposium. Department of Biological Sciences, Old Dominion University. Norfolk, Virginia. 305 pages.

Sincock, J. L. 1966. *Back Bay-Currituck Sound Data Report.* Patuxent Wildlife Research Center.

Smith, Cherri. 2008. *Invasive Exotic Plants of North Carolina*. NC Department of Transportation.

Stanley, D. R. and C. A. Wilson. 2000. "Seasonal and Spatial Variation in the Biomass and Size Frequency Distribution of Fish Associated with Oil and Gas Platforms in the Northern Gulf of Mexico." *Fisheries, Reefs, and Offshore Development*. pp. 123-153. American Fisheries Society Symposium 36. Gulf of Mexico Fish and Fisheries Meeting. New Orleans, Louisiana. October 24-26, 2000.

Terborgh, J. 1989. "Where Have all the Birds Gone?" *Princeton University Press*. Princeton, New Jersey.

Thurber, J. M., R. O. Peterson, T. D. Drummer, and S. A. Thomasma. 1994. "Gray wolf response to refuge boundaries and roads in Alaska." *Wildlife Society Bulletin*, 22: 61-67.

US Army Corps of Engineers. 2007. *Currituck Sound Hydrographic and Submerged Aquatic Vegetation Survey*. Field Research Facility. Duck, North Carolina.

US Army Corps of Engineers. 2010. *Currituck Sound, North Carolina Ecosystem Restoration Feasibility Study, Feasibility Scoping Meeting Report*. Available: http://www.saw.usace.army.mil/Currituck/FSM/Currituck%20Sound%20FSM%20Report_February%202010_FINAL.pdf. Accessed: February 23, 2011.

US Fish and Wildlife Service. 1996. *Recovery Plan for Seabeach Amaranth (Amaranthus pumilius).* Rafinesque. Atlanta, Georgia.

US Fish and Wildlife Service. 2007. *National Bald Eagle Management Guidelines*.

US Fish and Wildlife Service. 2003. *Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters*. Raleigh Field Office, Raleigh, North Carolina.

Wicker, Anton M. and Keith M. Endres. 1995. "Relationship between waterfowl and American coot abundance with submersed macrophytic vegetation in Currituck Sound, North Carolina." *Estuaries*. 18:428-431.

Winslow, S. E., N. S. Sanderlin, G. W. Judy, J. H. Hawkins, B. F. Holland, Jr., C. A. Fischer, and R. A. Rulifson. 1983. *North Carolina Anadromous Fisheries Management Program, Completion Report for Project AFCS-16.* North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries.

6.2 Web Sites

Coastal Carolina Purple Martin Society. Available: www.purplemartinroost.com. Accessed: February 2011.

Insurance Institute for Highway Safety. Available: http://www.iihs.org. Accessed: August 13, 2009.

Mid-Atlantic Fishery Management Council. 2008. Fishery Management Plans. Available: http://www.mafmc.org/mid-atlantic/fmp/fmp.htm. Accessed: December and January, 2009.

National Oceanic and Atmospheric Administration. 2008. Fisheries, Office of Protected Resources. Available: http://www.nmfs.noaa.gov/pr/species/. Accessed: February, 2008.

Natural Resources Conservation Service. 2008. Soil Data Mart. US Department of Agriculture. Available: http://soildatamart.nrcs.usda.gov/. Accessed: May 5, 2008.

Natural Resources Conservation Service . 2008a. Hydric Soils List for North Carolina. US Department of Agriculture. Available: http://soils.usda.gov/use/hydric/lists /state.html. Accessed: May 5, 2008.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available: http://www.natureserve.org/explorer. Accessed: February 15 and 18, 2008.

North Carolina Department of Environment and Natural Resources, Division of Coastal Management. 2007. CAMA Handbook for Development in Coastal North

Carolina. NC Department of Environment and Natural Resources. Available: http://dcm2.enr.state.nc.us/Handbook/contents.htm. Accessed: May 22, 2008.

North Carolina Department of Environment and Natural Resources, Division of Water Quality. 2006. Basinwide Assessment Report-Pasquotank River Basin. NC Department of Environment and Natural Resources. Available: http://www.esb.enr.state.nc.us/Basinwide/PASQUOTANK2006Final.pdf. Accessed: April 29, 2008.

North Carolina Department of Environment and Natural Resources, Division of Water Quality. 2008. North Carolina Waterbodies Reports. NC Department of Environment and Natural Resources. Available: http://h2o.enr.state.nc.us/bims/reports/reportsWB.html. Accessed: May 21, 2008.

North Carolina Department of Transportation. Vegetation Management Section Maintenance Programs. North Carolina Department of Transportation. Available: http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/vegetation/maintenance. Accessed: September 23, 2011.

North Carolina Natural Heritage Program. *Lepidochelys kempii* – Atlantic Ridley. Available: http://149.168.1.196/nhp/makeMap.php?sciName=Lepidochelys%20kempii. Accessed: February 21, 2008.

North Carolina Natural Heritage Program. 1990. Executive Summary: Natural Areas of Currituck County, North Carolina. Available: http://www.ncnhp.org/Images/CurrituckSummary7_14_06.pdf. Accessed: October 19, 2007.

North Carolina Natural Heritage Program. 2006. North Carolina Natural Heritage Program List of the Rare Animal Species of North Carolina. Available: http://www.ncnhp.org/Images/2006RareAnimalList.pdf. Accessed: May 29, 2008.

North Carolina Natural Heritage Program. 2006a. North Carolina Natural Heritage Program List of the Rare Plant Species of North Carolina. Available: http://www.ncnhp.org/Images/2006RarePlantList.pdf. Accessed: May 29, 2008.

North Carolina Natural Heritage Program. 2008. Heritage Data. Available: http://www.ncnhp.org/Pages/heritagedata.html. Accessed: May 7 and December 8, 2008.

North Carolina Natural Heritage Program. 2008a. GIS data layers: Natural History Element Occurrences and Significant Natural Heritage Areas. Available: http://www.nconemap.com/default.aspx?tabid=286. Accessed: May 16 and June 5, 2008.

North Carolina Wildlife Resources Commission. 2005. North Carolina Wildlife Action Plan. Raleigh, North Carolina. Available: http://www.ncwildlife.org /pg07_WildlifeSpeciesCon/pg7c1_3.htm. Accessed: May 29, 2008.

North Carolina Wildlife Resources Commission. 2008. Wildlife Profiles: West Indian Manatee (*Trichechus manatus*). Available: http://www.ncwildlife.org /pg07_WildlifeSpeciesCon/Profiles/manateewindian.pdf. Accessed: February 18, 2008.

South Atlantic Fishery Management Council. 2008. Fishery Management Plans. Available: http://www.safmc.net/Library /FisheryManagementPlansAmendments/tabid/395/Default.aspx. Accessed: December and January, 2009.

US Fish and Wildlife Service. American alligator (*Alligator mississippiensis*). Available: http://www.fws.gov/species/species_accounts/bio_alli.html. Accessed: February 15, 2009.

US Fish and Wildlife Service. Mid-Winter Waterfowl Surveys. Available: https://migbirdapps.fws.gov/. Accessed: January 14, 2011.

US Fish and Wildlife Service. Snowy Egret Habitat Model. Available: http://www.fws .gov/r5gomp/gom/habitatstudy/metadata2/snowy_egret_model.htm. Accessed: January 27, 2011.

US Fish and Wildlife Service. 2001 to 2009. Mid-Winter Waterfowl Surveys. Available: https://migbirdapps.fws.gov/. Accessed: January 14, 2011.

US Fish and Wildlife Service. 2006. Optimal Survey Windows for North Carolina's Federally Threatened and Endangered Plant Species. Available: http://www .fws.gov/nces/es/plant_survey.html. Accessed: February 18, 2008.

US Fish and Wildlife Service. 2008. South Atlantic Migratory Bird Initiative Aerial Survey Data for Currituck National Wildlife Refuge. Available: http:// samigbird.fws.gov/sawindex.html. Accessed: December 16, 2008.

US Fish and Wildlife Service. 2008a. Threatened and Endangered Species Descriptions. Available: http://www.fws.gov/nc-es/. Accessed: January to February, 2008.

US Fish and Wildlife Service. 2011. Threatened and Endangered Species in North Carolina. Available: http://www.fws.gov/nc%2Des/es/countyfr.html. Accessed: January, 2011.

University of North Carolina. 2008. NCU Flora of the Southeast. University of North Carolina. Available: http://www.herbarium.unc.edu/seflora/firstviewer.html. Accessed: March 20, 2008.

6.3 Personal Communications

Allen, David. Coastal Wildlife Diversity Supervisor, North Carolina Wildlife Resources Commission. February 4, 2009 and January 26, 2011.

Berry, Ron. Environmental Engineer, North Carolina Department of Environment and Natural Resources, Division of Water Quality. April 28, 2008.

Cameron, Sue. North Carolina Wildlife Resources Commission. October 30, 2007.

Cluse, Wendy. Sea Turtle Biologist, North Carolina Wildlife Resources Commission. December 18, 2008.

Dockendorf, Kevin. North Carolina Wildlife Resources Commission. June 13, 2008.

Fussell, John. Author: *A Birder's Guide to Coastal Carolina*. March 30, 2008.

Godfrey, Matthew. Sea Turtle Biologist, North Carolina Wildlife Resources Commission. December 8, 2010.

Harris, David. North Carolina Department of Transportation, Roadside Environmental Unit, Roadside Erosion Control and Vegetation Management. October 21, 2010 and September 23, 2011.

Hoff, Mike. Currituck National Wildlife Refuge Manager, US Fish and Wildlife Service. March 31, 2011.

Jordan, Gary. Fish and Wildlife Biologist, US Fish and Wildlife Service. November 8, 2010.

McNeil, Joanne. Fisheries Biologist, National Oceanic and Atmospheric Administration. December 8, 2010.

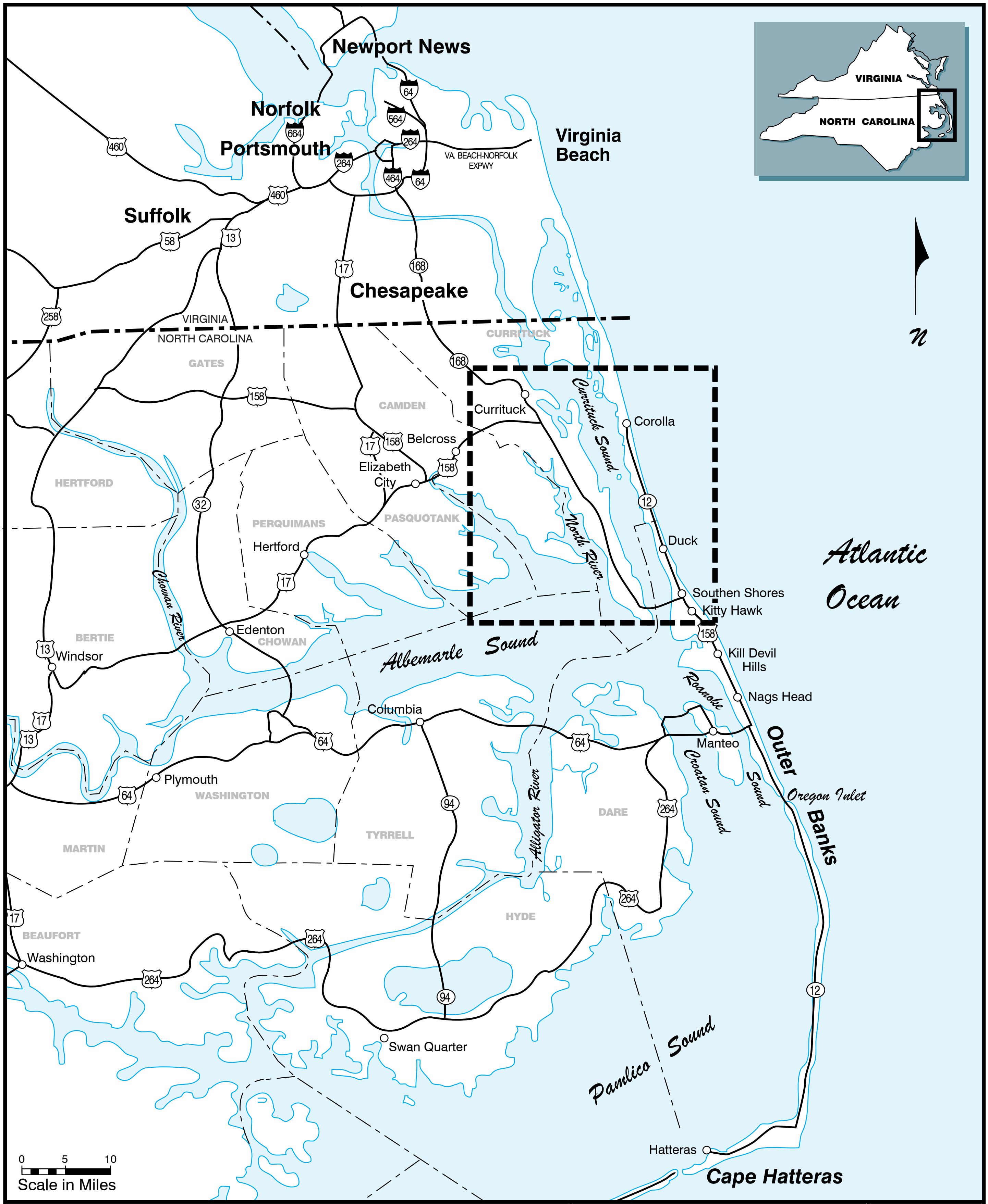
Vinzani, Gil. Environmental Engineer, North Carolina Department of Environment and Natural Resources, Division of Water Quality. April 28, 2008.

Winslow, Sara. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries. May 15, 2008.

Appendix A

Figures

A. Figures



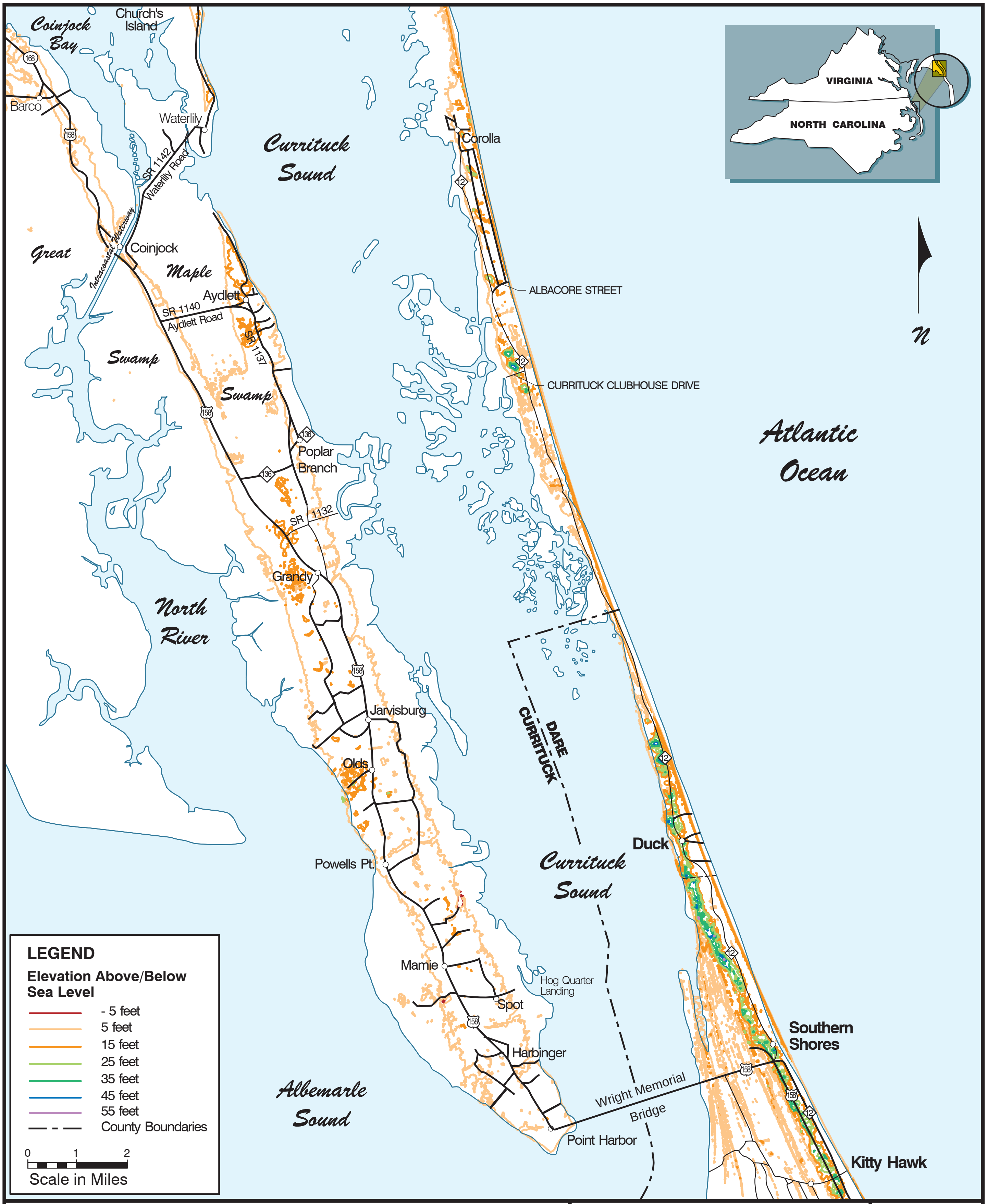
LEGEND

▭ Project Vicinity

Vicinity Map

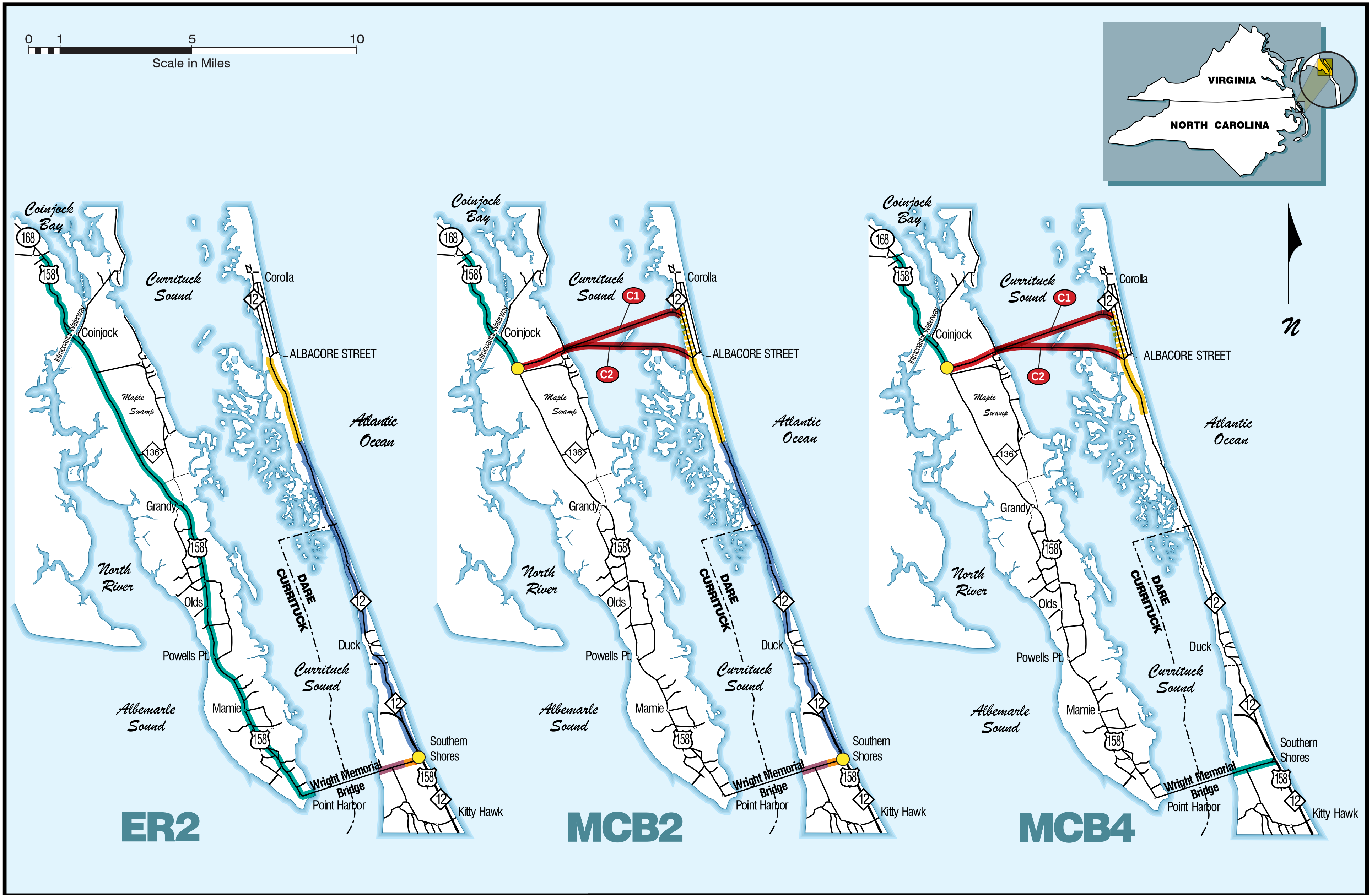
Figure

1



Project Area Map

Figure
2



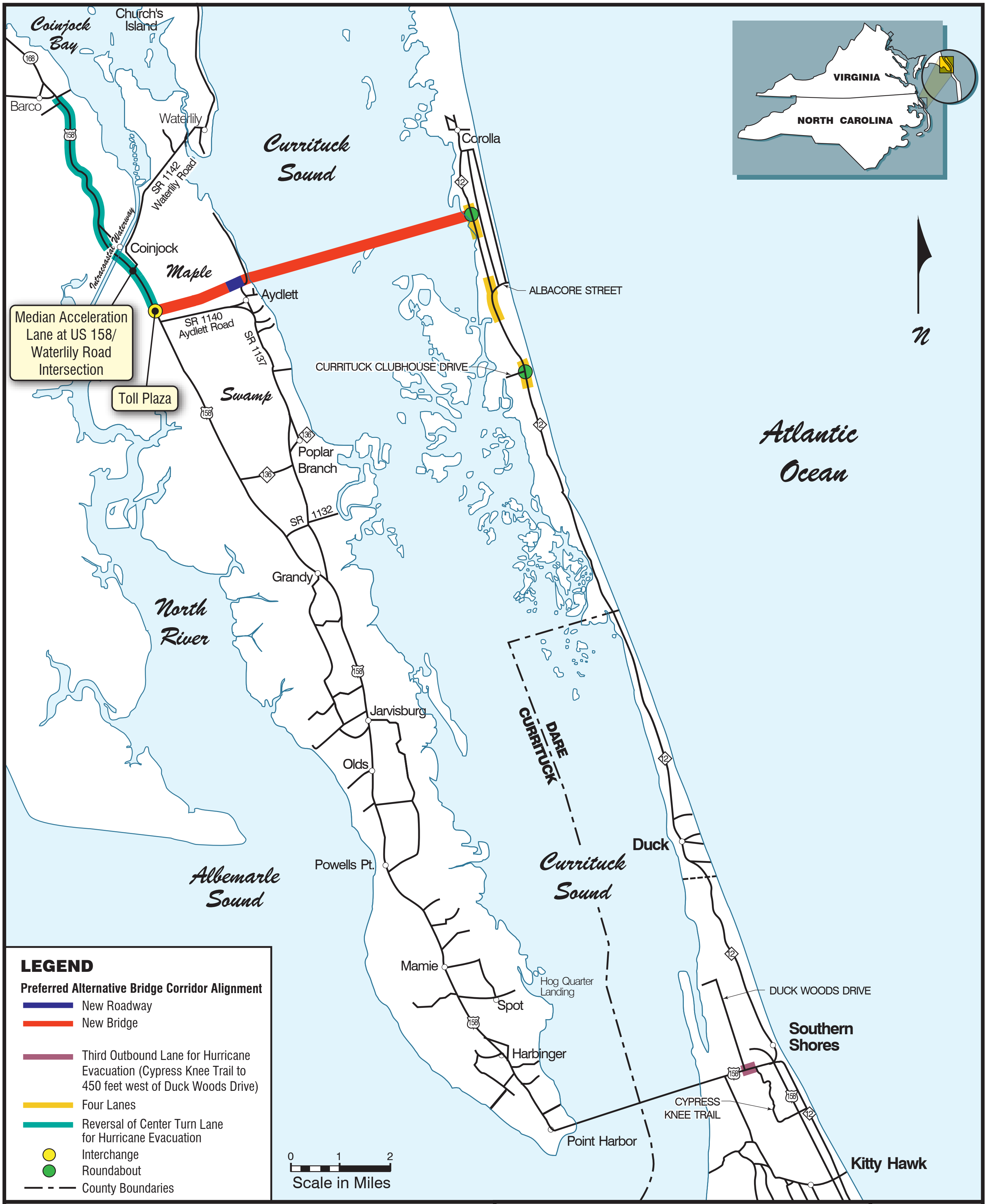
LEGEND

- Eight Lanes (Super-street)
- Six Lanes (Super-street)
- Four Lanes
- Four Lanes (Only with C1)
- Three Lanes
- Mid-Currituck Bridge
- Third Outbound Lane (Contraflow of an existing lane is an option)
- C1 / C2 Bridge Corridor Alternatives
- ● Interchange

NOTE: Existing 3-lane segment of NC 12 in Duck is unchanged.

DEIS Detailed Study Alternatives

Figure
3

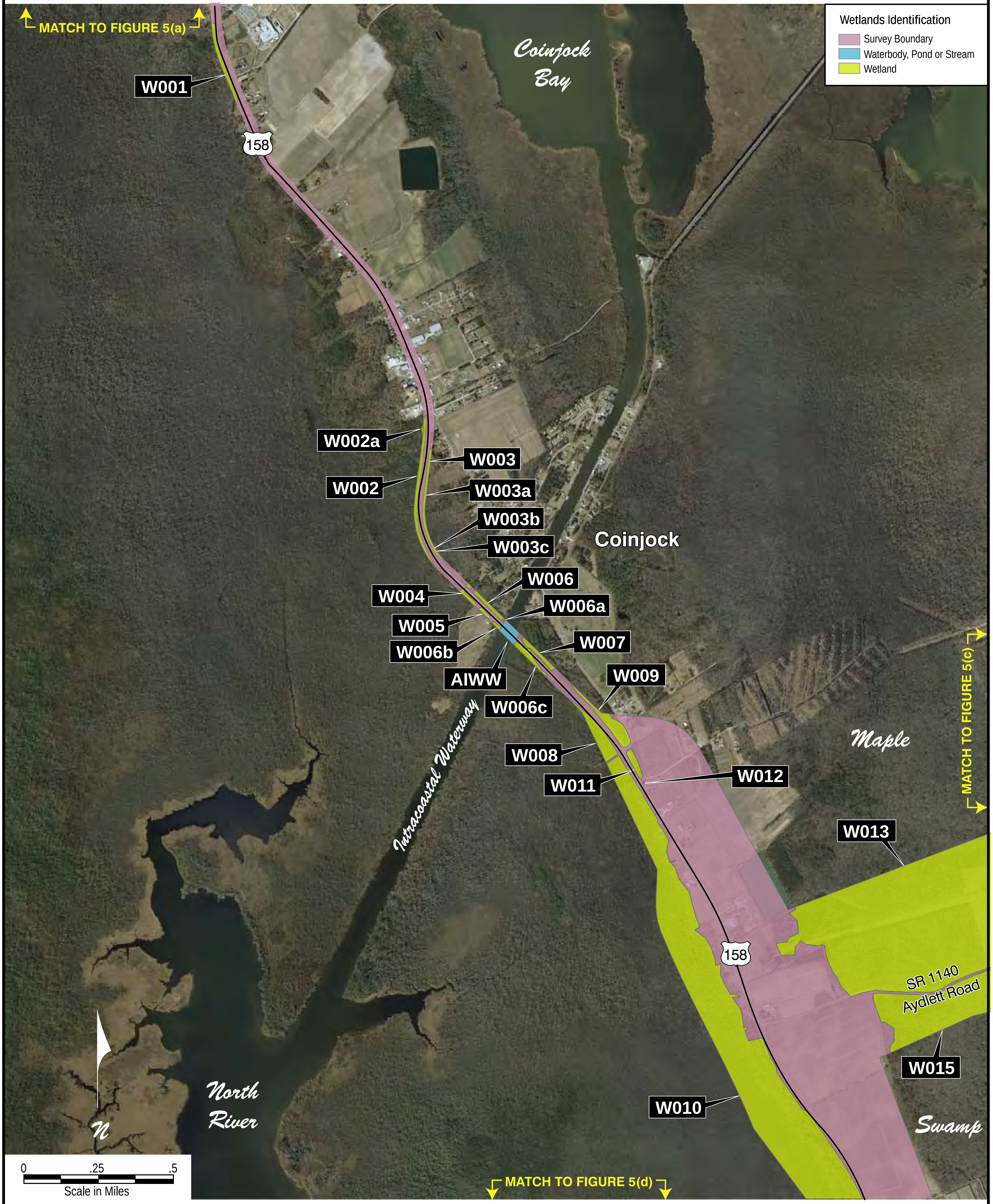


Preferred Alternative

Figure
4

Jurisdictional Features Map

Figure 5(a)



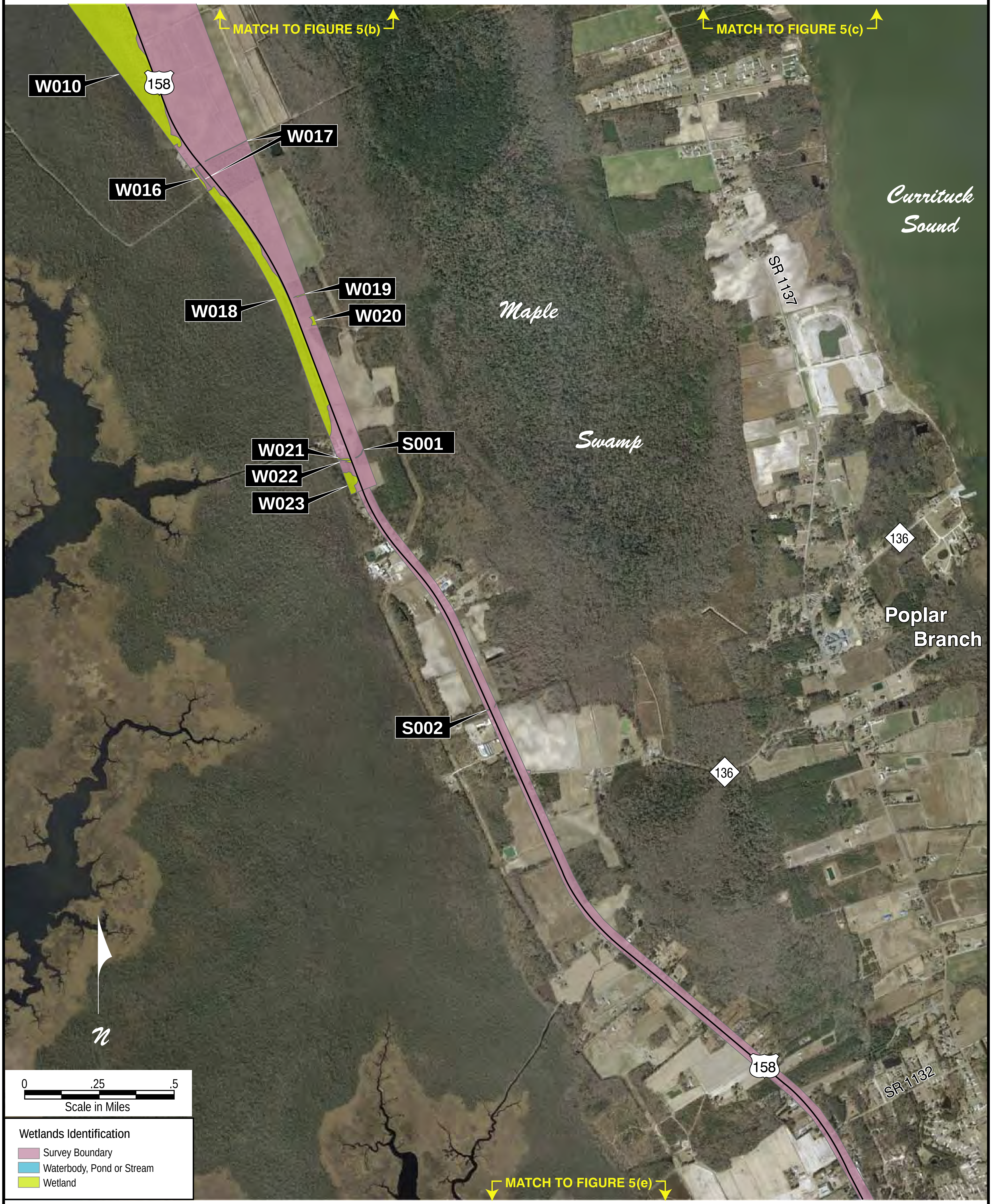
Jurisdictional Features Map

Figure

5(b)

Jurisdictional Features Map

Figure
5(c)



Jurisdictional Features Map

Figure 5(d)

Jurisdictional Features Map

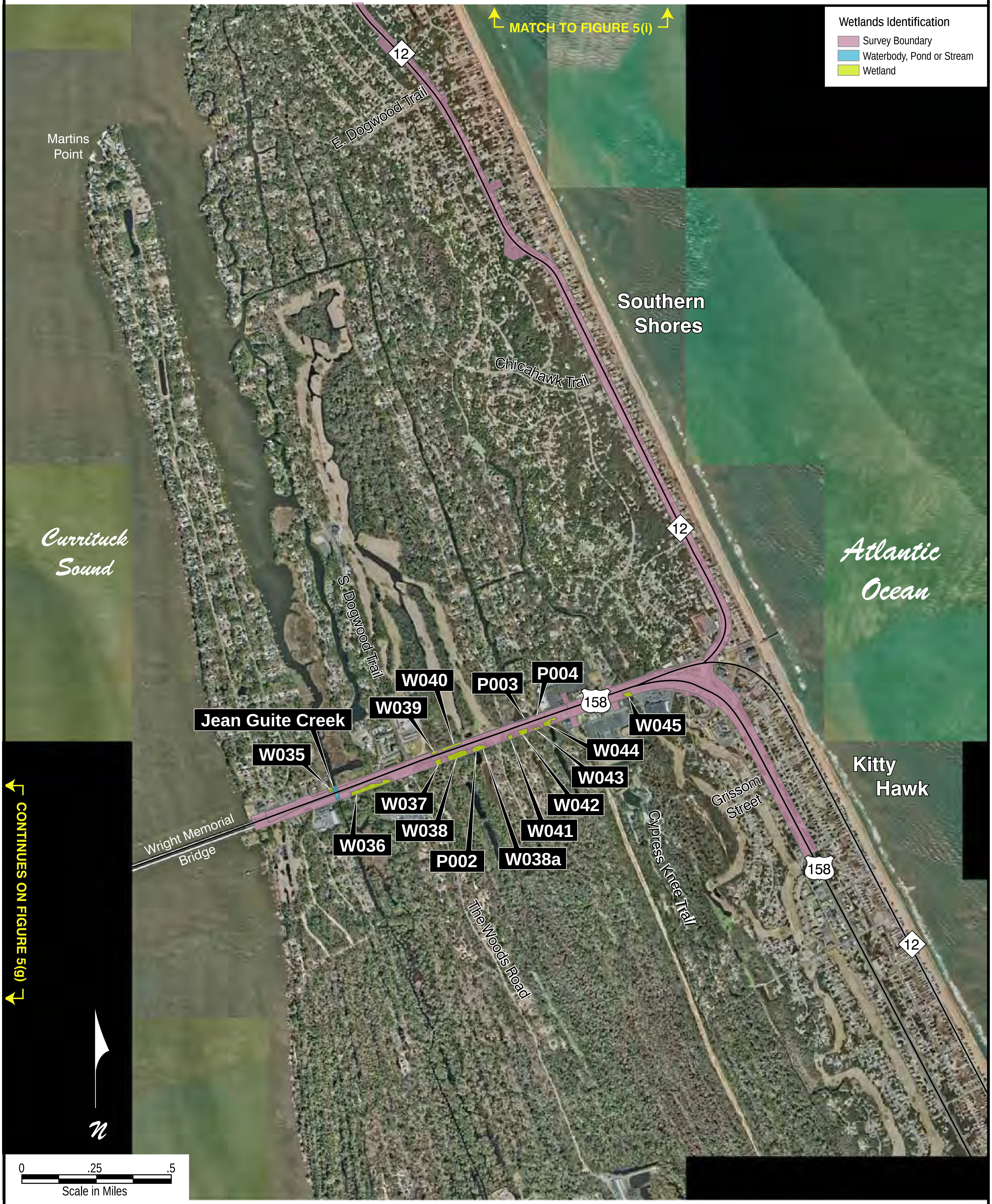
Figure
5(e)

Jurisdictional Features Map

Figure
5(f)

Jurisdictional Features Map

Figure 5(g)

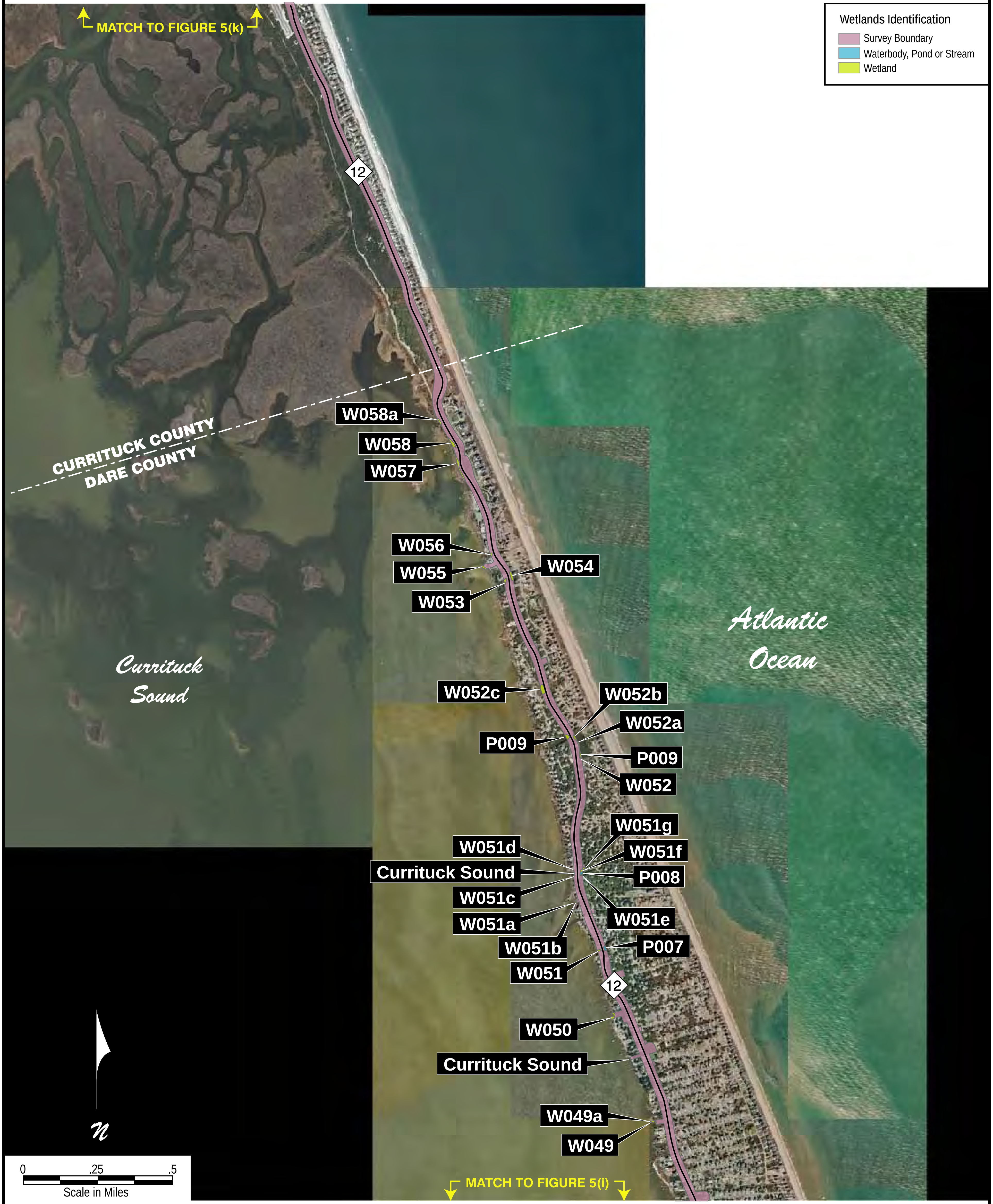


Jurisdictional Features Map

Figure
5(h)

Jurisdictional Features Map

Figure
5(i)

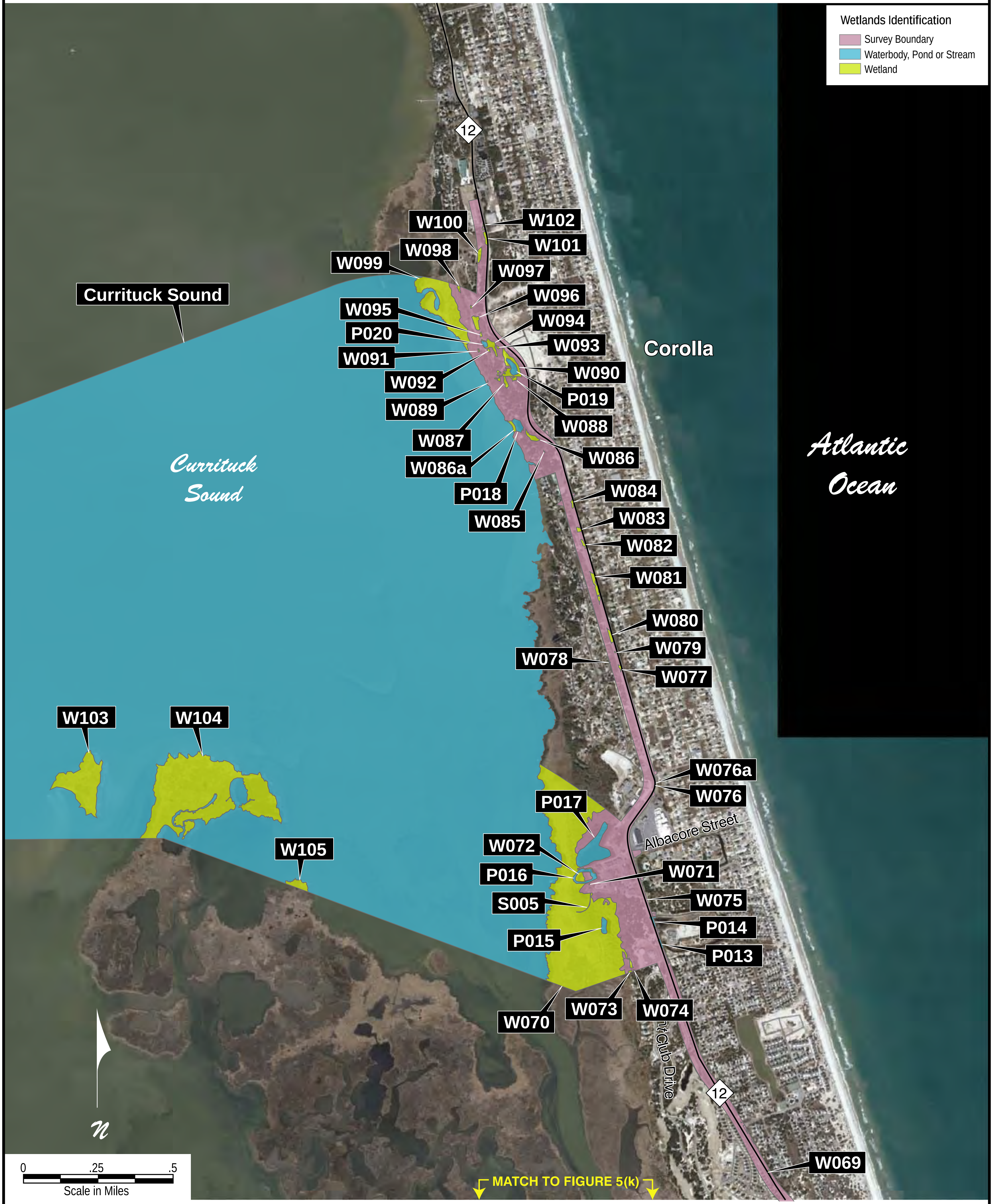


Jurisdictional Features Map

Figure
5(j)

Jurisdictional Features Map

Figure
5(k)



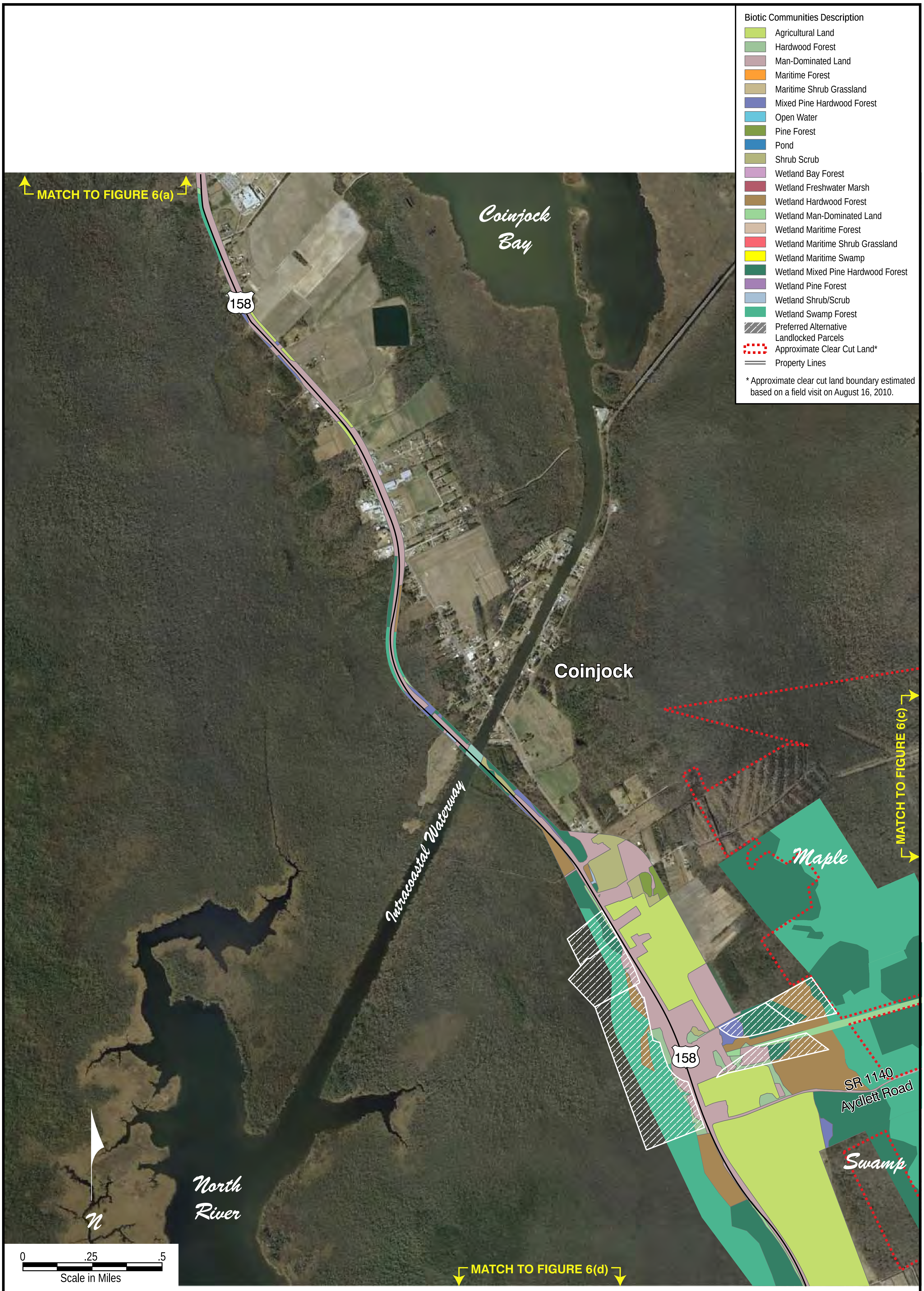
Jurisdictional Features Map

Figure

5(l)

Natural Communities Map

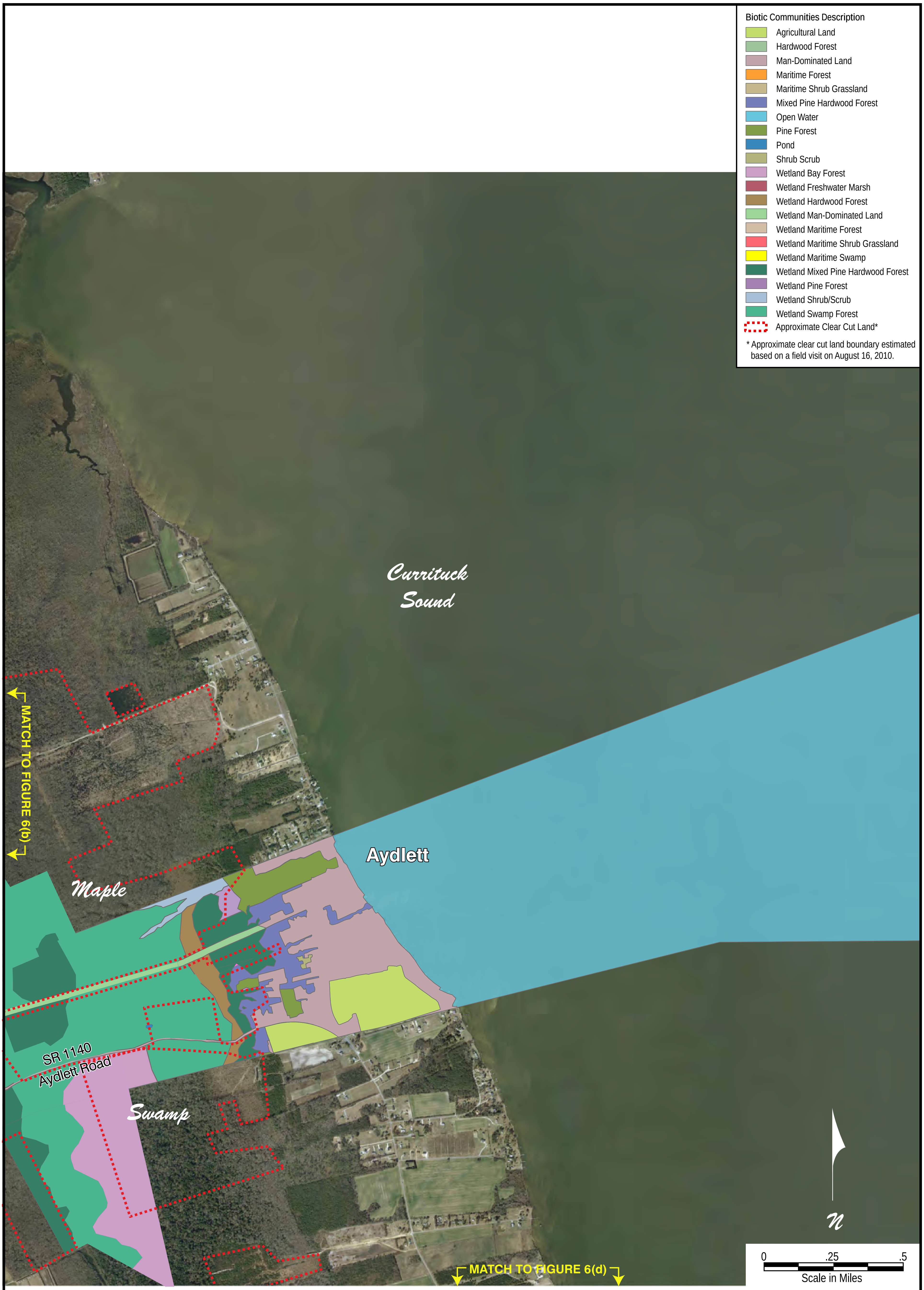
Figure
6(a)



Natural Communities Map

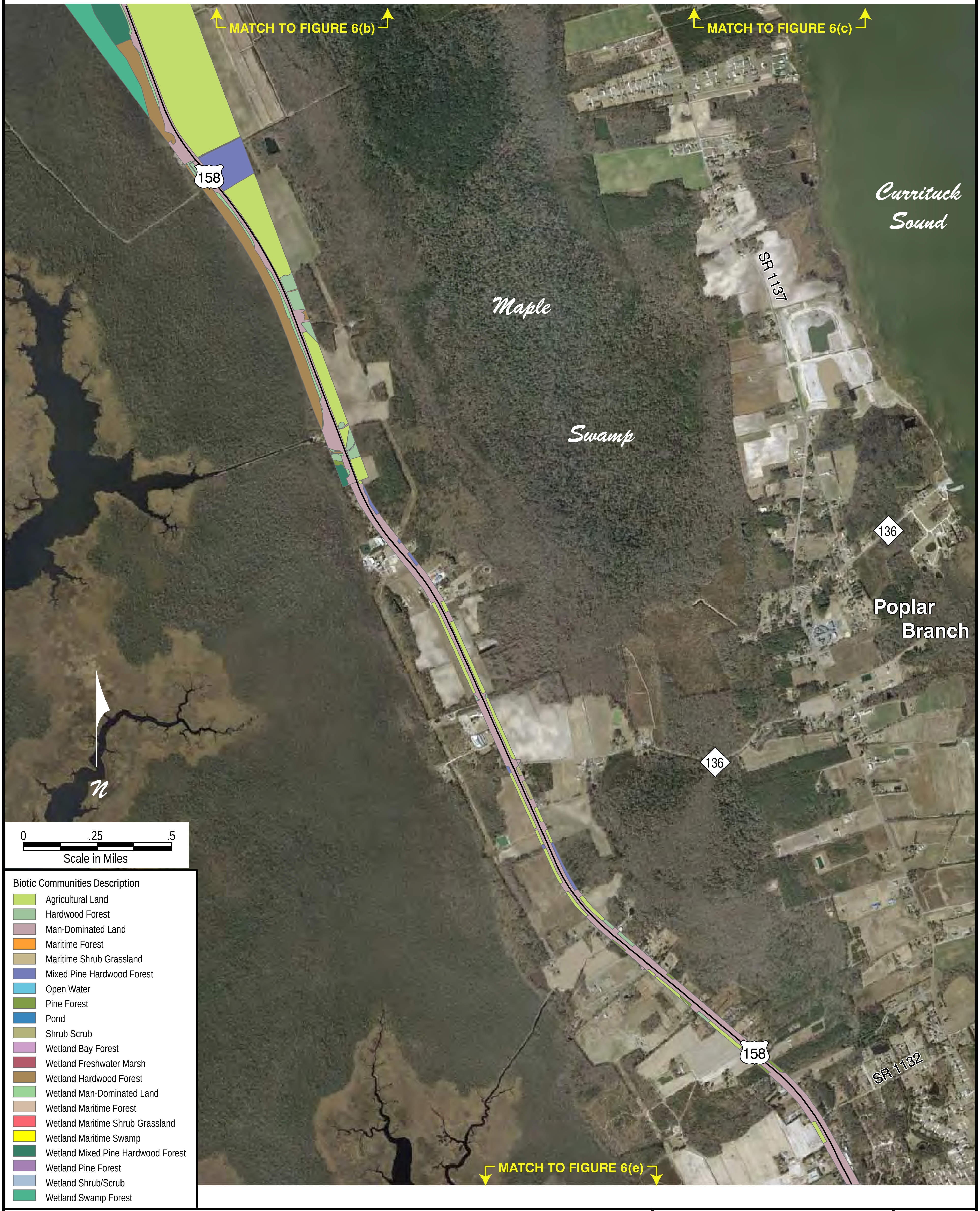
Figure

6(b)



Natural Communities Map

Figure
6(c)

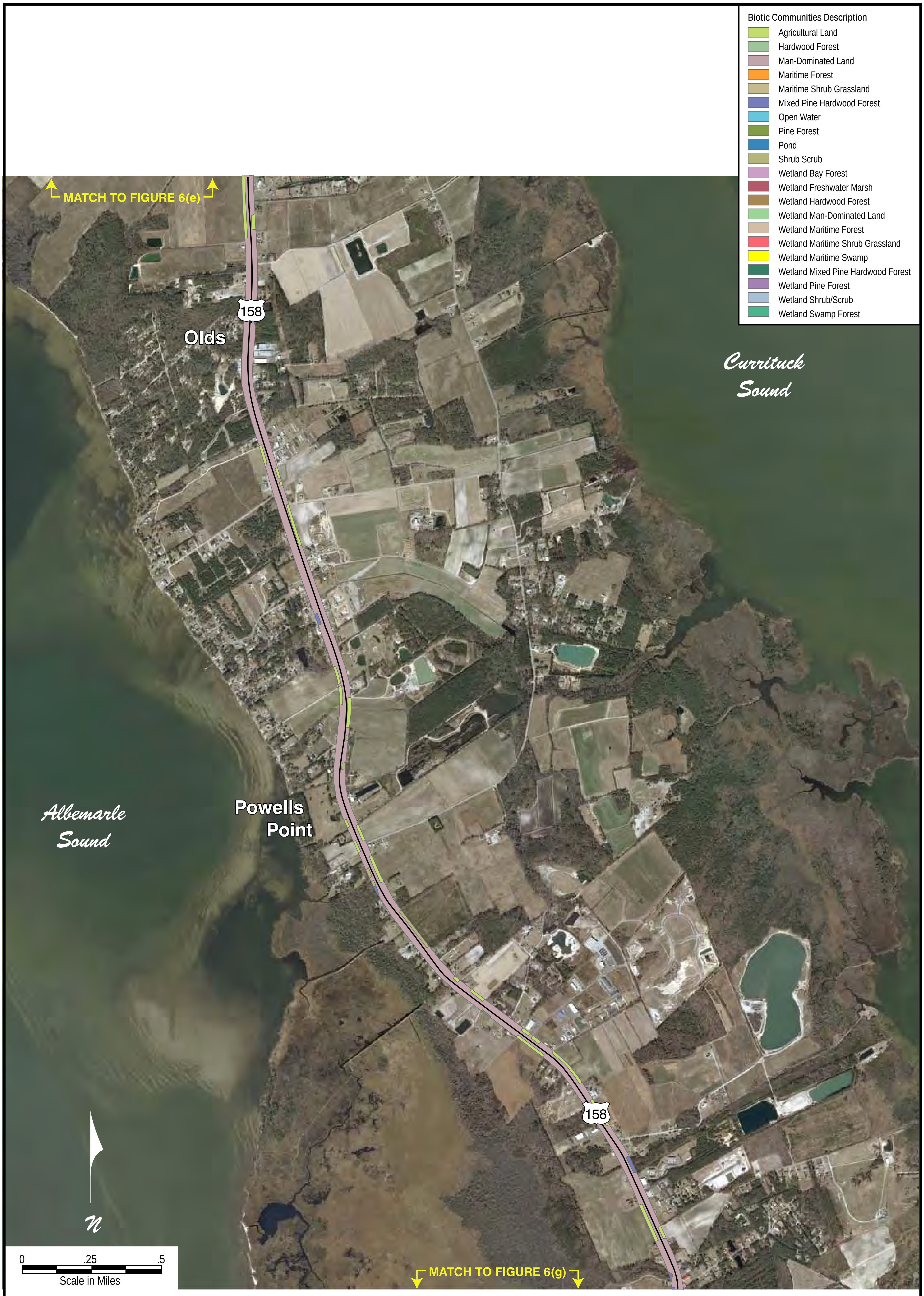


Natural Communities Map

Figure
6(d)

Natural Communities Map

Figure
6(e)



Natural Communities Map

Figure 6(f)

Natural Communities Map

Figure

6(g)

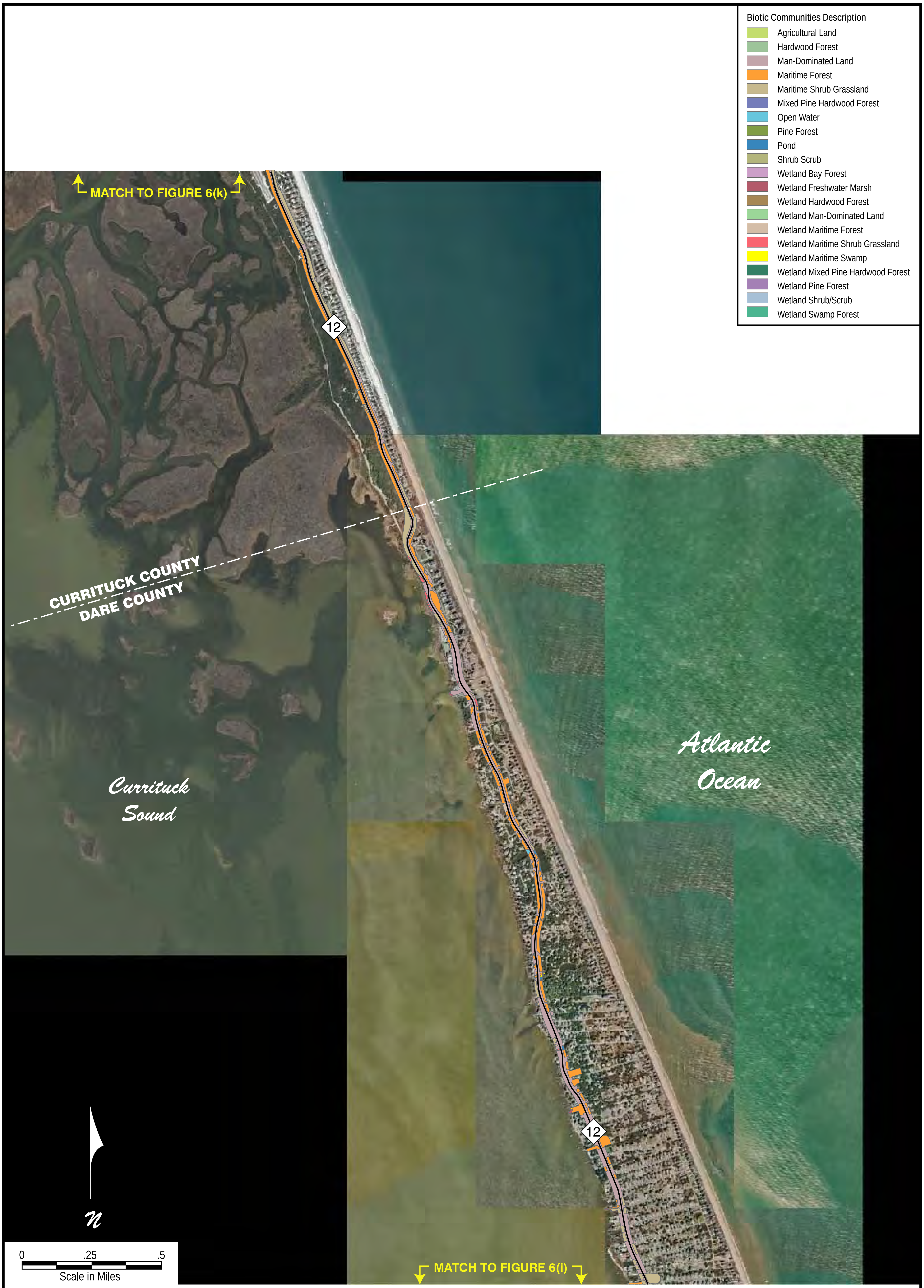
Natural Communities Map

Figure
6(h)

Natural Communities Map

Figure

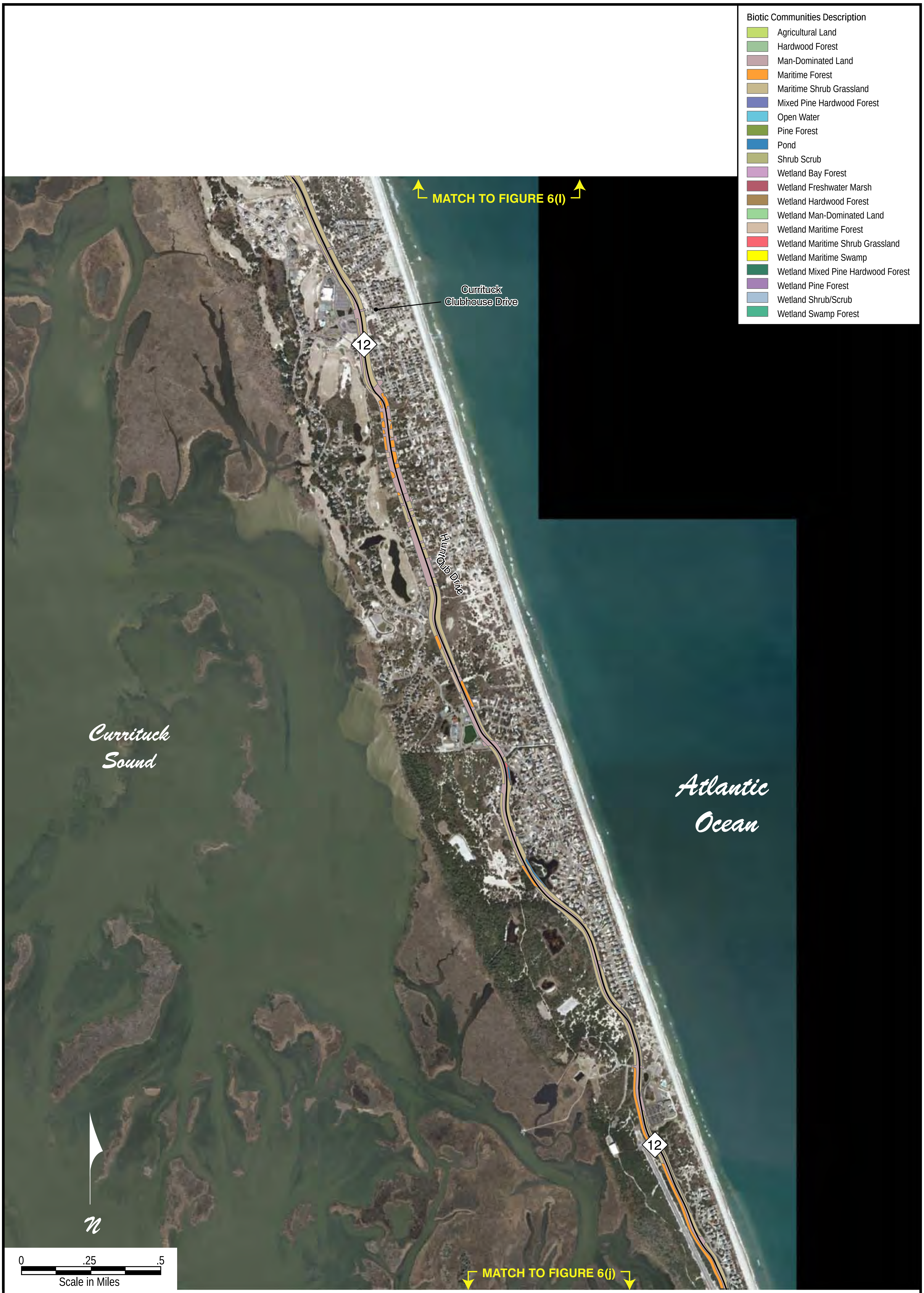
6(i)



Natural Communities Map

Figure

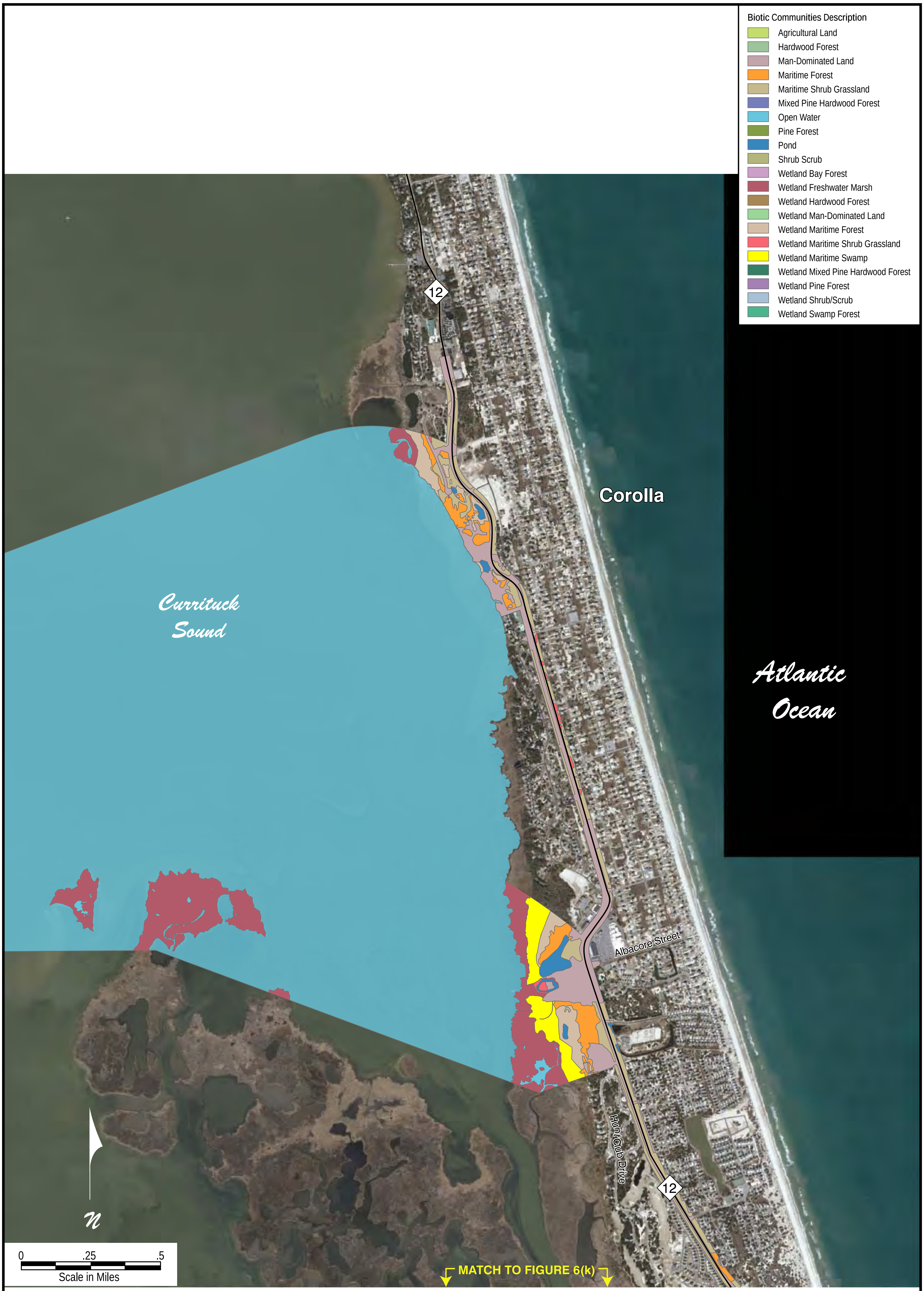
6(j)



Natural Communities Map

Figure

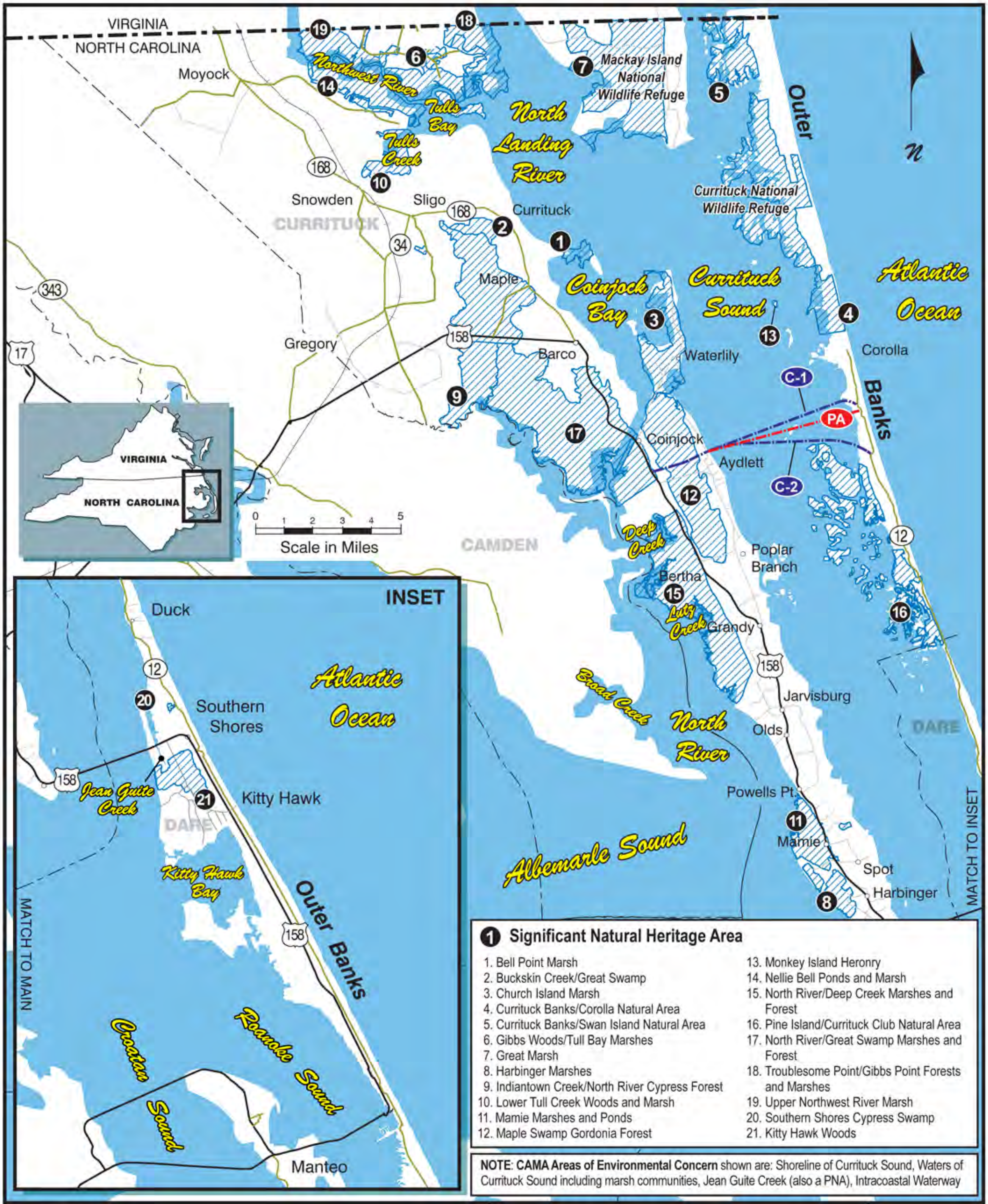
6(k)



Natural Communities Map

Figure

6(l)



❶ Significant Natural Heritage Area

1. Bell Point Marsh
2. Buckskin Creek/Great Swamp
3. Church Island Marsh
4. Currituck Banks/Corolla Natural Area
5. Currituck Banks/Swan Island Natural Area
6. Gibbs Woods/Tull Bay Marshes
7. Great Marsh
8. Harbinger Marshes
9. Indiantown Creek/North River Cypress Forest
10. Lower Tull Creek Woods and Marsh
11. Mamie Marshes and Ponds
12. Maple Swamp Gordonia Forest
13. Monkey Island Heronry
14. Nellie Bell Ponds and Marsh
15. North River/Deep Creek Marshes and Forest
16. Pine Island/Currituck Club Natural Area
17. North River/Great Swamp Marshes and Forest
18. Troublesome Point/Gibbs Point Forests and Marshes
19. Upper Northwest River Marsh
20. Southern Shores Cypress Swamp
21. Kitty Hawk Woods

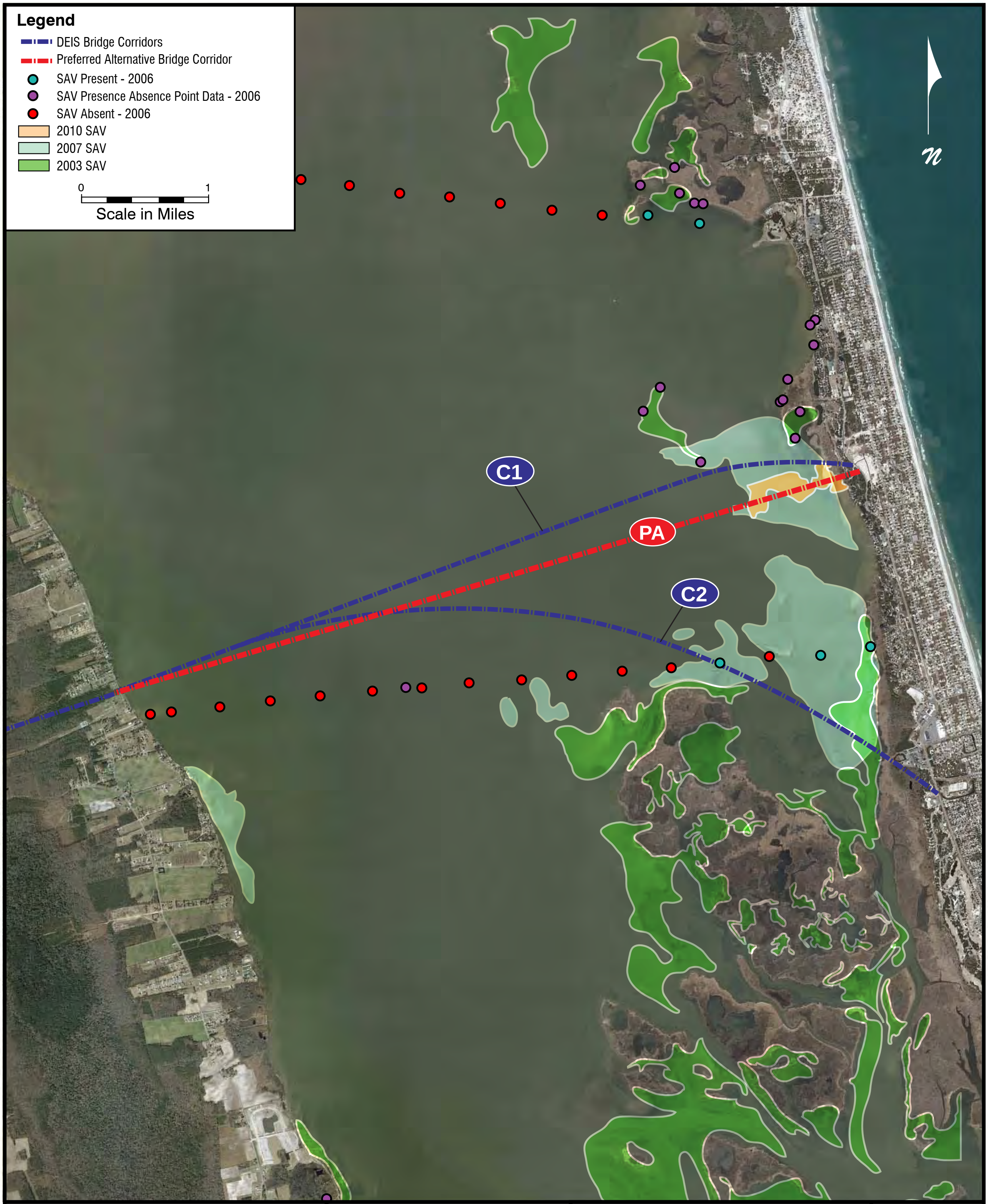
NOTE: **CAMA Areas of Environmental Concern** shown are: Shoreline of Currituck Sound, Waters of Currituck Sound including marsh communities, Jean Guite Creek (also a PNA), Intracoastal Waterway

LEGEND

-·-·-	DEIS Bridge Corridors
-·-·-	Preferred Alternative Bridge Corridor
— - -	County Boundaries
🟦	Water Bodies
▨	Significant Natural Heritage Area

Water Bodies and Other Natural Resource-Related Features

Figure 7



SAV Data from 2003, 2006, 2007 and 2010

Figure

8

Appendix B

Lists of Plant and Animal Species Found in the Vicinity of the Project Area and/or Referenced in the Report

B. Lists of Plant and Animal Species Found in the Vicinity of the Project Area and/or Referenced in the Report

Appendix B-1. Scientific and Common Names of Plants Referenced in the Text.

Common name	Scientific name
American holly	*Ilex opaca*
Arrow arum	*Peltandra virginica*
Arrow-head	*Sagittaria latifolia*
Bald Cypress	*Taxodium distichum*
Bedstraw	*Galium obtusum*
Big cordgrass	*Spartina cynosuroides*
Black cherry	*Prunus serotina*
Black oak	*Quercus velutina*
Blackberry	*Rubus argutus*
Broomsedge	*Andropogon virginicus*
Bulrush	*Scirpus tabernaemontani*
Bushy pondweed	*Najas guadalupensis*
Cattail	*Typha angustifolia*
Cattail	*Typha latifolia*
Chinese privet	*Ligustrum villosum*
Common reed	*Phragmites australis*
Crabgrass	*Digitaria sanguinalis*
Creeping spikerush	*Eleocharis fallax*
Cudweed	*Gamochaeta purpurea*
Cut grass	*Leersia oryzoides*
Day flower	*Commelina communis*
Dog fennel	*Eupatorium capillifolium*
Duck potato	*Sagittaria lancifolia*
Eastern red cedar	*Juniperus virginiana*
Eurasian water milfoil	*Myriophyllum spicatum*
False nettle	*Boehmeria cylindrica*
Flowering dogwood	*Cornus florida*
Giant cane	*Arundinaria gigantea*
Goldenrod	*Euthamia tenuifolia var. tenuifolia*
Greenbrier	*Smilax bona-nox*
Greenbrier	*Smilax rotundifolia*
Groundsel-tree	*Baccharis halimifolia*
Highbush blueberry	*Vaccinium corymbosum*
Horse sugar	*Symplocus tinctoria*
Ironwood	*Carpinus caroliniana*
Japanese honeysuckle	*Lonicera japonica*
Laurel oak	*Quercus laurifolia*

Common name	**Scientific name**
Live oak	*Quercus virginiana*
Lizard's tail	*Saururus cernuus*
Loblolly bay	*Gordonia lasianthus*
Loblolly pine	*Pinus taeda*
Longleaf pine	*Pinus palustris*
Marsh fern	*Thelypteris palustris*
Marsh seedbox	*Ludwigia palustris*
Mimosa	*Albizia julibrissin*
Mock bishop's weed	*Ptilimnium capillaceum*
Muscadine	*Vitus rotundifolia*
Nepalese browntop	*Microstegium vimineum*
Netted chainfern	*Woodwardia areolata*
Northern bayberry	*Morella pensylvanica*
Paw paw	*Asimina triloba*
Pennywort	*Hydracotyle bonariensis*
Persimmon	*Diospyros virginiana*
Pineweed	*Hypericum gentianoides*
Plantain	*Plantago lanceolata*
Poison ivy	*Toxicodendron radicans*
Pokeweed	*Phytolacca americana*
Red maple	*Acer rubrum*
Redhead grass	*Potamogeton perfoliatus*
Royal fern	*Osmunda regalis*
Rush	*Juncus acuminatus*
Rush	*Juncus coriaceus*
Rush	*Juncus dichotomus*
Sago pondweed	*Potamogeton pectinatus*
Seabeach amaranth	*Amaranthus pumilus*
Sedge	*Carex albolutescens*
Sedge	*Carex atlantica* ssp. *capillacea*
Sedge	*Carex comosa*
Sedge	*Carex laevivaginata*
Slender spikegrass	*Chasmanthium laxum*
Sourwood	*Oxydendrum arboreum*
Southern lady fern	*Athyrium filix-femina* ssp. *Aspleniodes*
Southern red oak	*Quercus falcata*
Spadeleaf	*Centella asiatica*
Stoneworts (macroscopic algae)	*Chara* spp.
Swamp chestnut oak	*Quercus michauxii*

Common name	Scientific name
Swamp red bay	*Persea palustris*
Swamp tupelo	*Nyssa biflora*
Swamp willow	*Salix caroliniana*
Sweet pepperbush	*Clethera alnifolia*
Sweetbay	*Magnolia virginiana*
Sweetgum	*Liquidambar styraciflua*
Switchcane	*Panicum virgatum*
Thoroughwort	*Eupatorium hyssopifolium*
Three-square	*Scirpus americanus*
Toad flax	*Nuttallanthus canadensis*
Tulip poplar	*Liriodendron tulipifera*
Venus' looking-glass	*Triodanis perfoliata var. perfoliata*
Virginia chainfern	*Woodwardia virginica*
Virginia creeper	*Parthenocissus quinquefolia*
Virginia willow	*Itea virginica*
Water hemlock	*Cicuta maculata*
Water oak	*Quercus nigra*
Wax myrtle	*Morella cerifera*
White oak	*Quercus alba*
Widgeon grass	*Ruppia maritima*
Wild celery	*Vallisneria americana*
Winged sumac	*Rhus copallinum*
Yarrow	*Achillea millefolium*
Yaupon	*Ilex vomitoria*
Yellow Jessamine	*Gelsemium sempervirens*

[a] *Nomenclature follows Kartesz (1994).*

[b] *Common names were obtained from Radford et al. (1968) when available, followed by Schafale and Weakley (1990), Reed (1988), and North Carolina Natural Heritage Program database, respectively.*

REFERENCES

Kartesz, J. T. 1994. *A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland*. Vols. 1 and 2. Timber Press. Portland, Oregon.

Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. *Manual of the Vascular Flora of the Carolinas*. The University of North Carolina Press. Chapel Hill, North Carolina.

Reed, P. B., Jr. 1988. "National List of Plant Species that Occur in Wetlands; Southeast (Region 2) for National Wetlands Inventory." US Fish and Wildlife Service, US Department of the Interior. Biological Report 88(26.2).

Schafale, M. P. and A. S. Weakley. 1990. *Classification of the Natural Communities of North Carolina, 3rd Approximation*. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program.

Appendix B-2. Aquatic Macroinvertebrates Referenced in the Text.

Common name	Scientific name
	CRUSTACEA
	Decapoda
Blue crab	*Callinectes sapidus*
Brown shrimp	*Crangon crangon*
Pink shrimp	*Penaeus duorarum*
Rock shrimp	*Sicyonia* sp.
White shrimp	*Penaeus setiferus*
	MOLLUSCA
Clams	
Eastern oyster	*Crassostrea virginica*

REFERENCES

Matta, J. 1980. *The Macroinvertebrates (Primarily Insects) of North Carolina Marshes*. Old Dominion University. 102 p.

North Carolina Department of Environment, Health, and Natural Resources. 1994. *Currituck Sound Outstanding Resource Water Evaluation*. Division of Environmental Management, Water Quality Section (Now the NC Department of Environment and Natural Resources, Division of Water Quality). Unpublished Report.

US Fish and Wildlife Service. 1980. *Proposed National Wildlife Refuge on the Currituck Outer Banks, Currituck County, N.C.* (FEIS). US Fish and Wildlife Service, US Department of the Interior. Newton Corner, Massachusetts.

Winslow, S. E., N. S. Sanderlin, G. W. Judy, J. H. Hawkins, B. F. Holland, Jr., C. A. Fischer, and R. A. Rulifson. 1983. *North Carolina Anadromous Fisheries Management Program, Completion Report for Project AFCS-16*. North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries. Morehead City, North Carolina. 151 p.

Appendix B-3. Scientific and Common Names of Fish Referenced in the Text.

Common name	Scientific name
Alewife	*Alosa pseudoharengus*
American shad	*Alosa sapidissima*
Atlantic croaker	*Micropogonias undulatus*
Banded killifish	*Fundulus diaphanus*
Bay anchovy	*Anchoa mitchilli*
Black sea bass	*Centropristis striata*
Blueback herring	*Alosa aestivalis*
Bluefish	*Pomatomus saltatrix*
Bluegill	*Lepomis macrochirus*
Bluespotted sunfish	*Enneacanthus gloriosus*
Brown bullhead	*Ictalurus nebulosus*
Butterfish	*Peprilius triacanthus*
Common Carp	*Cyprinus carpio*
Channel catfish	*Ictalurus punctatus*
Golden shiner	*Notemigonus crysoleucas*
Killifish	*Fundulus spp.*
Largemouth bass	*Micropterus salmoides*
Pumpkinseed	*Lepomis gibbosus*
Red drum	*Sciaenops ocellatus*
Red grouper	*Epinephelus morio*
Shortnose sturgeon	*Acipenser brevirostrum*
Southern flounder	*Paralichthys lethostigma*
Atlantic spadefish	*Chaetodipterus faber*
Spanish mackerel	*Scomberomorus maculatus*
Spot	*Leiostomus xanthurus*
Striped bass	*Morone saxatilis*
Striped mullet	*Mugil cephalus*
Summer flounder	*Paralichthys dematus*
Tidewater silverside	*Menidia peninsulae*
White catfish	*Ictalurus catus*
White perch	*Morone americana*
Yellow bullhead	*Ictalurus natalis*
Yellow perch	*Perca flavescens*

REFERENCES

Borawa, J. C., J. H. Kerby, M. T. Huish, and A. W. Mullis. 1978. "Currituck Sound Fish Populations Before and After Infestation by Eurasian Water-milfoil." *Proc. An. Conf. S.E. Assoc. Fish and Wildlife Agencies*. 32:520-528.

Kornegay, J. W. 1989. *Currituck Sound Fish Population Survey. Final Report*. *Federal Aid in Fish Restoration Project F-22-14*. North Carolina Wildlife Resources Commission, Division of Boating and Inland Fisheries.

Menhinnick, E. F. 1991. *Freshwater Fishes of North Carolina*. North Carolina Wildlife Resources Commission. Raleigh, North Carolina. 227 p.

North Carolina Wildlife Resources Commission. Unpublished sampling data.

North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries. Unpublished commercial data.

Winslow, S. E., N. S. Sanderlin, G. W. Judy, J. H. Hawkins, B. F. Holland, Jr., C. A. Fischer, and R. A. Rulifson. 1983. *North Carolina Anadromous Fisheries Management Program, Completion Report for Project AFCS-16*. North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries. Morehead City, North Carolina. 151 p.

Appendix B-4. Scientific and Common Names of Reptiles and Amphibians Referenced in the Text.

Common name	Scientific name
<u>**AMPHIBIANS**</u>	
Frogs/Toads	
Bull frog*	*Rana catesbeiana*
Fowler's toad	*Bufo woodhousei fowleri*
Green frog*	*Rana clamitans*
Spring peeper	*Hyla crucifer*
Squirrel treefrog	*Hyla squirella*
Salamanders	
<u>**REPTILES**</u>	
Alligators	
American alligator	*Alligator mississippiensis*
Lizards	
Broad-headed skink	*Eumeces laticeps*
Fence lizard	*Sceloporus undulatas*
Ground skink*	*Scincella lateralis*
Six-lined race runner	*Cnemidophorus sexlineatus*
Snakes	
Black racer*	*Coluber constrictor*
Brown watersnake	*Nerodia taxisplota*
Cottonmouth*	*Agkistrodon piscivorous*
Red-bellied watersnake	*Neroida erythrogaster*
Turtles	
Eastern mud turtle	*Kinosternon subrubrum*
Green sea turtle	*Chelonia mydas*
Hawksbill sea	*Eretmochelys imbricata*
Kemp's ridley sea turtle	*Lepidochelys kempii*
Leatherback sea turtle	*Dermochelys coriacea*
Loggerhead sea turtle	*Caretta caretta*
Snapping turtle	*Chelydra serpentina*
Stinkpot (Eastern musk turtle)	*Sternotherus odoratus*

REFERENCES

Martof, B. S., W. M. Palmer, J. R. Bailey, and J. R. Harrison, III. 1980. *Amphibians and Reptiles of the Carolinas and Virginia*. University of North Carolina Press. Chapel Hill, North Carolina. 264 p.

Palmer, W. A., and A. Braswell. 1995. *Reptiles of North Carolina*. University of North Carolina Press. Chapel Hill, North Carolina. 412 p.

Parnell, J. F., P. E. Hosier, D. J. Sieren, W. D. Webster, and S. Cooper. September 1987. *Ecological Reconnaissance Currituck Shooting Club Property, Final Report*.

Platania, S. P., and D. Lee. 1978. *Results of a Four-week Herpetological Survey of the Coinjock Region (NC) of the Great Dismal Swamp*. North Carolina State Museum of Natural History. Raleigh, North Carolina. 34 p.

Appendix B-5. Scientific and Common Names of Birds Referenced in the Text.

Common name	Scientific name
American black duck*	*Anas rubripes*
American coot*	*Fulica americana*
American crow*	*Corvus brachyrhynchos*
American white pelican	*Pelecanus erythrorhynchis*
American wigeon*	*Anas americana*
Bald eagle*	*Haliaetus leucocephalus*
Barred owl*	*Strix varia*
Black rail*	*Laterallus jamaicensis*
Black-throated green warbler	*Dendroica virens (wayneii- breeding)*
Brown pelican*	*Pelecanus occidentalis*
Canada goose*	*Branta canadeusis*
Canvasback	*Aythya valisineria*
Carolina chickadee*	*Parus carolinensis*
Carolina wren*	*Thryothorus ludovicianus*
Common yellowthroat*	*Geothlypis trichas*
Field sparrow*	*Spizella pusilla*
Gadwall*	*Anas strepeva*
Glossy ibis	*Plegadis falcinellus*
Golden eagle	*Aquila chrysaetos*
Gray catbird*	*Dumetella carolinensis*
Great blue heron*	*Ardea herodias*
Great egret	*Egretta alba*
Green-winged teal*	*Anas crecca*
Hooded warbler*	*Wilsonia citrina*
Least tern*	*Sterna antillarum*
Little blue heron	*Egretta caerulea*
Mallard*	*Anas platyrhynchos*
Northern cardinal*	*Cardinalis cardinalis*
Northern parula*	*Parula americana*
Northern pintail*	*Anas acuta*
Osprey*	*Pandian haliaetus*
Ovenbird*	*Seiurus aurocapillus*
Piping plover	*Charadrius melodus*
Prairie warbler*	*Dendroica striata*
Prothonotary warbler*	*Protonotaria citrea*
Purple martin	*Progne subis*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-cockaded woodpecker	*Picoides borealis*

Common name	Scientific name
Red-eyed vireo*	*Vireo olivaceus*
Red knot	*Calidris canutus*
Red-shouldered hawk*	*Buteo lineatus*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked duck	*Aythya collaris*
Roseate tern	*Sterna dougallii*
Snow goose*	*Chen caerulescaus*
Snowy egret	*Egretta thula*
Tufted titmouse*	*Parus bicolor*
Tundra swan*	*Cygnus columbianus*
White-eyed vireo*	*Vireo griseus*
Wood duck*	*Aix sponsa*
Yellow-billed cuckoo*	*Coccyzux americanus*
Yellow rail	*Coturnicops noveboracensis*

REFERENCES

Fussell, J. F., III, and M. Lyons. 1990. *Birds of the Outer Banks*. National Park Service, US Department of the Interior. (pamphlet)

Fussell, J.F., III. 1994. *A Birder's Guide to Coastal North Carolina*. University of North Carolina Press. Chapel Hill, North Carolina. 540 p.

Parnell, J. F., P. E. Hosier, D. J. Sieren, W. D. Webster, and S. Cooper. September 1987. *Ecological Reconnaissance Currituck Shooting Club Property, Final Report*.

Platania, S. P., and D. Lee. 1978. *Results of a Four-week Avian Survey of the Coinjock Region (NC) of the Great Dismal Swamp*. North Carolina State Museum of Natural History, Raleigh, North Carolina.

Appendix B-6. Scientific and Common Names of Mammals Referenced in the Text.

Common name	Scientific name
Beaver	*Castor canadensis*
Black bear*	*Ursus americanus*
Bobcat	*Lynx rufus*
Eastern cottontail*	*Sylvilagus floridanus*
Feral cat*	*Felis catus*
Feral horse	*Equus caballus*
Feral pig	*Sus scrofa*
Gray fox*	*Urocyon cinereoargenteus*
Gray squirrel	*Sciurus carolinensis*
House mouse	*Mus musculus*
Marsh rice rat	*Oryzomys palustris*
Mink	*Mustela vision*
Muskrat*	*Ondatra zibethica*
Norway rat	*Rattus norvegicus*
Nutria*	*Myocaster coypus*
Raccoon*	*Procyon lotor*
West Indian manatee	*Trichechus manatus*
White-footed mouse	*Peromyscus leucopus*
White-tailed deer*	*Odocoileus virginianus*

REFERENCES

Lee, D., J. B. Funderburg, Jr., and M. K. Clark. 1982. *A Distributional Survey of North Carolina Mammals*. Occasional papers of the North Carolina Biological Survey 1982-10. North Carolina State Museum of Natural History. Raleigh, North Carolina. 70p.

Parnell, J. F., P. E. Hosier, D. J. Sieren, W. D. Webster, and S. Cooper. September 1987. *Ecological Reconnaissance Currituck Shooting Club Property, Final Report*.

Platania, S. P., and D. Lee. 1978. *Results of a Five-week Mammal Survey of the Coinjock Region (NC) of the Great Dismal Swamp*. North Carolina State Museum of Natural History. Raleigh, North Carolina. 79 p.

Webster, W. D., J. F. Parnell, and W. C. Biggs, Jr. 1985. *Mammals of the Carolinas, Virginia, and Maryland*. The University of North Carolina Press. Chapel Hill, North Carolina. 255 p.

Appendix C

Wetland and Stream Forms

RW4-1

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W001

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 14 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW4-1
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Smilax rotundifolia*	V	FAC	9. *Arundinaria gigantea*	S	FACW
2. *Saururs cernuus*	H	OBL	10. *Magnolia virginiana*	T	FACW+
3. *Liquidambar styraciflua*	T	FAC+	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Morella cerifera*	S	FAC+	13.		
6. *Leucothoe axillaris*	H	FACW	14.		
7. *Osmunda regalis*	H	OBL	15.		
8. *Woodwardia areolata*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- X **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- X **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

RW4-1

SOILS

w001

Map Unit Name
(Series and Phase): Dorovan mucky peat **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Typic Medisaprists **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3					organic debris
3-12		7.5YR 2.5/1			sandy loam
12-24		7.5YR 2.5/1	10YR 6/1 heavy stripping		clay loam

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
_X_ **Gleyed or Low-Chroma Colors**

___ **Concretions**
_X_ **High Organic Content in Surface Layer in Sandy Soils**
___ **Organic Streaking in Sandy Soils**
_X_ **Listed On Local Hydric Soils List**
_X_ **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:
S7: Dark Surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** _X_ **No** ___
Wetland Hydrology Present? **Yes** _X_ **No** ___
Hydric Soils Present? **Yes** _X_ **No** ___

Is the Sampling Point Within a Wetland? **Yes** _X_ **No**___

Remarks:

Great ~~Dismal~~ Swamp – west side of Rt 158 immediately north of ICW

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W002

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 14 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW4-18
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Quercus nigra*	T	FAC	10.		
3. *Persea palustris*	T	FACW	11.		
4. *Vaccinium corymbosum*	H/S	FACW	12.		
5. *Liquidambar styraciflua*	T	FAC+	13.		
6. *Pinus taeda*	T	FAC	14.		
7. *Acer rubrum*	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >24 **(in.)**

Depth to Saturated Soil: >24 **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrolgy present

R4-18

SOILS

W002

Map Unit Name
(Series and Phase): Augusta fine sandy loam **Drainage Class:** somewhat poorly drained

Taxonomy (Subgroup): thermic Aeric Ochraquults **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-23		2.5Y 2.5/1			loamy sand
23-24		10YR 4/2			loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- X Listed On Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

~~Great Dismal~~ Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W003

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 14 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RE6-1
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Smilax rotundifolia*	V	FAC	9. *Arundinaria gigantea*	S	FACW
2. *Saururs cernuus*	H	OBL	10. *Magnolia virginiana*	T	FACW+
3. *Liquidambar styraciflua*	T	FAC+	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Morella cerifera*	S	FAC+	13.		
6. *Leucothoe axillaris*	H	FACW	14.		
7. *Osmunda regalis*	H	OBL	15.		
8. *Woodwardia areolata*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
___ Inundated
___ Saturated in Upper 12"
X Water Marks
___ Drift Lines
___ Sediment Deposits
X Drainage Patterns in Wetlands

Secondary Indicators:
X Oxidized Roots Channels in Upper 12"
X Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:
Drought Conditions
Wetland Hydrology present

REG-1

SOILS

W003

Map Unit Name
(Series and Phase): Portsmouth fine sandy loam **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Typic Umbraquults **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3					organic debris
3-12		7.5YR 2.5/1			sandy loam
12-24		7.5YR 2.5/1	10YR 6/1 heavy stripping		clay loam

Hydric Soil Indicators:

- ___ **Histosol**
- ___ **Histic Epipedon**
- ___ **Sulfidic Odor**
- ___ **Aquic Moisture Regime**
- ___ **Reducing Conditions**
- _X_ **Gleyed or Low-Chroma Colors**
- ___ **Concretions**
- _X_ **High Organic Content in Surface Layer in Sandy Soils**
- ___ **Organic Streaking in Sandy Soils**
- _X_ **Listed On Local Hydric Soils List**
- _X_ **Listed on National Hydric Soils List**
- ___ **Other (Explain in Remarks)**

Remarks:
S7: Dark Surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** _X_ **No** ___
Wetland Hydrology Present? **Yes** _X_ **No** ___
Hydric Soils Present? **Yes** _X_ **No** ___

Is the Sampling Point Within a Wetland? **Yes** _X_ **No** ___

Remarks:

Great Dismal Swamp – east side of Rt 158 immediately north of ICW

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 31 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? Yes [✓ No]
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW97U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Panicum virgatum*	herb	FAC+	9.		
2. *Festuca arundinacea*	herb	FACU	10.		
3. *Arthraxon hispidus*	herb	UPL	11.		
4. *Digitaria ischaemum*	herb	UPL	12.		
5. *Toxicodendron radicans*	vine	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 40

Remarks: Regularly mowed.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: >18 (in.)
Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NW97U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name
(Series and Phase): State fine sandy loam

Drainage Class: well drained

Taxonomy (Subgroup): thermic Typic Hapludults

Field Observations
Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-18	B	10YR5/2			sandy silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes [✓ No]

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W009

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 31 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? Yes [✓ No]
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW97W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix caroliniana*	sapling	OBL	9. *Hydrocotyle umbellata*	herb	OBL
2. *Juncus effusus*	herb	FACW+	10. *Toxicodendron radicans*	vine	FAC
3. *Woodwardia areolata*	herb	OBL	11.		
4. *Thelypteris thelypteroides*	herb	FACW+	12.		
5. *Osmunda regalis*	herb	OBL	13.		
6. *Typha angustifolia*	herb	OBL	14.		
7. *Cyperus* sp.	herb	N/A	15.		
8. *Panicum virgatum*	herb	FAC+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 90

Remarks: Regularly mowed.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: 2 (in.)
Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- x Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- x Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- x Local Soil Survey Data
- x FAC-Neutral Test
- x Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NW97W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W009

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic clayey silt
3-18	B	10YR3/1			sandy clayey silt

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
x Reducing Conditions
x Gleyed or Low-Chroma Colors

___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
x Listed on Local Hydric Soils List
x Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 31 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? Yes [✓ No]
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW57U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Festuca arundinacea*	herb	FACU	9.		
2. *Digitaria ischaemum*	herb	UPL	10.		
3. *Arthraxon hispidus*	herb	UPL	11.		
4. *Solidago rugosa*	herb	FAC	12.		
5. *Cynodon dactylon*	herb	FACU	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 20

Remarks: Regularly mowed.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: >18 (in.)
Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
  ___ Inundated
  ___ Saturated in Upper 12 Inches
  ___ Water Marks
  ___ Drift Lines
  ___ Sediment Deposits
  ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
  ___ Oxidized Root Channels in Upper 12 Inches
  ___ Water-Stained Leaf Litter
  ___ Local Soil Survey Data
  ___ FAC-Neutral Test
  ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NW57U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name
(Series and Phase): State fine sandy loam

Drainage Class: well drained

Taxonomy (Subgroup): thermic Typic Hapludults

Field Observations
Confirmed Mapped Type? Yes [✓ No]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-18	n/a	n/a			Poorly sorted fill material

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Road embankment fill material and colluvium.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes [✓ No]

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W010

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 31 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW67W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	sapling	FACW	9.		
2. *Liquidambar styraciflua*	sapling	FAC+	10.		
3. *Pinus taeda*	sapling	FAC	11.		
4. *Juncus effusus*	herb	FACW+	12.		
5. *Typha latifolia*	herb	OBL	13.		
6. *Eupatorium perfoliatum*	herb	FACW+	14.		
7. *Bidens frondosa*	herb	FACW	15.		
8. *Solidago rugosa*	herb	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: n/a (in.)
Depth to Saturated Soil: 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
  ___ Inundated
  x Saturated in Upper 12 Inches
  ___ Water Marks
  ___ Drift Lines
  ___ Sediment Deposits
  ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
  ___ Oxidized Root Channels in Upper 12 Inches
  x Water-Stained Leaf Litter
  x Local Soil Survey Data
  x FAC-Neutral Test
  ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NW57W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W010

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic clayey silt
3-20	B	10YR3/1			sandy clayey silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- x Reducing Conditions
- x Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- x Listed on Local Hydric Soils List
- x Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 30 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW19U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9.		
2. *Liquidambar styraciflua*	tree	FAC+	10.		
3. *Nyssa sylvatica*	tree	FAC	11.		
4. *Quercus nigra*	sapling	FAC	12.		
5. *Symplocus tinctorium*	sapling	FAC	13.		
6. *Ligustrum sinense*	shrub	FACU	14.		
7. *Eupatorium capillifolium*	herb	FACU	15.		
8. *Liriodendron tulipifera*	sapling	FACU	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 63

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: >24 (in.)
Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NW19U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name (Series and Phase): State fine sandy loam

Drainage Class: well drained

Taxonomy (Subgroup): thermic Typic Hapludults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-24	B	10YR4/4			sandy silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W016

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 30 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NW19W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Saururus cernuus*	herb	OBL
2. *Liquidambar styraciflua*	tree	FAC+	10. *Juncus effusus*	herb	FACW+
3. *Nyssa sylvatica*	tree	FAC	11. *Woodwardia areolata*	herb	OBL
4. *Carpinus caroliniana*	sapling	FAC	12. *Thelypteris thelypteroides*	herb	FACW+
5. *Symplocus tinctorium*	sapling	FAC	13. *Polygonum sagittatum*	herb	OBL
6. *Quercus nigra*	sapling	FAC	14. *Polygonum hydropiperoides*	herb	OBL
7. *Vaccinium corymbosum*	shrub	FAC	15. *Sparganium americanum*	herb	OBL
8. *Arundinaria gigantea*	shrub	FACW	16. *Boehmeria cylindricata*	herb	FACW+

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: n/a (in.)
Depth to Saturated Soil: 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- X Saturated in Upper 12 Inches
- X Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 Inches
- X Water-Stained Leaf Litter
- X Local Soil Survey Data
- X FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions). Slight buttressing of tree trunks.

DATA FORM (Community "NW19W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

w010

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic clayey silt
3-18	B	10YR3/1			sandy clayey silt

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

- Northwest Maple Swamp
- Southeast of NWET 1

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

Project/Site: Audlett Rd, SR 1140 Mid-Currituck
Applicant/Owner: NC Turnpike Authority Bridge
Investigator: CZR, INC-Kelly Chance, Steve Black
Date: 10-16-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: NWET 1
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Smilax rotundifolia	V	FAC	9. Lyonia lucida	S	FACW
2. Liquidambar styraciflua	T	FAC+	10. Ilex glabra	S	FACW
3. Liriodendron tulipifera	T	FAC	11. Morella cerifera	S	FAC+
4. Nyssa sylvatica var. biflora	T	OBL	12. Clethra alnifolia	S	FACW
5. Arundinaria gigantea	S	FACW	13. Gelsemium sempervirens	V	FAC
6. Vaccinium corymbosum	S	FACW	14. Euonymus americanus	S/T	FAC-
7. Woodwardia aereolata	H	OBL	15. Acer rubrum	H/S/T	FAC
8. Decumaria barbara	V	FACW	16. Persea borbonia	S/T	FACW

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). > 75%

Remarks: Has wetland plants

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
☐ Stream, Lake, or Tide Gauge
☐ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: 13 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
☒ Oxidized Root Channels in Upper 12 Inches
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

NWETI

SOILS

W013

Map Unit Name (Series and Phase): Ws - Wasda muck

Drainage Class: very poorly drained

Field Observations

Taxonomy (Subgroup): thermic Histic Humaquepts

Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-22		10 YR 2/1	10 YR 3/1	Few & small	LOAM
22-24"		10 YR 4/1			silty clay loam

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors

☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (Explain in Remarks)

Remarks: Few, small mottles in 0-22". Larger, more frequent mottles and streaking observed in 22-24"

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) [✓ Yes] No

Remarks: Meets all three wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W013

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 16 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: D wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Clethra alnifolia*	S	FACW	9. *Arundinaria gigantea*	S	FACW
2. *Morella cerifera*	S	FAC+	10. *Dichanthelium* sp.	H	
3. *Vaccinium corymbosum*	S	FACW	11. *Osmunda cinnomoea*	H	FACW+
4. *Liquidambar styraciflua*	T	FAC+	12. *Rubus* sp.	S	
5. *Liriodendron tulipifera*	T	FAC	13. *Sphagnum* sp.	H	NL
6. *Acer rubrum*	T	FAC	14.		
7. *Osmunda regalis*	H	OBL	15.		
8. *Juncus effusus*	H	FACW+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation Present

HYDROLOGY

____ **Recorded Data (Describe In Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: -10 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- ____ **Saturated in Upper 12"**
- ____ **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- X **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology Present

D wet

SOILS

W013

Map Unit Name
(Series and Phase): Wasda muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10		10YR 2/1			Sandy Loam
10-24		10YR 2/1			Clay Loam

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**

___ **Concretions**
___ **High Organic Content in Surface Layer in Sandy Soils**
X **Organic Streaking in Sandy Soils**
X **Listed On Local Hydric Soils List**
X **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

Wetland Soil Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ___
Wetland Hydrology Present? **Yes** X **No** ___
Hydric Soils Present? **Yes** X **No** ___

Is the Sampling Point Within a Wetland? **Yes** X **No** ___

Remarks:

NB/Maple Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 18 Dec 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: D up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Pinus taeda*	T	FAC	9.		
2. *Liriodendron tulipifera*	T	FAC	10.		
3. *Acer rubrum*	T/S	FAC	11.		
4. *Quercus alba*	T	FACU	12.		
5. *Quercus nigra*	T	FAC	13.		
6. *Fagus grandifolia*	T	FACU	14.		
7.	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >70%

Remarks:

Wetland Vegetation Present

HYDROLOGY

____ **Recorded Data (Describe in Remarks):**
  ____ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12"
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators:
- ____ Oxidized Roots Channels in Upper 12"
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks:
Drought Conditions
Wetland Hydrology Not Present

D up

SOILS

Map Unit Name
(Series and Phase): Munden loamy sand **Drainage Class:** moderately well drained

Taxonomy (Subgroup): thermic Aquic Hapludults **Confirm Mapped Type? Yes**____ **No**____

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6		10YR 2/1			Sandy Loam
6-24		10YR 4/4			Sandy Loam

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- ____ Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

Wetland Soil Not Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ____
Wetland Hydrology Present? Yes ____ No X
Hydric Soils Present? Yes ____ No X

Is the Sampling Point Within a Wetland? Yes____ No X

Remarks:

NE/Maple Swamp

~ NW MAPLE SWAMP
~ 1000' East of A

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

Project/Site: Aydlett Rd. SR 1140 Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc. Kelly Chandler, Steve Bic
Date: 10-16-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: 1A wt
Transect ID:
Plot ID:

VEGETATION

fern
aster

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Woodwardia areolata	H	OBL	9. Pinus taeda	T	FAC
2. Aster racemosus	H	OBL	10. Nyssa sylvatica var. bifl	S/T	OBL
3. Bacopa monnieri	H	OBL	11. Juncus effusus	H	FACW+
4. Scirpus cyperinus	S	OBL	12. Vaccinium corymbosum	S	FACW
5. Eleocharis tuberculosa	H	FACW+	13. Liquidambar styraciflua	T	FAC+
6. Morella cerifera	S	FAC+	14.		
7. Acer rubrum	T	FAC	15.		
8. Arundinaria gigantea	S	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). >75%

Remarks: Has wetland plants

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
  ☐ Stream, Lake, or Tide Gauge
  ☐ Aerial Photographs
  ☐ Other
☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  ☐ Inundated
  ☒ Saturated in Upper 12 Inches
  ☐ Water Marks
  ☐ Drift Lines
  ☐ Sediment Deposits
  ☒ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  ☒ Oxidized Root Channels in Upper 12 Inches
  ☐ Water-Stained Leaves
  ☐ Local Soil Survey Data
  ☐ FAC-Neutral Test
  ☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

A wet

W013

SOILS

Map Unit Name (Series and Phase): Ws - Wasda muck
Drainage Class: very poorly drained

Field Observations
Taxonomy (Subgroup): thermic Histic Humaquepts
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3"		10YR 2/1			LOAM
3-24"		10YR 3/1			SILTYLOAM

Hydric Soil Indicators:

- __ Histosol
- __ Histic Epipedon
- __ Sulfidic Odor
- __ Aquic Moisture Regime
- __ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- __ Concretions
- __ High Organic Content in Surface Layer in Sandy Soils
- __ Organic Streaking in Sandy Soils
- X Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- __ Other (Explain in Remarks)

Remarks: Soil texture became silty clay loam in 18-24"
Has hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) [✓ Yes] No

Remarks:
Meets all three wetland criteria

- NW MAPLE SWAMP - Powerlines
- ~100' E of NWET 114

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Aydlett Rd. SR 1140 Mid-Currituck
Applicant/Owner: NC Turnpike Authority Bridge
Investigator: CZR Inc. - Kelly Chance, Steve Beck

Date: 10-17-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: NWET 114
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus cyperinus	S	OBL	9. Andropogon virginicus	S	FAC-
2. Arundinaria gigantea	S	FACW	10. Eleocharis tuberculosa	H	FACW+
3. Juncus effusus	S	FACW+	11. Erianthus giganteus	S	FACW
4. Eupatorium capillifolium	S	FACU	12.		
5. Liquidambar styraciflua	S	FAC+	13.		
6. Acer rubrum	S	FAC	14.		
7. Polygala lutea	H	FACW+	15.		
8. Juncus biflorus	S	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). > 60%

Remarks:
Has wetland plants.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: 6-8 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

NWET 114

SOILS

W013

Map Unit Name (Series and Phase): Ws-Wasda muck Drainage Class: Very Poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10 YR 2/1			Silty Clay Loam

Hydric Soil Indicators:

__ Histosol
__ Histic Epipedon
__ Sulfidic Odor
__ Aquic Moisture Regime
__ Reducing Conditions
X Gleyed or Low-Chroma Colors
__ Concretions
__ High Organic Content in Surface Layer in Sandy Soils
X Organic Streaking in Sandy Soils
X Listed on Local Hydric Soils List
X Listed on National Hydric Soils List
__ Other (Explain in Remarks)

Remarks: 0-4" has many fibrous roots 6-24" had OR's present and small mottles. 20-24" exhibited heavy stripping. Has hydric soil.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) [✓ Yes] No

Remarks:

Meets all three wetland criteria

-NW MAPLE SWAMP
Powerlines
- 100' West of NWET112

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Avdlett Rd SR 1140 Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc-Kelly Chance, Steve Beck
Date: 10-17-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: NWET 112
Transect ID: ____
Plot ID: ____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	S	FAC	9.		
2. Rubus flagellaris	H	UPL	10.		
3. Eupatorium capillifolium	H	FAC-	11.		
4. Solidago fistulosa	H	FAC+	12.		
5. Dichanthelium sp.	H	—	13.		
6. Andropogon virginicus	H	FAC-	14.		
7. Lonicera japonica	V/H	FAC-	15.		
8. Rhus copallinum	S	NI	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). < 50%

Remarks: Vegetation is maintained and/or cut by humans. Site is located under powerlines.

HYDROLOGY

__ Recorded Data (Describe in Remarks):
  __ Stream, Lake, or Tide Gauge
  __ Aerial Photographs
  __ Other
__ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  __ Inundated
  __ Saturated in Upper 12 Inches
  __ Water Marks
  __ Drift Lines
  __ Sediment Deposits
  __ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  __ Oxidized Root Channels in Upper 12 Inches
  __ Water-Stained Leaves
  __ Local Soil Survey Data
  __ FAC-Neutral Test
  __ Other (Explain in Remarks)

Remarks: Does not have wetland hydrology

PWET 112

SOILS

Map Unit Name (Series and Phase): Ws-Wasda muck
Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts
Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16"		2.5Y 5/3			Loamy Sand
16-24"		2.5Y 5/4			Loamy Sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Does not exhibit hydric soil characteristics

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes [✓ No] (Circle)
Wetland Hydrology Present? Yes [✓ No]
Hydric Soils Present? Yes [✓ No]

(Circle)
Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks: Does not meet wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W013

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: P10
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Saururus cernuus*	H	OBL	9. *Nyssa biflora*	T	OBL
2. *Woodwardia areolata*	H	OBL	10. *Persea palustris*	T	FACW
3. *Smilax rotundifolia*	V	FAC	11. *Cornus foemina*	T	FACW-
4. *Woodwardia virginica*	H	OBL	12. *Arundinaria gigantea*	S	FACW
5. *Osmunda regalis*	H	OBL	13.		
6. *Acer rubrum*	T	FAC	14.		
7. *Liriodendron tulipifera*	T	FAC	15.		
8. *Quercus phellos*	T	FACW-	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- X **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- X **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology Present

P10

SOILS

W013

Map Unit Name
(Series and Phase): Wasda muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8		10YR 2/1			Loamy Sand/Muck mix
8-24		10YR 2/1	10YR 4/2 moderate distinct stripping		Clay Loam

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
X Gleyed or Low-Chroma Colors

___ Concretions
___ High Organic Content In Surface Layer In Sandy Soils
___ Organic Streaking In Sandy Soils
X Listed On Local Hydric Soils List
X Listed on National Hydric Soils List
X Other (Explain in Remarks)

Remarks:
S7: Dark Surface Indicator

Wetland Soil Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

200' ~~west~~ east of P10

~50' west between Flags
X and W

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Aydlett Rd, SR 1140 Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc - Kelly Chance, Steve Brown
Date: 10-17-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: W/X
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Hamamelis virginiana	S	FACU	9. Liriodendron tulipifera	T	FAC
2. Bignonia capreolata	V/H	FAC	10. Symplocos tinctoria	S/T	FAC
3. Lonicera japonica	V/H	FAC-	11.		
4. Liquidambar styraciflua	T	FAC+	12.		
5. Acer rubrum	T	FAC	13.		
6. Arundinaria gigantea	S	FACW	14.		
7. Quercus laurifolia	S	FACW	15.		
8. Carya glabra	S	FACU	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). ≈ 50%

Remarks: Does not have wetland vegetation

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Does not have wetland hydrology

w/x

SOILS

Map Unit Name (Series and Phase): Ws- Wasda muck

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24''		10YR 3/4			Loamy sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: 0-2'' had many small, fibrous roots. Entire profile lacked mottling, streaking.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes [✓ No] (Circle)

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

(Circle)

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Does not meet wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W013

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: BB
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9. *Smilax rotundifolia*	V	FAC
2. *Clethra alnifolia*	H	FACW	10.		
3. *Arundinaria gigantea*	S	FACW	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Liriodendron tulipifera*	T	FAC	13.		
6. *Quercus nigra*	T	FAC	14.		
7. *Vaccinium corymbosum*	S	FACW	15.		
8. *Symplocos tinctoria*	T	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation Present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- X Oxidized Roots Channels in Upper 12"
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- X FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:
Drought Conditions
Wetland Hydrology Present

BB wet

SOILS

W013

Map Unit Name
(Series and Phase): Wasda muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10		7.5YR 2/1			loamy sand
10-14		7.5YR 2/1	10YR 4/2	moderate distinct stripping	loamy sand
14-24		10Y/R 4/2			silty clay loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- _X_ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- _X_ Listed On Local Hydric Soils List
- _X_ Listed on National Hydric Soils List
- _X_ Other (Explain in Remarks)

Remarks:
S7: Dark Surface Indicator

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** _X_ **No** ___
Wetland Hydrology Present? **Yes** _X_ **No** ___
Hydric Soils Present? **Yes** _X_ **No** ___

Is the Sampling Point Within a Wetland? **Yes** _X_ **No** ___

Remarks:

150' North of BB

- Wooded "island" in Field ~300' west of Point AA west of Maple Swamp North of Aydlett Rd.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Aydlett Rd, SR 1140 Mid-Currituck
Applicant/Owner: NC Turnpike Authority Bridge
Investigator: CZR, Inc-Kelly Chance, Steve Beck
Date: 10-15-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: AA1
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Arundanaria gigantea	S	FACW	9. Quercus lyrata	S	OBL
2. Nyssa sylvatica var. biflora	T	OBL	10. Clethra alnifolia	S	FACW
3. Acer rubrum	S/T	FAC	11. Toxicodendron radicans	H/V	FAC
4. Liriodendron tulipifera	T	FAC	12. Woodwardia areolata	H	OBL
5. Liquidambar styraciflua	T	FAC+	13. Smilax rotundifolia	V	FAC
6. Persea borbonia	S/T	FACW	14.		
7. Vitis rotundifolia	V	FAC	15.		
8. Lonicera japonica	H/V	FAC-	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). > 50%

Remarks: Has some wetland plants

HYDROLOGY

__ Recorded Data (Describe in Remarks):
  __ Stream, Lake, or Tide Gauge
  __ Aerial Photographs
  __ Other
__ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  __ Inundated
  __ Saturated in Upper 12 Inches
  __ Water Marks
  __ Drift Lines
  __ Sediment Deposits
  __ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  __ Oxidized Root Channels in Upper 12 Inches
  __ Water-Stained Leaves
  __ Local Soil Survey Data
  __ FAC-Neutral Test
  __ Other (Explain in Remarks)

Remarks: Does not exhibit wetland hydrology

AA up

SOILS

Map Unit Name (Series and Phase): At - Augusta fine sandy loam Drainage Class: somewhat poorly drained

Field Observations

Taxonomy (Subgroup): thermic Aeric Ochraquults Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10YR 2/1			SANDY LOAM

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chrome Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Dry, many fine roots in 0-8".

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? Yes [✓ No]
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) Yes [✓ No]

Remarks: Does not meet all three wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W013

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: nwet164
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9. *Vitis* sp.	V	
2. *Magnolia virginiana*	T	FACW+	10.		
3. *Vaccinium corymbosum*	S	FACW	11.		
4. *Smilax rotundifolia*	V	FAC	12.		
5. *Acer rubrum*	T	FAC	13.		
6. *Liquidambar styraciflua*	T	FAC+	14.		
7. *Liriodendron tulipifera*	T	FAC	15.		
8. *Symplocus tinctoria*	T/S	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

nwet 164

SOILS

W013

Map Unit Name
(Series and Phase): Wasda muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24		7.5 YR 2.5/1			loamy sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
X Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
X Organic Streaking in Sandy Soils
X Listed On Local Hydric Soils List
X Listed on National Hydric Soils List
X Other (Explain in Remarks)

Remarks:
S7: Dark Surface Indicator

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W013

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: nwet185
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9.		
2. *Persea palustris*	T	FACW	10.		
3. *Clethra alnifolia*	S	FACW	11.		
4. *Ilex opaca*	T	FAC-	12.		
5. *Vaccinium corymbosum*	S	FACW	13.		
6. *Liquidambar styraciflua*	T	FAC+	14.		
7. *Acer rubrum*	T	FAC	15.		
8. *Asimina triloba*	T/S	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >87%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

NWET 185

SOILS

W013

Map Unit Name
(Series and Phase): Ponzer muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Terric Medisaprists **Confirm Mapped Type? Yes___ No___**

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12					organic debris/peat
12-24		10YR 2/2			silty clay loam

Hydric Soil Indicators:

___ Histosol
X Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
X Gleyed or Low-Chroma Colors

___ Concretions
X High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
X Listed On Local Hydric Soils List
X Listed on National Hydric Soils List
X Other (Explain in Remarks)

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No___
Wetland Hydrology Present? Yes X No___
Hydric Soils Present? Yes X No___

Is the Sampling Point Within a Wetland? Yes X No___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W03

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: nwet200
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9.		
2. *Leucothoe axillaris*	H/S	FACW	10.		
3. *Perseus palustris*	T/S	FACW	11.		
4. *Ilex opaca*	T	FAC-	12.		
5. *Symplocos tinctoria*	T	FAC	13.		
6. *Clethra alnifolia*	S	FACW	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >83%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (In.)

Depth to Free Water in Pit: >24 (In.)

Depth to Saturated Soil: >24 (In.)

Wetland Hydrology Indicators

Primary Indicators:
___ Inundated
___ Saturated in Upper 12"
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators:
X Oxidized Roots Channels in Upper 12"
___ Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:
Drought Conditions
Wetland Hydrology present

NWET 2000

SOILS

W013

Map Unit Name
(Series and Phase): Wasda muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20		10YR 2/1			Sandy Loam
20-24		10YR 2/1	10YR 4/2	moderate distinct stripping	Sandy Loam

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**

___ **Concretions**
___ **High Organic Content in Surface Layer in Sandy Soils**
___ **Organic Streaking in Sandy Soils**
X **Listed On Local Hydric Soils List**
X **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 17 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NE12W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Ligustrum sinense*	shrub	FACW
2. *Liquidambar styraciflua*	tree	FAC+	10. *Vaccinium corymbosum*	shrub	FAC
3. *Quercus nigra*	tree	FAC	11. *Woodwardia areolata*	herb	OBL
4. *Pinus taeda*	tree	FAC	12. *Osmunda cinnamomea*	herb	FACW+
5. *Oxydendron arboreum*	tree	FACU	13.		
6. *Prunus serotina*	sapling	FACU	14.		
7. *Persia borbonia*	shrub	FACW	15.		
8. *Magnolia virginiana*	sapling	FACW+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 83

Remarks:

HYDROLOGY

____ Recorded Data (Describe in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other (Explain in Remarks)

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >10 (in.)

Depth to Saturated Soil: >10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 Inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 Inches
- X Water-Stained Leaf Litter
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NE12W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W012

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic loam
2-18	B	10YR3/1.5			fine sandy loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- X Listed on Local Hydric Soils List
- x Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS

Applicant/Owner: North Carolina Turnpike Authority

Investigator: M. Mitchell (PB Americas, Inc.)

Date: 17 October 2007

Co./City: Currituck County

State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No

Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]

Is the area a potential Problem Area? Yes [✓ No]

(If needed, explain on reverse)

Community ID: NE12U

Transect ID: not applicable

Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Ligustrum sinense*	shrub	FACW
2. *Liquidambar styraciflua*	tree	FAC+	10. *Vaccinium corymbosum*	shrub	FAC
3. *Quercus nigra*	tree	FAC	11.		
4. *Pinus taeda*	tree	FAC	12.		
5. *Oxydendron arboreum*	tree	FACU	13.		
6. *Prunus serotina*	sapling	FACU	14.		
7. *Persia borbonia*	shrub	FACW	15.		
8. *Quercus falcata*	tree	FACU-	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 70

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

DATA FORM (Community "NE12U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundence/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic loam
2-18	B	10YR3/2		none	fine sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Chroma greater than 2 with no mottles.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.) / S. Beck

Date: 17 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: NE60W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Solidago* sp.	herb	N/A
2. *Liquidamber styraciflua*	tree	FAC+	10.		
3. *Quercus nigra*	tree	FAC	11.		
4. *Myrica cerifera*	shrub	FAC+	12.		
5. *Clethra alnifolia*	shrub	FACW	13.		
6. *Arundinaria gigantea*	shrub	FACW	14.		
7. *Eupatorium perfoliatum*	herb	FACW+	15.		
8. *Thelypteris thelypteroides*	herb	FACW+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks: Within tree line abutting power line easement.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

_x_ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: n/a (in.)
Depth to Saturated Soil: 12 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
  ___ Inundated
  _x_ Saturated in Upper 12 Inches
  ___ Water Marks
  ___ Drift Lines
  ___ Sediment Deposits
  ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
  ___ Oxidized Root Channels in Upper 12 Inches
  ___ Water-Stained Leaf Litter
  _x_ Local Soil Survey Data
  ___ FAC-Neutral Test
  ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NE50W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

wo13

Map Unit Name (Series and Phase): Ponzer muck

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Terric Haplosaprists

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic loam
3-18	B	10YR4/1.5	10YR5/3	weak	fine sandy loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- x Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- x Listed on Local Hydric Soils List
- x Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: >70% Coated Sand Grains

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS

Applicant/Owner: North Carolina Turnpike Authority,

Investigator: M. Mitchell (PB Americas, Inc.) /S. Beck

Date: 17 October 2007

Co./City: Currituck County

State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No

Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]

Is the area a potential Problem Area? Yes [✓ No]

(If needed, explain on reverse)

Community ID: NE50U

Transect ID: not applicable

Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW
2. *Liquidambar styraciflua*	tree	FAC+
3. *Pinus taeda*	tree	FAC
4. *Liriodendron tulipifera*	tree	FACU
5. *Myrica cerifera*	shrub	FAC+
6. *Arundinaria gigantea*	shrub	FACW
7. *Solidago* sp.	herb	N/A
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 83

Remarks: Within tree line abutting power line easement.

HYDROLOGY

___ Recorded Data (Describe in Remarks):

- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >14 (in.)

Depth to Saturated Soil: 14 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "NE50U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name (Series and Phase): Ponzer muck

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Terric Haplosaprists

Field Observations
Confirmed Mapped Type? Yes [✓ No]

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-18	B	10YR6/3			fine sandy loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Non-hydric sandy inclusion. "Sand ridges" of local terminology.
<50% Coated Sand Grains

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No
Wetland Hydrology Present? Yes [✓ No]
Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.) / S. Beck

Date: 19 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: ~~NE54W~~ X24w
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	sapling	FACW	9. *Mikania scandens*	herb	FACW+
2. *Liquidambar styraciflua*	sapling	FAC+	10. *Thelypteris thelypteroides*	herb	FACW+
3. *Pinus taeda*	sapling	FAC	11. *Cinna arundinacea*	herb	FACW
4. *Myrica cerifera*	shrub	FAC+	12. *Solidago sp.*	herb	N/A
5. *Baccharis halimifolia*	shrub	FAC	13. *Eleocharis sp.*	herb	N/A
6. *Scirpus cyperinus*	herb	OBL	14.		
7. *Eupatoriadelphus maculatus*	herb	FACW-	15.		
8. *Eupatorium perfoliatum*	herb	FACW+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks: PEM/SS

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: n/a (in.)
Depth to Saturated Soil: 8 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
  ___ Inundated
  X Saturated in Upper 12 Inches
  ___ Water Marks
  ___ Drift Lines
  X Sediment Deposits
  ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
  X Oxidized Root Channels in Upper 12 Inches
  ___ Water-Stained Leaf Litter
  X Local Soil Survey Data
  X FAC-Neutral Test
  ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions). Desiccation cracks.

x34w

DATA FORM (Community "~~NE64W~~" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

SOILS

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-2	A				organic loam
2-18	B	10YR4/1.5	10YR5/3	weak	fine sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chrome Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.) / S. BECK

Date: 19 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: ~~[illegible]~~ X24 uP
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	sapling	FACW	9.		
2. ~~*Liquidambar styraciflua*~~	~~sapling~~	~~FAC+~~	10.		
3. *Pinus taeda*	tree / sapling	FAC	11.		
4. *Myrica cerifera*	shrub	FAC+	12.		
5. *Baccharis halimifolia*	shrub	FAC	13.		
6. *Solidago* sp.	herb	N/A	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks: PEM/SS

HYDROLOGY

___ Recorded Data (Describe in Remarks):
 ___ Stream, Lake, or Tide Gauge
 ___ Aerial Photographs
 ___ Other (Explain in Remarks)

_X_ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: > 24 (in.)
Depth to Saturated Soil: > 24 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

X24 vp

DATA FORM (Community "~~NE64B~~" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name (Series and Phase): Tomotley fine sandy loam

Drainage Class: poorly drained

Taxonomy (Subgroup): thermic Typic Endoaquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-24	B	10YR4/2			fine sandy loam

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors

☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (Explain in Remarks)

Remarks: Chroma greater than 2 with no mottles./ Sand Grains Mostly Uncoated (<50% Coated)

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

w013

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 15 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SWBW
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Thelypterus thelypteroides*	herb	FACW+
2. *Liquidambar styraciflua*	tree	FAC+	10. *Smilax rotundifolia*	vine	FAC
3. *Quercus nigra*	sapling	FAC	11. *Toxicodendron radicans*	vine	FAC
4. *Magnolia virginiana*	sapling	FACW+	12.		
5. *Carpinus caroliniana*	sapling	FAC	13.		
6. *Viburnum nudum*	shrub	FACW+	14.		
7. *Chasmanthium laxum*	herb	FACW-	15.		
8. *Woodwardia areolata*	herb	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

_x_ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: >12 (in.)
Depth to Saturated Soil: 12 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- _x_ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- _x_ Water-Stained Leaf Litter
- _x_ Local Soil Survey Data
- _x_ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "SW8W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W013

SOILS

Map Unit Name
(Series and Phase): Portsmouth fine sandy loam

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Typic Umbraquults

Field Observations
Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-18	B	2.5Y6/1	10YR6/4	prominent	clayey silty sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- _x_ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- _x_ Listed on Local Hydric Soils List
- _x_ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W015

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 15 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SW1W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Toxicodendron radicans*	herb	FAC
2. *Liquidambar styraciflua*	tree	FAC+	10.		
3. *Nyssa sylvatica*	tree	FAC	11.		
4. *Magnolia virginiana*	sapling	FACW+	12.		
5. *Arundinaria gigantea*	shrub	FACW	13.		
6. *Myrica cerifera*	shrub	FAC+	14.		
7. *Chasmanthium laxum*	herb	FACW-	15.		
8. *Woodwardia areolata*	herb	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other (Explain in Remarks)

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >10 (in.)

Depth to Saturated Soil: >10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaf Litter
- ☒ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "SW1W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

w015

SOILS

Map Unit Name (Series and Phase): Portsmouth fine sandy loam

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Typic Umbraquults

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic loam
3-18	B	10YR7/1.5			fine sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content In Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 15 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SW8U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Smilax bona-nox*	herb	FAC
2. *Liquidambar styraciflua*	tree	FAC+	10. *Toxicodendron radicans*	vine	FAC
3. *Quercus nigra*	tree	FAC	11.		
4. *Pinus taeda*	tree	FAC	12.		
5. *Liriodendron tulipifera*	tree	FACU	13.		
6. *Magnolia virginiana*	sapling	FACW+	14.		
7. *Woodwardia areolata*	herb	OBL	15.		
8. *Smilax rotundifolia*	vine	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 90

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other (Explain in Remarks)

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >16 (in.)

Depth to Saturated Soil: >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaf Litter
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "SW8U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name
(Series and Phase): Portsmouth fine sandy loam

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Typic Umbraquults

Field Observations
Confirmed Mapped Type? Yes [✓ No]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-18	B	2.5Y6/3	10YR6/4	moderate	silty sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors

___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks: Non-hydric inclusion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	[✓ Yes] No	Is this Sampling Point Within a Wetland? Yes [✓ No]
Wetland Hydrology Present?	Yes [✓ No]	
Hydric Soils Present?	Yes [✓ No]	

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 15 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? Yes [✓ No]
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SW1U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Liquidambar styraciflua*	sapling	FAC+	9.		
2. *Arundinaria gigantea*	shrub	FACW	10.		
3. *Myrica cerifera*	shrub	FAC+	11.		
4. *Toxicodendron radicans*	herb	FAC	12.		
5. *Vicia sativa*	herb	FACU-	13.		
6. *Setaria italica*	herb	FACU	14.		
7. *Zea mays*	herb	U	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 57

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
  ___ Stream, Lake, or Tide Gauge
  ___ Aerial Photographs
  ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >18 (in.)

Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
  ___ Inundated
  ___ Saturated in Upper 12 Inches
  ___ Water Marks
  ___ Drift Lines
  ___ Sediment Deposits
  ___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  ___ Oxidized Root Channels in Upper 12 Inches
  ___ Water-Stained Leaf Litter
  ___ Local Soil Survey Data
  ___ FAC-Neutral Test
  ___ Other (Explain in Remarks)

Remarks:

DATA FORM (Community "SW1U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name (Series and Phase): Portsmouth fine sandy loam, drained

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Typic Umbraquults

Field Observations Confirmed Mapped Type? Yes [✓ No]

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				organic loam
3-18	B	10YR4/2			fine sandy loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- _X_ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Higher chroma than typical Portsmouth loam.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? Yes [✓ No]

Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W015

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 17 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: se26w
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Sphagnum* sp.	H	NL	9. *Triadenum virginicum*	H	OBL
2. *Woodwardia virginica*	H	OBL	10.		
3. *Smilax laurifolia*	V	FACW+	11.		
4. *Acer rubrum*	T/S	FAC	12.		
5. *Magnolia virginiana*	T	FACW+	13.		
6. *Nyssa sylvatica*	T	FAC	14.		
7. *Persea palustris*	T	FACW	15.		
8. *Dulichium arundinaceum*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

____ **Recorded Data (Describe In Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >24 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- X **Saturated in Upper 12"**
- X **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- ____ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ____ **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology Present

JE26W

SOILS

W015

Map Unit Name
(Series and Phase): Ponzer muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Terric Medisaprists **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		7.5YR 2/1			mucky peat
12-24		7.5YR 2/1			silty clay loam

Hydric Soil Indicators:

- ___ Histosol
- X Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- X High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- X Listed On Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W015

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 18 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SE3W
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Magnolia tripelata*	sapling	FAC
2. *Pinus taeda*	tree	FAC	10. *Woodwardia areolata*	herb	OBL
3. *Quercus nigra*	tree	FAC	11. *Thelypteris thelypteroides*	herb	FACW+
4. *Magnolia virginiana*	sapling	FACW+	12. *Toxicodendron radicans*	vine	FAC
5. *Arundinaria gigantea*	shrub	FACW	13. *Smilax laurifolia*	vine	FACW+
6. *Clethra alnifolia*	shrub	FACW	14. *Smilax bona-nox*	vine	FAC
7. *Symplocus tinctoria*	sapling	FAC	15. *Vitis rotundifolia*	vine	FAC
8. *Persea borbonia*	sapling	FACW	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other (Explain in Remarks)

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Standing Water in Pit: >10 (in.)

Depth to Saturated Soil: 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaf Litter
- ☒ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "SE3W" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

J015

SOILS

Map Unit Name (Series and Phase): Wasde muck

Drainage Class: very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-3	A				loam
3-18	B	10YR3/1			fine sandy loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- _x_ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- _x_ Listed on Local Hydric Soils List
- _x_ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	[✓ Yes] No	Is this Sampling Point Within a Wetland? [✓ Yes] No
Wetland Hydrology Present?	[✓ Yes] No	
Hydric Soils Present?	[✓ Yes] No	

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 16 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: SE3U
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9.		
2. *Pinus taeda*	tree	FAC	10.		
3. *Quercus nigra*	tree	FAC	11.		
4. *Liriodendron tulipifera*	sapling	FACU	12.		
5. *Liquidambar styraciflua*	tree	FAC	13.		
6. *Clethra alnifolia*	shrub	FACW	14.		
7. *Kalmia latifolia*	shrub	FACU	15.		
8. *Smilax rotundifolia*	vine	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 75

Remarks: Kalmia latifolia appears to be escaped cultivar.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

X No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: >18 (in.)
Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaf Litter
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Much drier-than-normal year (drought conditions).

DATA FORM (Community "SE3U" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

Map Unit Name
(Series and Phase): Dragston loamy fine sand

Drainage Class: somewhat poorly drained

Taxonomy (Subgroup): thermic Aeric Endoaquults

Field Observations
Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-2	A				sandy loam
2-18	B	10YR4/2			silty fine sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
_x_ Listed on Local Hydric Soils List
_x_ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks: Chroma of 2 with no mottles.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No
Wetland Hydrology Present? Yes [✓ No]
Hydric Soils Present? Yes [✓ No]

Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W010

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 13 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW3-95
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9. *Quercus nigra*	T	FAC
2. *Persea palustris*	T/S	FACW	10. *Clethra alnifolia*	H/S	FACW
3. *Carpinus caroliniana*	T	FAC	11.		
4. *Arundinaria gigantea*	S	FACW	12.		
5. *Taxodium distichum*	T	OBL	13.		
6. *Acer rubrum*	T	FAC	14.		
7. *Osmunda cinnomomea*	H	FACW+	15.		
8. *Morella cerifera*	S	FAC+	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water In Pit: >24 (in.)

Depth to Saturated Soil: -8 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- X **Saturated In Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns In Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels In Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain In Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

SW3-15

SOILS

Map Unit Name
(Series and Phase): Tomotely fine sandy loam **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Ochraquults **Confirm Mapped Type? Yes**___ **No**___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2					organic debris
2-24		7.5YR 2.5/1		slightly stripped	sandy loam/muck

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- X High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- X Listed On Local Hydric Soils List
- X Listed on National Hydric Soils List
- X Other (Explain in Remarks)

Remarks:
S7: Dark Surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No**___
Wetland Hydrology Present? **Yes** X **No**___
Hydric Soils Present? **Yes** X **No**___

Is the Sampling Point Within a Wetland? **Yes** X **No**___

Remarks:

Great ~~Dismal~~ Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W018

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 31 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW3-47
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda regalis*	H	OBL	9.		
2. *Saururus cernuus*	H	OBL	10.		
3. *Acer rubrum*	T/S	FAC	11.		
4. *Carpinus caroliniana*	T	FAC	12.		
5. *Woodwardia areolata*	H	OBL	13.		
6. *Pinus taeda*	T	FAC	14.		
7. *Ilex opaca*	T	FAC-	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >85%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >24 **(in.)**

Depth to Saturated Soil: >24 **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- X **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

RW3-47

SOILS

W018

Map Unit Name
(Series and Phase): Tomotely fine sandy loam **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Ochraquults **Confirm Mapped Type? Yes___ No___**

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24		10YR 3/1			silty clay loam

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
X Gleyed or Low-Chroma Colors

___ Concretions
X High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
X Listed On Local Hydric Soils List
X Listed on National Hydric Soils List
X Other (Explain in Remarks)

Remarks:
S7: Dark surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No___
Wetland Hydrology Present? Yes X No___
Hydric Soils Present? Yes X No___

Is the Sampling Point Within a Wetland? Yes X No___

Remarks:

Great ~~Dismal~~ Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W019

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 12 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RE5
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Toxicodendron radicans*	V	FAC	9.		
2. *Woodwardia areolata*	H	OBL	10.		
3. *Arundindaria gigantea*	S	FACW	11.		
4. *Carpinus caroliniana*	T	FAC	12.		
5. *Smilax rotundifolia*	V	FAC	13.		
6. *Acer rubrum*	T	FAC	14.		
7. *Quercus michauxii*	T	FACW-	15.		
8. *Quercus nigra*	T	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated In Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- X **Drainage Patterns In Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels In Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

RES wet

SOILS

W019

Map Unit Name
(Series and Phase): Dragston fine sandy loam **Drainage Class:** somewhat poorly drained

Taxonomy (Subgroup): Thermic Aeric Ochraquults **Confirm Mapped Type? Yes**____ **No**____

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1					organic debris
1-24		10YR 3/2			loamy sand

Hydric Soil Indicators:

- ____ **Histosol**
- ____ **Histic Epipedon**
- ____ **Sulfidic Odor**
- ____ **Aquic Moisture Regime**
- ____ **Reducing Conditions**
- _X_ **Gleyed or Low-Chroma Colors**
- ____ **Concretions**
- ____ **High Organic Content in Surface Layer in Sandy Soils**
- ____ **Organic Streaking in Sandy Soils**
- _X_ **Listed On Local Hydric Soils List**
- _X_ **Listed on National Hydric Soils List**
- _X_ **Other (Explain in Remarks)**

Remarks:
Wetland located adjacent to streambed
Soil contrasts strongly compared to upland soil
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** _X_ **No** ____
Wetland Hydrology Present? **Yes** _X_ **No** ____
Hydric Soils Present? **Yes** _X_ **No** ____

Is the Sampling Point Within a Wetland? **Yes** _X_ **No** ____

Remarks:

Wetland on east side of Rt 158 and connects to Great Dismal Swamp on west side via culvert

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 12 Nov 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RE5 up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Ligustrum sinense*	H	FAC	9.		
2. *Asimina triloba*	S	FAC	10.		
3. *Campsis radicans*	V	FAC	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Celtis occidentalis*	T	FACU	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 80%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water In Pit: >24 **(in.)**

Depth to Saturated Soil: >24 **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated In Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology Not present

RE5 up

SOILS

Map Unit Name (Series and Phase): Dragston fine sandy loam **Drainage Class:** somewhat poorly drained

Taxonomy (Subgroup): thermic Aeric Ochraquults **Confirm Mapped Type?** Yes___ No___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12		10YR 3/2			loamy sand
12-24		2.5Y 5/6			loamy sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
_X_ Gleyed or Low-Chroma Colors

___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
_x_ Listed On Local Hydric Soils List
_x_ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

Wetland Soil Not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ___
Wetland Hydrology Present? Yes ___ No _X_
Hydric Soils Present? Yes ___ No _X_

Is the Sampling Point Within a Wetland? Yes _X_ No ___

Remarks:

Upland woods just north of RE5 wetland on east side of Rt 158

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

WD18

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 31-Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW3-44
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix nigra*	T	OBL	9. *Andropogon* sp.	H	
2. *Acer rubrum*	S/T	FAC	10.		
3. *Tyhpa* sp.	H/S	OBL	11.		
4. *Juncus effusus*	H	FACW+	12.		
5. *Boehmeria cylindrica*	H	FACW+	13.		
6. *Morella cerifera*	S	FAC+	14.		
7. *Woodwardia areolata*	H	OBL	15.		
8. *Woodwardia virginica*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ Recorded Data (Describe In Remarks):
- **___ Stream, Lake, or Tide Gauge**
- **X Aerial Photographs**
- **___ Other**

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >24 **(in.)**

Depth to Saturated Soil: 0 **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- **___ Inundated**
- **X Saturated in Upper 12"**
- **___ Water Marks**
- **___ Drift Lines**
- **___ Sediment Deposits**
- **___ Drainage Patterns in Wetlands**

Secondary Indicators:
- **___ Oxidized Roots Channels in Upper 12"**
- **___ Water-Stained Leaves**
- **___ Local Soil Survey Data**
- **X FAC-Neutral Test**
- **___ Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

Rw3-44

SOILS

W018

Map Unit Name
(Series and Phase): Tomotely fine sandy loam **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Ochraquults **Confirm Mapped Type? Yes___ No___**

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20					muck
20-24		10YR 2/1			sandy loam

Hydric Soil Indicators:

_X_ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
_X_ Gleyed or Low-Chroma Colors

___ Concretions
_X_ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
_X_ Listed On Local Hydric Soils List
_X_ Listed on National Hydric Soils List
_X_ Other (Explain in Remarks)

Remarks:
S7: Dark Surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ___
Wetland Hydrology Present? Yes _X_ No ___
Hydric Soils Present? Yes _X_ No ___

Is the Sampling Point Within a Wetland? Yes _X_ No ___

Remarks:

Wetland meadow beneath powerlines between Rt 158 and Great ~~Dismal~~ Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W018

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 31 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: RW3-35
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Woodwardia areolata*	H	OBL	9.		
2. *Juncus effusus*	H	FACW+	10.		
3. *Arundinaria gingantea*	S	FACW	11.		
4. *Liriodendron tulipifera*	T	FAC	12.		
5. *Acer rubrum*	T	FAC	13.		
6. *Smilax rotundifolia*	V	FAC	14.		
7. *Clethra alnifolia*	H/S	FACW	15.		
8. *Persea palustris*	T/S	FACW	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

RW3-35

SOILS

W018

Map Unit Name
(Series and Phase): Tomotely fine sandy loam **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Ochraquults **Confirm Mapped Type? Yes___ No___**

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1					organic debris
1-6		10YR 2/1		slightly stripped	loamy sand/muck
6-20		10YR 2/1			loamy sand/muck
20-24		10YR 3/2			sandy loam/muck

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
_X_ Gleyed or Low-Chroma Colors

___ Concretions
_X_ High Organic Content in Surface Layer in Sandy Soils
_X_ Organic Streaking in Sandy Soils
_X_ Listed On Local Hydric Soils List
_X_ Listed on National Hydric Soils List
_X_ Other (Explain in Remarks)

Remarks:
S1: Sandy Mucky Mineral Indicator
S7: Dark Surface Indicator
Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ___
Wetland Hydrology Present? Yes _X_ No ___
Hydric Soils Present? Yes _X_ No ___

Is the Sampling Point Within a Wetland? Yes _X_ No ___

Remarks:

Great ~~Dismal~~ Swamp

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W027/29

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 10 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EMW-A
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix nigra*	S/T	OBL	9. *Woodwardia areolata*	H	OBL
2. *Magnolia virginiana*	T	FACW+	10. *Liquidambar styraciflua*	T	FAC+
3. *Morella cerifera*	S	FAC+	11. *Carpinus caroliniana*	S/T	FAC
4. *Nyssa biflora*	T	OBL	12. *Juncus roemeranus*	H	OBL
5. *Smilax rotundifolia*	V	FAC	13.		
6. *Arundinaria gigantea*	H	FACW	14.		
7. *Acer rubrum*	T	FAC	15.		
8. *Saururus cernuus*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: -10" (in.)

Depth to Saturated Soil: 0" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- X **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

W027/29

Map Unit Name(Series and Phase): Connaby muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Hystic Humaquepts **Confirm Mapped Type?** **Yes** ___ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		7.5YR 2/1			loamy sand/muck

Hydric Soil Indicators:

- ___ **Histosol**
- ___ **Histic Epipedon**
- ___ **Sulfidic Odor**
- ___ **Aquic Moisture Regime**
- ___ **Reducing Conditions**
- X **Gleyed or Low-Chroma Colors**
- ___ **Concretions**
- X **High Organic Content in Surface Layer in Sandy Soils**
- X **Organic Streaking in Sandy Soils**
- ___ **Listed On Local Hydric Soils List**
- ___ **Listed on National Hydric Soils List**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ___

Wetland Hydrology Present? **Yes** X **No** ___

Hydric Soils Present? **Yes** X **No** ___

Is the Sampling Point Within a Wetland? **Yes** X **No** ___

Remarks:

-Wet hardwood forest bordering intermittent stream (EMS-C)

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 10 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EMWAup
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Illex opaca*	T	FAC-	10.		
3. *Liquidambar styraciflua*	T	FAC	11.		
4. *Quercus nigra*	T	FAC	12.		
5. *Toxicodendron radicans*	V	FAC	13.		
6. *Aralia spinosa*	S/T	FAC	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >83%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: >-24" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology not present

SOILS

Map Unit Name(Series and Phase): Connaby muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Hystic Humaquepts **Confirm Mapped Type? Yes**___ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-20"		10YR 2/2			sand
20-24"		10YR 2/2	2.5Y 5/4	frequent/large	sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed On Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

-Wetland Soils not present
-Most likely a Dragston transitional area, although map shows all Connaby muck

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes ___ No X
Hydric Soils Present? Yes ___ No X

Is the Sampling Point Within a Wetland? Yes ___ No X

Remarks:

-Mixed pine/hardwood forest

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W-032/33

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EMW-F
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda regalis*	H	OBL	9. *Woodwardia areolata*	H	OBL
2. *Magnolia virginiana*	T	FACW+	10.		
3. *Woodwardia virginica*	H	OBL	11.		
4. *Nyssa biflora*	T	OBL	12.		
5. *Morella cerifera*	T	FAC+	13.		
6. *Arundinaria gigantea*	H	FACW	14.		
7. *Acer rubrum*	T	FAC	15.		
8. *Saururus cernuus*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: -10" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- X **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- X **Other (Explain in Remarks)**

Remarks:
-Tapered Trunks
-Wetland Hydrology present

SOILS

w032/33

Map Unit Name(Series and Phase): Munden fine sand **Drainage Class:** moderately well drained

Taxonomy (Subgroup): thermic Aquic Hapludults **Confirm Mapped Type? Yes** ___ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10YR 2/1			loamy sand/muck

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**

___ **Concretions**
X **High Organic Content in Surface Layer in Sandy Soils**
X **Organic Streaking in Sandy Soils**
___ **Listed On Local Hydric Soils List**
___ **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present
-Most likely within Portsmouth area, although map shows Munden

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X **No** ___
Wetland Hydrology Present? Yes X **No** ___
Hydric Soils Present? Yes X **No** ___

Is the Sampling Point Within a Wetland? Yes X **No** ___

Remarks:

-Wet hardwood forest
-Upland boundary defined by development

Dare County

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W02a/40

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 7 May 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: DCB wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	S	FAC
2. *Arundinaria gigantea*	H	FACW
3. *Juncus effusus*	H	FACW+
4. *Juncus roemeranus*	H	OBL
5. *Juncus gerardii*	H	OBL
6. *Smilax bona-nox*	V	FAC
7. *Morella cerifera*	S	FAC+
8. *Lonicera japonica*	V	FAC-
9. *Parthenocissus quinquefolia*	V	FAC
10. *Pteridium aquilinum*	H	FACU
11. *Quercus falcata*	S	FAC+
12. *Fraxinus pennsylvanica*	S	FACW
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >83%

Remarks:

Wetland Vegetation Present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: -5" **(in.)**

Depth to Saturated Soil: -18" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- X **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology Present

SOILS

w03a/40

Map Unit Name
(Series and Phase): Conaby muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes** ___ **No** X

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2"		10YR 2/1			loamy sand
2-20"		10YR 4/2			loamy sand
20-24"		10YR 4/2			loamy sand/ large
					woody debris

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
X **Aquic Moisture Regime**
___ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**
___ **Concretions**
___ **High Organic Content in Surface Layer in Sandy Soils**
X **Organic Streaking in Sandy Soils**
___ **Listed On Local Hydric Soils List**
___ **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

Wetland Soil Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ___
Wetland Hydrology Present? **Yes** X **No** ___
Hydric Soils Present? **Yes** X **No** ___

Is the Sampling Point Within a Wetland? **Yes** X **No** ___

Remarks:

Previously filled with wetland soils, exists under maintained powerlines.

Dare County

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 7 May 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: DCB up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	S	FAC	9.		
2. *Quercus falcata*	S	FAC+	10.		
3. *Pteridium aquilinum*	H	FACU	11.		
4. *Parthenocissus quinquefolia*	V	FAC	12.		
5. *Lonicera japonica*	V	FAC-	13.		
6. *Smilax bona-nox*	V	FAC	14.		
7. *Morella cerifera*	S	FAC+	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >71%

Remarks:

Wetland Vegetation Present

HYDROLOGY

____ **Recorded Data (Describe in Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >-24"(in.)

Depth to Saturated Soil: >-24"(in.)

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- ____ **Saturated in Upper 12"**
- ____ **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- ____ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ____ **Oxidized Roots Channels in Upper 12"**
- ____ **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- ____ **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology Not Present

SOILS

Map Unit Name
(Series and Phase): Conaby muck **Drainage Class:** very poorly drained

Taxonomy (Subgroup): thermic Histic Humaquepts **Confirm Mapped Type? Yes** ___ **No** X

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2"		10YR 2/1			loamy sand
2-24"		10YR 4/3			loamy sand

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
___ **Gleyed or Low-Chroma Colors**
___ **Concretions**
___ **High Organic Content in Surface Layer in Sandy Soils**
___ **Organic Streaking in Sandy Soils**
___ **Listed On Local Hydric Soils List**
___ **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

-High proportion of uncoated sand grains
-Wetland Soil Not Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ___
Wetland Hydrology Present? **Yes** ___ **No** X
Hydric Soils Present? **Yes** ___ **No** X

Is the Sampling Point Within a Wetland? **Yes** ___ **No** X

Remarks:

-Previously filled with wetland soils, exists under maintained powerlines.
-Large pile of fill

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W035-39a/41-45

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 22 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: DC-D
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix nigra*	T	OBL	9. *Woodwardia areolata*	H	OBL
2. *Persea borbonia*	T	FACW	10. *Liquidambar styraciflua*	T	FAC+
3. *Morella cerifera*	S	FAC+	11. *Carpinus caroliniana*	T	FAC
4. *Osmunda regalis*	H	OBL	12. *Juncus roemeranus*	H	OBL
5. *Smilax rotundifolia*	V	FAC	13.		
6. *Arundinaria gigantea*	H	FACW	14.		
7. *Acer rubrum*	T	FAC	15.		
8. *Saururus cemuus*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

____ **Recorded Data (Describe In Remarks):**
  ____ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA **(in.)**

Depth to Free Water in Pit: -10" **(in.)**

Depth to Saturated Soil: -5" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
____ **Inundated**
X **Saturated in Upper 12"**
X **Water Marks**
____ **Drift Lines**
____ **Sediment Deposits**
____ **Drainage Patterns in Wetlands**

Secondary Indicators:
X **Oxidized Roots Channels in Upper 12"**
X **Water-Stained Leaves**
____ **Local Soil Survey Data**
X **FAC-Neutral Test**
____ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

w35-38a/41-45

Map Unit Name(Series and Phase): Osier fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes**______ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6		10YR 2/1			muck
6-24		10YR 3/2			sand

Hydric Soil Indicators:

___ **Histosol**
___ **Histic Epipedon**
___ **Sulfidic Odor**
___ **Aquic Moisture Regime**
___ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**

___ **Concretions**
X **High Organic Content in Surface Layer in Sandy Soils**
X **Organic Streaking in Sandy Soils**
___ **Listed On Local Hydric Soils List**
___ **Listed on National Hydric Soils List**
___ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ___
Wetland Hydrology Present? **Yes** X **No** ___
Hydric Soils Present? **Yes** X **No** ___

Is the Sampling Point Within a Wetland? **Yes** X **No** ___

Remarks:

-Wet Maritime Forest and Swamp located in large parallel interdunal swales

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 22 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes _X_ No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No _X_
Is the area a potential problem area? Yes ___ No _X_
(explain on reverse if needed)

Comm ID: DC-up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Pinus taeda*	T	FAC	10.		
3. *Liquidambar styraciflua*	T	FAC	11.		
4. *Ilex opaca*	T	FAC-	12.		
5. *Smilax bona-nox*	V	FAC	13.		
6. *Morella cerifera*	S	FAC+	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >83%

Remarks:

Wetland Vegetation Present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- _X_ **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >-24" **(in.)**

Depth to Saturated Soil: >-24" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology Not Present

SOILS

Map Unit Name
(Series and Phase): Fripp fine sand **Drainage Class:** excessively drained

Taxonomy (Subgroup): uncoated Typic Quartzipsamments **Confirm Mapped Type?** Yes ___ No X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2"		10YR 2/1			loamy sand
2-24"		10YR 4/3			loamy sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed On Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

-High proportion of uncoated sand grains
-Wetland Soil Not Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes ___ No X
Hydric Soils Present? Yes ___ No X

Is the Sampling Point Within a Wetland? Yes ___ No X

Remarks:

-Forested parallel dune ridge series

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

w046-47

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 20 Oct 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: NOW-E
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Persea borbonia*	S/T	FACW	10.		
3. *Phragmites australis*	H/S	FACW	11.		
4. *Juncus* sp.	H		12.		
5. *Spartina cynosuroides*	H	OBL	13.		
6. *Arundinaria gigantea*	H	FACW	14.		
7. *Vaccinium corybosum*	S	FACW	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA **(in.)**

Depth to Free Water in Pit: -5" **(in.)**

Depth to Saturated Soil: 0" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- X **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

w046-47

Map Unit Name(Series and Phase): Corolla fine sand **Drainage Class:** moderately well drained to somewhat poorly drained

Taxonomy (Subgroup): uncoated Aquic Quartzipsamments **Confirm Mapped Type?** Yes___ No_X_

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6"		10YR 3/2			sand
6-20"		10YR 4/3			sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
_X_ Gleyed or Low-Chroma Colors
___ Concretions
_X_ High Organic Content in Surface Layer in Sandy Soils
_X_ Organic Streaking in Sandy Soils
___ Listed On Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ___
Wetland Hydrology Present? Yes _X_ No ___
Hydric Soils Present? Yes _X_ No ___

Is the Sampling Point Within a Wetland? Yes_X_ No___

Remarks:

-Currituck Sound eastern shore, including marsh transitioning to wetland shrub

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 8 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: NOWE up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	S/T	FACU+	9.		
2. *Diospyros virginiana*	S/T	FAC	10.		
3. *Smilax bona-nox*	V	FAC	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >50%

Remarks:

-Wetland Vegetation not present

HYDROLOGY

____ **Recorded Data (Describe In Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA **(in.)**

Depth to Free Water in Pit: >-24"**(in.)**

Depth to Saturated Soil: >-24"**(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- ____ **Saturated in Upper 12"**
- ____ **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- ____ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ____ **Oxidized Roots Channels in Upper 12"**
- ____ **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- ____ **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology not present

SOILS

Map Unit Name
(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained

Taxonomy (Subgroup): thermic Typic Udipsamments **Confirm Mapped Type? Yes**___ **No** X

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10YR 5/3			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- ____ Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** ____ **No** X
Wetland Hydrology Present? **Yes** ____ **No** X
Hydric Soils Present? **Yes** ____ **No** X

Is the Sampling Point Within a Wetland? **Yes** ___ **No** X

Remarks:

Upland boundaries for Extended Project Area Outer Banks Wetlands (EOW/P, NOW/P) defined by sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W048

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: AP3wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Persea borbonia*	S/T	FACW	10.		
3. *Baccharis halmifolia*	S	FAC	11.		
4. *Juncus* sp.	H		12.		
5. *Spartina cynosuroides*	H	OBL	13.		
6. *Salix nigra*	S/T	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA **(in.)**

Depth to Free Water in Pit: 0" **(in.)**

Depth to Saturated Soil: 0" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- X **Inundated**
- ___ **Saturated in Upper 12"**
- X **Water Marks**
- X **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

W048

Map Unit Name(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained
Taxonomy (Subgroup): uncoated Typic Quartzipsamments **Confirm Mapped Type? Yes**____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 4/1			sand

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
____ **Sulfidic Odor**
____ **Aquic Moisture Regime**
____ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**
____ **Concretions**
____ **High Organic Content in Surface Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ____
Wetland Hydrology Present? **Yes** X **No** ____
Hydric Soils Present? **Yes** X **No** ____

Is the Sampling Point Within a Wetland? **Yes** X **No** ____

Remarks:

-Currituck Sound eastern shore, including marsh transitioning to wetland shrub

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: AP3 up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	S/T	FACU+	9.		
2. *Baccharis halmifolia*	S	FAC	10.		
3. *Smilax bona-nox*	V	FAC	11.		
4. *Persea borbonia*	S/T	FACW	12.		
5. Morella cerifera	S	FAC+	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >50%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24”(in.)

Depth to Saturated Soil: >-24”(in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12”
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- ___ Oxidized Roots Channels in Upper 12”
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

Wetland Hydrology not present

SOILS

Map Unit Name
(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained
Taxonomy (Subgroup): uncoated Typic Quartzipsamments **Confirm Mapped Type? Yes**____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 6/4			sand

Hydric Soil Indicators:

- ____ **Histosol**
- ____ **Histic Epipedon**
- ____ **Sulfidic Odor**
- ____ **Aquic Moisture Regime**
- ____ **Reducing Conditions**
- ____ **Gleyed or Low-Chroma Colors**
- ____ **Concretions**
- ____ **High Organic Content in Surface Layer in Sandy Soils**
- ____ **Organic Streaking in Sandy Soils**
- ____ **Listed On Local Hydric Soils List**
- ____ **Listed on National Hydric Soils List**
- ____ **Other (Explain in Remarks)**

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ____
Wetland Hydrology Present? **Yes** ____ **No** X
Hydric Soils Present? **Yes** ____ **No** X

Is the Sampling Point Within a Wetland? **Yes** ____ **No** X

Remarks:

Upland boundaries for shoreline wetlands defined by OHWM, sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W049

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: AP2wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Persea borbonia*	S/T	FACW	10.		
3. *Baccharis halmifolia*	S	FAC	11.		
4. *Juncus* sp.	H		12.		
5. *Spartina cynosuroides*	H	OBL	13.		
6. *Salix nigra*	S/T	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA **(in.)**

Depth to Free Water in Pit: 0" **(in.)**

Depth to Saturated Soil: 0" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- X **Inundated**
- ___ **Saturated in Upper 12"**
- X **Water Marks**
- X **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

w049

Map Unit Name(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained
Taxonomy (Subgroup): uncoated Typic Quartzipsamments **Confirm Mapped Type?** **Yes**____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 4/1			sand

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
____ **Sulfidic Odor**
____ **Aquic Moisture Regime**
____ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**
____ **Concretions**
____ **High Organic Content in Surface Layer in Sandy Soils**
____ **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ____
Wetland Hydrology Present? **Yes** X **No** ____
Hydric Soils Present? **Yes** X **No** ____

Is the Sampling Point Within a Wetland? **Yes** X **No** ____

Remarks:

-Currituck Sound eastern shore, including marsh transitioning to wetland shrub

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No____
Is the site significantly disturbed (Atypical situation)? Yes____ No X
Is the area a potential problem area? Yes____ No X
(explain on reverse if needed)

Comm ID: AP2 up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Diospyros virginica*	S	FAC	9.		
2. *Ilex vomitoria*	S	FAC	10.		
3. *Smilax rotundifolia*	V	FAC	11.		
4. *Persea borbonia*	S/T	FACW	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
 ___ **Stream, Lake, or Tide Gauge**
 X **Aerial Photographs**
 ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24"(in.)

Depth to Saturated Soil: >-24"(in.)

Wetland Hydrology Indicators

Primary Indicators:
___ **Inundated**
___ **Saturated in Upper 12"**
___ **Water Marks**
___ **Drift Lines**
___ **Sediment Deposits**
___ **Drainage Patterns in Wetlands**

Secondary Indicators:
___ **Oxidized Roots Channels in Upper 12"**
___ **Water-Stained Leaves**
___ **Local Soil Survey Data**
___ **FAC-Neutral Test**
___ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology not present

SOILS

Map Unit Name
(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained
Taxonomy (Subgroup): uncoated Typic Quartzipsamments **Confirm Mapped Type? Yes**____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 6/4			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- ____ Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ____
Wetland Hydrology Present? **Yes** ____ **No** X
Hydric Soils Present? **Yes** ____ **No** X

Is the Sampling Point Within a Wetland? **Yes**____ **No** X

Remarks:

Upland boundaries for shoreline wetlands defined by OHWM, sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W050

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: AP1wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Morella cerifera*	S	FAC+	9.		
2. *Persea borbonia*	S/T	FACW	10.		
3. *Baccharis halmifolia*	S	FAC	11.		
4. *Juncus* sp.	H		12.		
5. *Spartina cynosuroides*	H	OBL	13.		
6. *Salix nigra*	S/T	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 0" (in.)

Depth to Saturated Soil: 0" (in.)

Wetland Hydrology Indicators

Primary Indicators:
X **Inundated**
___ **Saturated in Upper 12"**
X **Water Marks**
X **Drift Lines**
___ **Sediment Deposits**
___ **Drainage Patterns in Wetlands**

Secondary Indicators:
___ **Oxidized Roots Channels in Upper 12"**
___ **Water-Stained Leaves**
___ **Local Soil Survey Data**
X **FAC-Neutral Test**
___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

w050

Map Unit Name(Series and Phase): Corolla fine sand **Drainage Class:** moderately well drained to somewhat poorly drained

Taxonomy (Subgroup): uncoated Aquic Quartzipsamments **Confirm Mapped Type?** **Yes** ____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 4/1			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** X **No** ____
Wetland Hydrology Present? **Yes** X **No** ____
Hydric Soils Present? **Yes** X **No** ____

Is the Sampling Point Within a Wetland? **Yes** X **No** ____

Remarks:

-Currituck Sound eastern shore, including marsh transitioning to wetland shrub

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 15 Jan 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: AP1 up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	S/T	FACU+	9.		
2. *Ilex vomitoria*	S	FAC	10.		
3. *Smilax rotundifolia*	V	FAC	11.		
4. *Persea borbonia*	S/T	FACW	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >50%

Remarks:

-Wetland Vegetation not present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24"(in.)

Depth to Saturated Soil: >-24"(in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- ___ Oxidized Roots Channels in Upper 12"
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

Wetland Hydrology not present, ORs present > -20"

SOILS

Map Unit Name
(Series and Phase): Corolla fine sand **Drainage Class:** moderately well drained to somewhat poorly drained
Taxonomy (Subgroup): uncoated Aquic Quartzipsamments **Confirm Mapped Type? Yes**____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18"		10YR 3/2			loamy sand
18-20		10YR 5/3			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- ____ Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

Wetland Soil not present, > 50% uncoated sand grains throughout

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** ____ **No** X
Wetland Hydrology Present? **Yes** ____ **No** X
Hydric Soils Present? **Yes** ____ **No** X

Is the Sampling Point Within a Wetland? **Yes**____ **No** X

Remarks:

Upland boundaries for shoreline wetlands defined by OHWM sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

w05le/6

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 16 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW-S
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Taxodium distichum*	T	OBL	9.		
2. *Persea borbonia*	T	FACW	10.		
3. *Morella cerifera*	S	FAC+	11.		
4. *Osmunda regalis*	H	OBL	12.		
5. *Smilax rotundifolia*	V	FAC	13.		
6. *Lonicera japonica*	V	FAC-	14.		
7. *Toxicoendron radicans*	V	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >85%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: >-15" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- X Oxidized Roots Channels in Upper 12"
- X Water-Stained Leaves
- ___ Local Soil Survey Data
- X FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

-Wetland Hydrology present

SOILS

w051e/f

Map Unit Name(Series and Phase): Duckston fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type?** Yes ____ No X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3		10YR 2/1			loamy sand
3-20		2.5Y 5/2			sand
20-24		GLEY 1.5/10Y			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ____ Concretions
- X High Organic Content in Surface Layer in Sandy Soils
- X Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____
Hydric Soils Present? Yes X No ____

Is the Sampling Point Within a Wetland? Yes X No ____

Remarks:

-Maritime Swamp surrounding inlet to Currituck Sound

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W057-58a

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 16 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW-J
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salix nigra*	S/T	OBL	9.		
2. *Persea borbonia*	S/T	FACW	10.		
3. *Baccharis* sp.	H/S		11.		
4. *Phragmites australis*	H/S	FACW	12.		
5. *Smilax rotundifolia*	V	FAC	13.		
6. *Morella cerifera*	S	FAC+	14.		
7. *Juncus* sp.	H		15.		
8. *Spartina cynosuroides*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: >-24" (in.)

Wetland Hydrology Indicators

Primary Indicators:
___ **Inundated**
___ **Saturated in Upper 12"**
___ **Water Marks**
___ **Drift Lines**
___ **Sediment Deposits**
___ **Drainage Patterns In Wetlands**

Secondary Indicators:
X **Oxidized Roots Channels in Upper 12"**
___ **Water-Stained Leaves**
___ **Local Soil Survey Data**
X **FAC-Neutral Test**
___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

W057-58a

Map Unit Name(Series and Phase): Corolla fine sand **Drainage Class:** moderately well drained to somewhat poorly drained

Taxonomy (Subgroup): uncoated Aquic Quartzipsamments **Confirm Mapped Type? Yes** ____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-13"		2.5Y 6/3			sand
13-24"		10YR 6/2	7.5YR 5/8	many, small, distinct	sand

Hydric Soil Indicators:

____ **Histosol**
____ **Histic Epipedon**
____ **Sulfidic Odor**
____ **Aquic Moisture Regime**
____ **Reducing Conditions**
X **Gleyed or Low-Chroma Colors**
____ **Concretions**
X **High Organic Content in Surface Layer in Sandy Soils**
X **Organic Streaking in Sandy Soils**
____ **Listed On Local Hydric Soils List**
____ **Listed on National Hydric Soils List**
____ **Other (Explain in Remarks)**

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____
Hydric Soils Present? Yes X No ____

Is the Sampling Point Within a Wetland? Yes X No ____

Remarks:

-Currituck Sound eastern shore, including marsh transitioning to wetland shrub
-Upland boundary defined by developement

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

w060

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 16 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW-E
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnamomea*	H	FACW+	9.		
2. *Toxicodendron radicans*	V	FAC	10.		
3. *Osmunda regalis*	H	OBL	11.		
4. *Acer rubrum*	S/T	FAC	12.		
5. *Smilax bona nox*	V	FAC	13.		
6. *Morella cerifera*	S	FAC+	14.		
7. *Pinus taeda*	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: >-24" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

W060

Map Unit Name(Series and Phase): Duckston fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes** ____ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-13"		2.5Y 6/3			sand
13-24"		10YR 6/2	7.5YR 5/8	many, small, distinct	sand

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☐ Listed On Local Hydric Soils List
☐ Listed on National Hydric Soils List
☐ Other (Explain in Remarks)

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____
Hydric Soils Present? Yes X No ____

Is the Sampling Point Within a Wetland? Yes X No ____

Remarks:

-Roadside interdunal swale/depressional wetland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 8 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	S/T	FACU+	9.		
2. *Toxicodendron radicans*	V	FAC	10.		
3. *Smilax bona-nox*	V	FAC	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >50%

Remarks:

-Wetland Vegetation not present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24"(in.)

Depth to Saturated Soil: >-24"(in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- ___ Oxidized Roots Channels in Upper 12"
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

Wetland Hydrology not present

SOILS

Map Unit Name
(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained

Taxonomy (Subgroup): thermic Typic Udipsamments **Confirm Mapped Type? Yes**___ **No** X

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10YR 5/3			sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed On Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X
Hydric Soils Present? Yes ___ No X

Is the Sampling Point Within a Wetland? Yes___ No X

Remarks:

Upland boundaries for Extended Project Area Outer Banks Wetlands (EOW/P, NOW/P) defined by sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

w06d

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 16 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW-D
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnamomea*	H	FACW+	9.		
2. *Toxicodendron radicans*	V	FAC	10.		
3. *Osmunda regalis*	H	OBL	11.		
4. *Acer rubrum*	S/T	FAC	12.		
5. *Smilax bona nox*	V	FAC	13.		
6. *Morella cerifera*	S	FAC+	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

-Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24" (in.)

Depth to Saturated Soil: >-24" (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

-Wetland Hydrology present

SOILS

w061

Map Unit Name
(Series and Phase): Newhan -Corolla complex
Drainage Class: excessively drained to somewhat poorly drained
Taxonomy (Subgroup): N: thermic Typic Udipsamments C: uncoated Aquic Quartzipsamments
Confirm Mapped Type? Yes ___ No _X_

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-13"		2.5Y 6/3			sand
13-24"		10YR 6/2	7.5YR 5/8	many, small, distinct	sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- _X_ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- _X_ Organic Streaking in Sandy Soils
- ___ Listed On Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

-Wetland Soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ___
Wetland Hydrology Present? Yes _X_ No ___
Hydric Soils Present? Yes _X_ No ___

Is the Sampling Point Within a Wetland? Yes _X_ No ___

Remarks:

-Roadside interdunal swale/depressional wetland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 8 July 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: EOW-A-up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	S/T	FACU+	9.		
2. *Toxicodendron radicans*	V	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). <50%

Remarks:

-Wetland Vegetation not present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: >-24"(in.)

Depth to Saturated Soil: >-24"(in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12"
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators:
- ___ Oxidized Roots Channels in Upper 12"
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

Wetland Hydrology not present

SOILS

Map Unit Name
(Series and Phase): Newhan fine sand **Drainage Class:** excessively drained

Taxonomy (Subgroup): thermic Typic Udipsamments **Confirm Mapped Type?** Yes___ No___

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		10YR 5/3			sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed On Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X
Hydric Soils Present? Yes ___ No X

Is the Sampling Point Within a Wetland? Yes___ No X

Remarks:

Upland boundaries defined by sandy ridges, dunes and/or development

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

w066/67

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 6 May 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: SE12E-wet
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	**Stratum**	**Indicator**	**Dominant Plant Species**	**Stratum**	**Indicator**
1. *Osmunda regalis*	H	OBL	**9.**		
2. *Juncus effusus*	H	FACW+	**10.**		
3. *Osmunda cinnomomea*	H	FACW+	**11.**		
4. *Acer rubrum*	S/T	FAC	**12.**		
5. *Liquidambar styraciflua*	S/T	FAC+	**13.**		
6. *Pinus taeda*	T	FAC	**14.**		
7. *Salix nigra*	S/T	OBL	**15.**		
8.			**16.**		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation Present

HYDROLOGY

____ **Recorded Data (Describe in Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: -10" **(in.)**

Depth to Saturated Soil: -2" **(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- X **Saturated in Upper 12"**
- ____ **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- ____ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- X **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology Present

SOILS

w066/67

Map Unit Name
(Series and Phase): Duckston fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes**___ **No** X

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2"		10YR 2/2			loamy sand/organic
2-24"		2.5Y 5/2			loamy sand

Hydric Soil Indicators:

- ___ **Histosol**
- ___ **Histic Epipedon**
- ___ **Sulfidic Odor**
- X **Aquic Moisture Regime**
- ___ **Reducing Conditions**
- X **Gleyed or Low-Chroma Colors**
- ___ **Concretions**
- X **High Organic Content in Surface Layer in Sandy Soils**
- ___ **Organic Streaking in Sandy Soils**
- ___ **Listed On Local Hydric Soils List**
- ___ **Listed on National Hydric Soils List**
- ___ **Other (Explain in Remarks)**

Remarks:

Wetland Soil Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X **No** ___
Wetland Hydrology Present? Yes X **No** ___
Hydric Soils Present? Yes X **No** ___

Is the Sampling Point Within a Wetland? Yes X **No** ___

Remarks:

Inter-dunal swale

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 6 May 2008
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: SE12E-up
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	T/S	FACU+	9.		
2. *Smilax rotundifolia*	V	FAC	10.		
3. *Campsis radicans*	V	FACU	11.		
4. *Opuntia stricta*	S	FACU-	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 25%

Remarks:

Wetland Vegetation Not Present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A **(in.)**

Depth to Free Water in Pit: >-24"**(in.)**

Depth to Saturated Soil: >-24"**(in.)**

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- ___ **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- ___ **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:

Wetland Hydrology Not Present

SOILS

Map Unit Name
(Series and Phase): Duckston fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes** ___ **No** X

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 6/4			Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed On Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil Not Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? **Yes** ___ **No** X
Wetland Hydrology Present? **Yes** ___ **No** X
Hydric Soils Present? **Yes** ___ **No** X

Is the Sampling Point
Within a Wetland? **Yes** ___ **No** X

Remarks:

Sandy Ridge/Dune

RI-W
West side of Rt. 12

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W068

Project/Site: NC 12 Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, TWG - Kelly Chance, Steve Beck

Date: 10-23-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: RI
Transect ID: W
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Salix caroliniana	T	OBL	9.		
2. Morella cerifera	S	FAC+	10.		
3. Andropogon virginicus	SH	FAC-	11.		
4. Juncus effusus	H	FACW+	12.		
5. Juncus canadensis	H	OBL	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). >80%

Remarks: Has wetland plants

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
  ☐ Stream, Lake, or Tide Gauge
  ☐ Aerial Photographs
  ☐ Other
☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  ☐ Inundated
  ☐ Saturated in Upper 12 Inches
  ☒ Water Marks
  ☐ Drift Lines
  ☐ Sediment Deposits
  ☐ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  ☒ Oxidized Root Channels in Upper 12 inches
  ☐ Water-Stained Leaves
  ☐ Local Soil Survey Data
  ☐ FAC-Neutral Test
  ☐ Other (Explain in Remarks)

Remarks: Used water mark as primary indicator for wetland hydrology

SOILS

W068

Map Unit Name (Series and Phase): Du - Dune land

Drainage Class: ____________

Field Observations

Taxonomy (Subgroup):

Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5 Y 6/3			SAND

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: 6-24" had OR's throughout

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

(Circle)
Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Meets all three wetland criteria

R1-UP

northwest of R1-W

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: NC 12 - Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR Inc - Kelly Chance, Steve Beck

Date: 10-23-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: R1
Transect ID: UP
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Eremochloa ophiuroides	H	NI	9.		
2. Chrysopsis gossypina	H	NI	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Does not have wetland plants

HYDROLOGY

__ Recorded Data (Describe in Remarks):
  __ Stream, Lake, or Tide Gauge
  __ Aerial Photographs
  __ Other
__ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  __ Inundated
  __ Saturated in Upper 12 Inches
  __ Water Marks
  __ Drift Lines
  __ Sediment Deposits
  __ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  __ Oxidized Root Channels in Upper 12 Inches
  __ Water-Stained Leaves
  __ Local Soil Survey Data
  __ FAC-Neutral Test
  __ Other (Explain in Remarks)

Remarks: Does not have wetland hydrology

SOILS

Map Unit Name (Series and Phase): Du- Duneland Drainage Class:

Field Observations

Taxonomy (Subgroup): Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24"		2.5Y 5/3			Sand

Hydric Soil Indicators:

__ Histosol
__ Histic Epipedon
__ Sulfidic Odor
__ Aquic Moisture Regime
__ Reducing Conditions
__ Gleyed or Low-Chroma Colors
__ Concretions
__ High Organic Content in Surface Layer in Sandy Soils
__ Organic Streaking in Sandy Soils
__ Listed on Local Hydric Soils List
__ Listed on National Hydric Soils List
__ Other (Explain in Remarks)

Remarks:
Does not have hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes [✓ No] (Circle)
Wetland Hydrology Present? Yes [✓ No]
Hydric Soils Present? Yes [✓ No]

(Circle)
Is this Sampling Point Within a Wetland? Yes [✓ No]

Remarks:
Does not meet all wetland criteria

R2-W
Point taken between flags R2-2, R2-3

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W069.

Project/Site: NC 12 Mid-Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc. - Kelly Chance, Steve Eck
Date: 10-24-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes No
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)
Community ID: R2-2
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Salix caroliniana	T	OBL	9.		
2. Acer rubrum	T/H	FAC	10.		
3. Morella cerifera	S/H	FAC+	11.		
4. Vaccinium corymbosum	S	FACW	12.		
5. Polygonum hydropiperoides	H	OBL	13.		
6. Smilax rotundifolia	V/H	FAC	14.		
7. Nyssa sylvatica var. biflora	H	OBL	15.		
8. Toxicodendron radicans	V/H	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). >75%

Remarks: Has wetland plants

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)
Depth to Free Water in Pit: NA (in.)
Depth to Saturated Soil: 3" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

w06a

SOILS

0-to 6% slopes

Map Unit Name (Series and Phase): CrB- Corolla-Duckston complex Drainage Class: moderately and somewh well-drain at poorly- well-drai

Field Observations

Taxonomy (Subgroup):

Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5"		10 YR 2/2			SANDY CLAYLOAM
5-20"		2.5Y 6/3			SANDY LOAM
20-24"		2.5Y 6/1			SAND

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

Has hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

(Circle)
Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Meets all three wetland criteria

R4-W
between flag #s
R4-6, R4-7

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Edge of
PO14.

Project/Site: NC 12 - Mid Currituck Bridge
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc - Kelly Chance, Steve Beck
Date: 10-24-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: R4-6
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Toxicodendron radicans	V/H	FAC	9. Morella cerifera	S	FAC+
2. Parthenocissus quinquefolia	V/H	FAC	10. Baccharis halimifolia	S	FACW
3. Aster racemosus	H	OBL	11. Polygonum hydropiperoides	H	OBL
4. Mikania scandens	H	FACW+	12.		
5. Juncus canadensis	H	OBL	13.		
6. Hydrocotyle umbellata	H	OBL	14.		
7. Andropogon virginicus	H	FAC-	15.		
8. Salix caroliniana	T	OBL	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). >75%

Remarks: Has wetland plants

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
  ☐ Stream, Lake, or Tide Gauge
  ☐ Aerial Photographs
  ☐ Other
☐ No Recorded Data Available

Field Observations:
Depth of Surface Water: NA (in.)
Depth to Free Water in Pit: -10 (in.)
Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  ☐ Inundated
  ☒ Saturated in Upper 12 Inches
  ☐ Water Marks
  ☐ Drift Lines
  ☐ Sediment Deposits
  ☐ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  ☒ Oxidized Root Channels in Upper 12 inches
  ☐ Water-Stained Leaves
  ☐ Local Soil Survey Data
  ☐ FAC-Neutral Test
  ☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

mix 2-40% slopes
Edge of 8014

SOILS

Map Unit Name (Series and Phase): DwD - Dune land, Newhan com Drainage Class: excessively drained

Taxonomy (Subgroup): Dune land + thermic typic, Udipsamments

Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1"		2.5 YR 2/1			
1-4"		10 YR 4/7			Loamy Sand
4-24"		5Y 5/2			Loamy Sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Has hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) [✓ Yes] No

Remarks: Meets all three wetland criteria

near flag B-26

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W070

Project/Site: NC 12 Mid-Currituck Bri
Applicant/Owner:
Investigator: CZR, Inc-Kelly Chance Steve Beck

Date: 10-23-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: B-26
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Liquidambar styraciflua	T	FAC+	9. Vitis rotundifolia	V/H	FAC
2. Acer rubrum	T	FAC	10. Juncus effusus	H	FACW+
3. Typha angustifolia	S	OBL	11. Boehmeria cylindrica	H	FACW+
4. Morella cerifera	S	FAC+	12. Woodwardia areolata	H	OBL
5. Pinus taeda	S	FAC	13. Osmunda cinnamomea	H	FACW+
6. Vaccinium corymbosum	S	FACW	14.		
7. Mikania scandens	H	FACW+	16.		
8. Rhexia nashii	H	FACW+	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). >75%

Remarks: Has wetland plants.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Has wetland hydrology

B-26

SOILS

W070

Map Unit Name (Series and Phase): Os - Osier fine sand Drainage Class: poorly drained

Field Observations

Taxonomy (Subgroup): thermic Typic Psammaquents Confirm Mapped Type? Yes No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5"		10 YR 3/2			SAND
5-15"		2.5 YR 5/2			SAND
15-24"		5Y 5/1			SAND

Hydric Soil Indicators:

- __ Histosol
- __ Histic Epipedon
- __ Sulfidic Odor
- __ Aquic Moisture Regime
- X Reducing Conditions
- X Gleyed or Low-Chroma Colors
- __ Concretions
- X High Organic Content in Surface Layer in Sandy Soils
- X Organic Streaking in Sandy Soils
- X Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- __ Other (Explain in Remarks)

Remarks: many OR's in 5-15".

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? (Circle) [✓ Yes] No

Remarks:

Meets all three wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 22 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: b-24
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus virginiana*	T/S	FACU+	9.		
2. *Vitis* sp.	V		10.		
3. *Acer rubrum*	T	FAC	11.		
4. *Prunus serotina*	T	FACU	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). <33%

Remarks:

Wetland Vegetation Not Present

HYDROLOGY

____ **Recorded Data (Describe in Remarks):**
  ____ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >18 (in.)

Depth to Saturated Soil: >18 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12"
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators:
- ____ Oxidized Roots Channels in Upper 12"
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- ____ FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks:
Drought Conditions
Wetland Hydrology Not Present

SOILS

Map Unit Name
(Series and Phase): Dune land-Newhan complex 0-40% slopes **Drainage Class:** excessively drained

Taxonomy (Subgroup): themic Typic Udipsamments (NeC) **Confirm Mapped Type? Yes____ No____**

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		2.5Y 5/3			sand

Hydric Soil Indicators:

____ Histosol
____ Histic Epipedon
____ Sulfidic Odor
____ Aquic Moisture Regime
____ Reducing Conditions
____ Gleyed or Low-Chroma Colors

____ Concretions
____ High Organic Content in Surface Layer in Sandy Soils
____ Organic Streaking in Sandy Soils
____ Listed On Local Hydric Soils List
____ Listed on National Hydric Soils List
____ Other (Explain in Remarks)

Remarks:

Wetland Soil Not Present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X
Hydric Soils Present? Yes ____ No X

Is the Sampling Point Within a Wetland? Yes____ No X

Remarks:

Dunes

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

WJ07D

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 24 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: b d-9
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnomomea*	H	FACW+	9.		
2. *Morella cerifera*	S	FAC+	10.		
3. *Acer rubrum*	T	FAC	11.		
4. *Salix caroliniana*	T	OBL	12.		
5. *Persea palustris*	T	FACW	13.		
6. *Boehmeria cylindrica*	H	FACW+	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
  ___ **Stream, Lake, or Tide Gauge**
  X **Aerial Photographs**
  ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators

Primary Indicators:
___ **Inundated**
X **Saturated in Upper 12"**
X **Water Marks**
___ **Drift Lines**
___ **Sediment Deposits**
X **Drainage Patterns in Wetlands**

Secondary Indicators:
X **Oxidized Roots Channels in Upper 12"**
X **Water-Stained Leaves**
___ **Local Soil Survey Data**
X **FAC-Neutral Test**
___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

SOILS

W070

Map Unit Name
(Series and Phase): Osier fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes____ No____**

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2		10YR 2/1			muck
2-24		GLEY1 5/10Y			sandy loam

Hydric Soil Indicators:

____ Histosol
____ Histic Epipedon
____ Sulfidic Odor
____ Aquic Moisture Regime
____ Reducing Conditions
_X_ Gleyed or Low-Chroma Colors
____ Concretions
_X_ High Organic Content in Surface Layer in Sandy Soils
_X_ Organic Streaking in Sandy Soils
_X_ Listed On Local Hydric Soils List
_X_ Listed on National Hydric Soils List
____ Other (Explain in Remarks)

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes _X_ No ____
Wetland Hydrology Present? Yes _X_ No ____
Hydric Soils Present? Yes _X_ No ____

Is the Sampling Point Within a Wetland? Yes _X_ No____

Remarks:

SW of Timbuck II
W of Stream Flag D-9

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W070

Project/Site: Mid-Currituck Bridge - Section B
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc. - Kelly Chance, Steve Beck

Date: 10-24-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: bn-7
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Persea borbonia	T/S	FACW	9. Smilax rotundifolia	V	FAC
2. Acer rubrum	T	FAC	10.		
3. Nyssa sylvatica	T	FAC	11.		
4. Vaccinium corymbosum	S/H	FACW	12.		
5. Osmunda cinnamomea	H	FACW+	13.		
6. Glyceria striata	H	OBL	14.		
7. Woodwardia aereolata	H	OBL	15.		
8. Woodwardia virginica	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Has wetland plants

HYDROLOGY

__ Recorded Data (Describe in Remarks):
  __ Stream, Lake, or Tide Gauge
  __ Aerial Photographs
  __ Other
__ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)
Depth to Free Water in Pit: NA (in.)
Depth to Saturated Soil: 8" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
  __ Inundated
  X Saturated in Upper 12 Inches
  __ Water Marks
  __ Drift Lines
  __ Sediment Deposits
  __ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
  __ Oxidized Root Channels in Upper 12 inches
  __ Water-Stained Leaves
  __ Local Soil Survey Data
  __ FAC-Neutral Test
  __ Other (Explain in Remarks)

Remarks: Has wetland hydrology

BN-7

SOILS

W070

Map Unit Name (Series and Phase): Os- Osier fine sand

Drainage Class: ______

Field Observations

Taxonomy (Subgroup): thermic Typic Psammaquents

Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3"		10 YR 2/1			SAND
3-7"		10 YR 2/2			SAND
7-24"		2.5 Y 5/3			SAND

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Stripped matrix beyond 7"

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	[✓ Yes] No (Circle)		(Circle)
Wetland Hydrology Present?	[✓ Yes] No		
Hydric Soils Present?	[✓ Yes] No	Is this Sampling Point Within a Wetland?	[✓ Yes] No

Remarks:

Meets all three wetland criteria

northwest of bn-28
west southwest of bn-25

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W070.

Project/Site: Mid-Currituck Bridge - Section B
Applicant/Owner: NC Turnpike Authority
Investigator: CZR, Inc - Kelly Chance, Steve Beck
Date: 10-24-07
County: Currituck
State: NC

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse.)

Community ID: bn-29
Transect ID:
Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Glyceria striata	H	OBL	9. Vaccinium corymbosum	S	FACW
2. Vitis rotundifolia	V	FAC	10. Liquidambar styraciflua	S	FAC+
3. Smilax rotundifolia	V	FAC	11.		
4. Woodwardia virginica	H	OBL	12.		
5. Ilex opaca	T	FAC-	13.		
6. Acer rubrum	T	FAC	14.		
7. Persea borbonia	T/S	FACW	15.		
8. Nyssa sylvatica var. biflora	T	OBL	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 80%

Remarks: Has wetland plants

HYDROLOGY

__ Recorded Data (Describe in Remarks):
__ Stream, Lake, or Tide Gauge
__ Aerial Photographs
__ Other
__ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)
Depth to Free Water in Pit: NA (in.)
Depth to Saturated Soil: 7" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
__ Inundated
X Saturated in Upper 12 Inches
__ Water Marks
__ Drift Lines
__ Sediment Deposits
__ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
__ Oxidized Root Channels in Upper 12 Inches
X Water-Stained Leaves
__ Local Soil Survey Data
__ FAC-Neutral Test
__ Other (Explain in Remarks)

Remarks: Has wetland hydrology

BW - 28/29

SOILS

W070

Map Unit Name (Series and Phase): Os-Osier fine sand
Drainage Class: Poorly drained
Taxonomy (Subgroup): thermic Typic Psammaquents
Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8"		10 YR 4/2			SAND
8-24"		2.5Y 6/3			SAND

Hydric Soil Indicators:

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☒ Organic Streaking in Sandy Soils
☒ Listed on Local Hydric Soils List
☒ Listed on National Hydric Soils List
☐ Other (Explain in Remarks)

Remarks: Has hydric soil

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No (Circle)
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

(Circle)
Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks: Meets all three wetland criteria

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W070

Project / Site: Mid-Currituck Sound Bridge EIS **Applicant / Owner:** North Carolina Turnpike Authority **Investigator:** S. Beck (CZR Inc. Environmental Consultants)	**Date:** 24 Oct 2007 **County:** Currituck **State:** North Carolina
Do normal circumstances exist on the site? Yes X No ___ **Is the site significantly disturbed (Atypical situation)?** Yes ___ No X **Is the area a potential problem area?** Yes ___ No X **(explain on reverse if needed)**	**Comm ID:** bn-30 **Transect ID:** N/A **Plot ID:** N/A

VEGETATION

Dominant Plant Species	**Stratum**	**Indicator**	**Dominant Plant Species**	**Stratum**	**Indicator**
1. *Quercus virginiana*	T	FACU+	9.		
2. *Acer rubrum*	T	FAC	10.		
3. *Vaccinium corymbosum*	S	FACW	11.		
4. *Liquidambar styraciflua*	T	FAC+	12.		
5. *Ilex opaca*	T	FAC-	13.		
6. *Perseus palustris*	T	FACW	14.		
7. *Nyssa biflora*	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). >70%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe in Remarks):** ___ **Stream, Lake, or Tide Gauge** X **Aerial Photographs** ___ **Other** ___ **No Recorded Data Available** **Field Observations:** **Depth of Surface Water:** N/A (in.) **Depth to Free Water in Pit:** >24 (in.) **Depth to Saturated Soil:** >24 (in.)	**Wetland Hydrology Indicators** **Primary Indicators:** ___ **Inundated** ___ **Saturated in Upper 12"** ___ **Water Marks** ___ **Drift Lines** ___ **Sediment Deposits** ___ **Drainage Patterns in Wetlands** **Secondary Indicators:** ___ **Oxidized Roots Channels in Upper 12"** ___ **Water-Stained Leaves** ___ **Local Soil Survey Data** X **FAC-Neutral Test** ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology not present

3N-30

SOILS

W070

Map Unit Name
(Series and Phase): Osier fine sand **Drainage Class:** poorly drained

Taxonomy (Subgroup): thermic Typic Psammaquents **Confirm Mapped Type? Yes___ No___**

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1		10YR 2/1			loamy sand
1-2		2.5Y 4/1			sand
2-24		2.5Y 4/3			sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- X Listed On Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil not present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No___
Wetland Hydrology Present? Yes___ No X
Hydric Soils Present? Yes___ No X

Is the Sampling Point Within a Wetland? Yes___ No X

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W077-84

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 25 Oct 2007
County: Currituck
State: North Carolina

Do normal circumstances exist on the site? Yes X No ____
Is the site significantly disturbed (Atypical situation)? Yes ____ No X
Is the area a potential problem area? Yes ____ No X
(explain on reverse if needed)

Comm ID: R9
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Liquidambar styraciflua*	T/S	FAC+	9. *Solidago* sp.	H	
2. *Salix caroliniana*	T/S	OBL	10. *Andropogon* sp.	H	
3. *Diospyros virginiana*	T	FAC	11. *Dichanthelium* sp.	H	
4. *Osmunda regalis*	H	OBL	12.		
5. *Scirpus cyperinus*	H	OBL	13.		
6. *Polygonum hydropiperoides*	H	OBL	14.		
7. *Spartina patens*	H	FACW	15.		
8. *Scirpus* sp.	H		16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

HYDROLOGY

____ **Recorded Data (Describe In Remarks):**
- ____ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ____ **Other**

____ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ____ **Inundated**
- ____ **Saturated In Upper 12"**
- x **Water Marks**
- ____ **Drift Lines**
- ____ **Sediment Deposits**
- ____ **Drainage Patterns In Wetlands**

Secondary Indicators:
- x **Oxidized Roots Channels in Upper 12"**
- x **Water-Stained Leaves**
- ____ **Local Soil Survey Data**
- x **FAC-Neutral Test**
- ____ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

SOILS

W077-84

Map Unit Name
(Series and Phase): Dune land-Newhan complex 0-40% slopes **Drainage Class:** excessively drained

Taxonomy (Subgroup): thermic Typic Udipsamments (NeC) **Confirm Mapped Type?** Yes____ No____

Profile Description:

Depth (inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1					organic debris
1-15		2.5Y 4/2			sandy loam
15-24		5Y 4/2			sand

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- ____ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- X Organic Streaking in Sandy Soils
- ____ Listed On Local Hydric Soils List
- ____ Listed on National Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____
Hydric Soils Present? Yes X No ____

Is the Sampling Point Within a Wetland? Yes X No ____

Remarks:

Isolated roadside depressional wetland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

W087

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 20 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: C1
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Smilax bona-nox*	vine	FAC
2. *Salix caroliniana*	sapling	OBL	10. *Rubus cuneifolius*	herb	FACU
3. *Quercus phellos*	sapling	FAC+	11.		
4. *Thelypteris thelypteroides*	herb	FACW+	12.		
5. *Boehmeria cylindrica*	herb	FACW+	13.		
6. *Woodwardia areolata*	herb	OBL	14.		
7. *Juncus effusus*	herb	FACW+	15.		
8. *Toxicodendron radicans*	vine	FAC	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 90

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

_x_ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: n/a (in.)
Depth to Saturated Soil: 8 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- _x_ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- _x_ Water-Stained Leaf Litter
- _x_ Local Soil Survey Data
- _x_ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Inter-dune wetland. Much drier-than-normal year (drought conditions).

DATA FORM (Community "W1" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W087

Map Unit Name (Series and Phase): Ousley fine sand

Drainage Class: moderately well drained

Taxonomy (Subgroup): Thermic, uncoated Aquic Quartzipsamments

Field Observations Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-2	A				slightly organic silty sand
2-20	B	5Y6/1			fine sand with slight organic streaking

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
_x_ Aquic Moisture Regime
___ Reducing Conditions
_x_ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
_x_ Organic Streaking in Sandy Soils
_x_ Listed on Local Hydric Soils List
_x_ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No
Wetland Hydrology Present? [✓ Yes] No
Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

WD88

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 23 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: CA2
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	tree	FACW	9. *Magnolia virginiana*	shrub	FACW+
2. *Vaccinium corymbosum*	shrub	FACW	10. *Rosa multiflora*	shrub	UPL
3. *Myrica cerifera*	shrub	FAC+	11. *Polygonum punctatum*	herb	FACW+
4. *Thelypteris thelypteroides*	herb	FACW+	12. *Chasmanthium laxum*	herb	FACW-
5. *Boehmeria cylindrica*	herb	FACW+	13. *Arthraxon hispidus*	herb	FACU+
6. *Woodwardia areolata*	herb	OBL	14. *Eupatorium capillifolium*	herb	FACU
7. *Juncus effusus*	herb	FACW+	15. *Cyperus strigosus*	herb	FACW+
8. *Toxicodendron radicans*	vine	FAC	16. *Desmodium tenuifolium*	herb	FAC

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 81

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other (Explain in Remarks)

x No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Standing Water in Pit: 4 (in.)
Depth to Saturated Soil: 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- x Saturated in Upper 12 Inches
- x Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- x Water-Stained Leaf Litter
- x Local Soil Survey Data
- x FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: PFO1A above excavated pond. Much drier-than-normal year (drought conditions).

DATA FORM (Community "W1" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W098

Map Unit Name
(Series and Phase): Ousley fine sand

Drainage Class: moderately well drained

Taxonomy (Subgroup): Thermic, uncoated Aquic Quartzipsamments

Field Observations
Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-2	A				slightly organic silty sand
2-18	B	5Y6/1			fine sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- _x_ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- _x_ Listed on Local Hydric Soils List
- _x_ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

W086a

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Mid-Currituck Sound Bridge EIS
Applicant/Owner: North Carolina Turnpike Authority
Investigator: M. Mitchell (PB Americas, Inc.)

Date: 27 October 2007
Co./City: Currituck County
State: North Carolina

Do Normal Circumstances exist on the site? [✓ Yes] No
Is the site significantly disturbed (Atypical Situation)? Yes [✓ No]
Is the area a potential Problem Area? Yes [✓ No]
(If needed, explain on reverse)

Community ID: CA62
Transect ID: not applicable
Plot ID: not applicable

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Pinus taeda*	tree	FAC	9. *Woodwardia areolata*	herb	OBL
2. *Acer rubrum*	sapling	FACW	10. *Juncus effusus*	herb	FACW+
3. *Myrica cerifera*	shrub	FAC+	11. *Boehmeria cylindrica*	herb	FACW+
4. *Vaccinium corymbosum*	shrub	FACW	12. *Desmodium tenuifolium*	herb	FAC
5. *Magnolia virginiana*	shrub	FACW+	13. *Sium suave*	herb	OBL
6. *Persia borbonia*	shrub	FACW	14. *Carex* sp.	herb	N/A
7. *Salix caroliniana*	sapling	OBL	15. *Hydrocotyle americana*	herb	OBL
8. *Arundinaria gigantea*	shrub	FACW	16. *Toxicodendron radicans*	vine	OBL

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100

Remarks

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other (Explain in Remarks)

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 - 2 (in.)

Depth to Standing Water in Pit: 3 (in.)

Depth to Saturated Soil: 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaf Litter
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Freshwater tidal inlet. Shown as inundated in client-provided aerials.

DATA FORM (Community "CA62" continued)
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

SOILS

W086a

Map Unit Name
(Series and Phase): Ousley fine sand

Drainage Class: moderately well drained

Taxonomy (Subgroup): Thermic, uncoated Aquic Quartzipsamments

Field Observations
Confirmed Mapped Type? [✓ Yes] No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structures, etc.
0-2	A	10YR6/1			organic muck
2-18	B	10YR6/1	10YR6/6	Mod. developed	silty fine sand

Hydric Soil Indicators:

- ☐ Histosol
- ☒ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Muck mantle due to freshwater tidal incursions.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? [✓ Yes] No

Wetland Hydrology Present? [✓ Yes] No

Hydric Soils Present? [✓ Yes] No

Is this Sampling Point Within a Wetland? [✓ Yes] No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Determination Manual)

W100-102

Project / Site: Mid-Currituck Sound Bridge EIS
Applicant / Owner: North Carolina Turnpike Authority
Investigator: S. Beck (CZR Inc. Environmental Consultants)

Date: 30 Oct 2007
County: Currituok
State: North Carolina

Do normal circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical situation)? Yes ___ No X
Is the area a potential problem area? Yes ___ No X
(explain on reverse if needed)

Comm ID: R18
Transect ID: N/A
Plot ID: N/A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Pinus taeda*	T	FAC	9.		
2. *Acer rubrum*	T	FAC	10.		
3. *Salix caroliniana*	T/S	OBL	11.		
4. *Morella cerifera*	S	FAC+	12.		
5. *Vaccinium corymbosum*	S	FACW	13.		
6. *Nyssa* sp.	T	FAC	14.		
7. *Smilax rotundifolia*	V	FAC	15.		
8. *Osmunda regalis*	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC excluding FAC-). 100%

Remarks:

Wetland Vegetation present

HYDROLOGY

___ **Recorded Data (Describe In Remarks):**
- ___ **Stream, Lake, or Tide Gauge**
- X **Aerial Photographs**
- ___ **Other**

___ **No Recorded Data Available**

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: >24 (in.)

Depth to Saturated Soil: >24 (in.)

Wetland Hydrology Indicators

Primary Indicators:
- ___ **Inundated**
- ___ **Saturated in Upper 12"**
- ___ **Water Marks**
- ___ **Drift Lines**
- ___ **Sediment Deposits**
- ___ **Drainage Patterns in Wetlands**

Secondary Indicators:
- X **Oxidized Roots Channels in Upper 12"**
- ___ **Water-Stained Leaves**
- ___ **Local Soil Survey Data**
- X **FAC-Neutral Test**
- ___ **Other (Explain in Remarks)**

Remarks:
Drought Conditions
Wetland Hydrology present

SOILS

W100-102

Map Unit Name
(Series and Phase): Corolla-Duckston complex 0-6% slopes uncoated Aquic Quartzipsamments (CoB)
Drainage Class: poorly drained
Taxonomy (Subgroup): thermic Typic psammaquents (Dt)
Confirm Mapped Type? Yes___ No___

Profile Description:

Depth (Inches)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2					organic debris
2-24		2.5Y 4/2			sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- X Organic Streaking in Sandy Soils
- ___ Listed On Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Wetland Soil present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___
Hydric Soils Present? Yes X No ___

Is the Sampling Point Within a Wetland? Yes X No ___

Remarks:

Isolated roadside depressional wetland

USACE AID#__________ DWQ #__________ Site #_____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority
2. Evaluator's name: S. BECK (CZR)
3. Date of evaluation: 12/8/07
4. Time of evaluation: 1100
5. Name of stream: —
6. River basin: North River
7. Approximate drainage area: 25-50 acres
8. Stream order: 1
9. Length of reach evaluated: 100'
10. County: Currituck
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any):__________

Latitude (ex. 34.872312):__________ Longitude (ex. –77.556611):__________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other__________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): Rt. 158 Just south of Riviera Tire Shop (ED1) (S1).

14. Proposed channel work (if any):__________

15. Recent weather conditions: Dry, Cold, Clear

16. Site conditions at time of visit: Saturated no surface water

17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:__________

19. Does channel appear on USGS quad map? [✓ YES] NO

20. Does channel appear on USDA Soil Survey? [✓ YES] NO

21. Estimated watershed land use: ____% Residential ____% Commercial ____% Industrial 25 % Agricultural 75 % Forested ____% Cleared / Logged ____% Other (__________)

22. Bankfull width: 10-15'

23. Bank height (from bed to top of bank): 2-3'

24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)

25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 58 **Comments:** Drains into Canal that drains into Deep Creek

Called Intermittent Stream by USACE Dec 6 07

Evaluator's Signature S J Beck **Date** 12/8/07

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

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STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	6
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	4
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	6
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						58

* These characteristics are not assessed in coastal streams.

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 12-7-07	**Project:** Mid-Currituck Sound Bridge	**Latitude:**
Evaluator: C. Beck (URS)	**Site:** RT 158 – just South of Riviera Tire	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 25.5	**County:** Currituck ED-1	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	0	[✓ 1]	2	3
3. In-channel structure: riffle-pool sequence	0	[✓ 1]	2	3
4. Soil texture or stream substrate sorting	0	1	[✓ 2]	3
5. Active/relic floodplain	0	1	[✓ 2]	3
6. Depositional bars or benches	0	[✓ 1]	2	3
7. Braided channel	[✓ 0]	1	2	3
8. Recent alluvial deposits	0	[✓ 1]	2	3
9[a] Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	0	0.5	[✓ 1]	1.5
12. Natural valley or drainageway	0	[✓ 0.5]	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	[✓ No = 0]		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)				
14. Groundwater flow/discharge	0	1	[✓ 2]	3
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	[✓ 1]	2	3
16. Leaflitter	1.5	[✓ 1]	0.5	0
17. Sediment on plants or debris	0	[✓ 0.5]	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	[✓ 1]	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 6)				
20[b]. Fibrous roots in channel	[✓ 3]	2	1	0
21[b]. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	[✓ 0]	0.5	1	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	[✓ 0]	0.5	1	1.5
25. Amphibians	[✓ 0]	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	[✓ 0]	0.5	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	[✓ 0]	0.5	1	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; [✓ Other = 0]			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

USACE AID#________ DWQ #________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority
2. Evaluator's name: CZR
3. Date of evaluation: 10/11/07
4. Time of evaluation: 0930
5. Name of stream: —
6. River basin: North River
7. Approximate drainage area: 25-50 acres
8. Stream order: 1
9. Length of reach evaluated: 100'
10. County: Currituck
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any):________

Latitude (ex. 34.872312):________ Longitude (ex. –77.556611):________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): West side of Rt 158 - WO1 - South of Rest Area
14. Proposed channel work (if any):________
15. Recent weather conditions: Upper 70's - Few Showers
16. Site conditions at time of visit: Appear normal
17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:________
19. Does channel appear on USGS quad map? [✓ YES] NO
20. Does channel appear on USDA Soil Survey? [✓ YES] NO
21. Estimated watershed land use: ____% Residential ____% Commercial ____% Industrial 50 % Agricultural 50 % Forested ____% Cleared / Logged ____% Other (________)
22. Bankfull width: 15'
23. Bank height (from bed to top of bank): 3-4'
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)
25. Channel sinuosity: ✓ Straight ____Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 43 **Comments:** Canal Feeds into Deep Creek

Called water - Not a stream by USACE Dec 6 07

Evaluator's Signature________ **Date** 10/11/07

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WDI
Water -
Not a
stream

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	5
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						53

* These characteristics are not assessed in coastal streams.

Waters - not a Stream

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 10/11/07	**Project:** Currituck Sound Bridge	**Latitude:**
Evaluator: CZR (SB)	**Site:** Rt 158 [✓ WD1] (west)	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 27.5	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 7)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	[✓ 0]	1	2	3
3. In-channel structure: riffle-pool sequence	0	[✓ 1]	2	3
4. Soil texture or stream substrate sorting	0	[✓ 1]	2	3
5. Active/relic floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	0	[✓ 1]	2	3
7. Braided channel	[✓ 0]	1	2	3
8. Recent alluvial deposits	[✓ 0]	1	2	3
9[a] Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	[✓ 0]	0.5	1	1.5
12. Natural valley or drainageway	[✓ 0]	0.5	1	1.5
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)				
14. Groundwater flow/discharge	0	1	2	[✓ 3]
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel – dry or growing season	0	1	2	[✓ 3]
16. Leaflitter	1.5	1	0.5	[✓ 0]
17. Sediment on plants or debris	0	[✓ 0.5]	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	[✓ 1]	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 11.5)				
20[b]. Fibrous roots in channel	[✓ 3]	2	1	0
21[b]. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	0	[✓ 0.5]	1	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	0	0.5	[✓ 1]	1.5
25. Amphibians	0	0.5	[✓ 1]	1.5
26. Macrobenthos (note diversity and abundance)	0	[✓ 0.5]	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	[✓ 1]	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; [✓ OBL = 1.5] SAV = 2.0; Other = 0			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

USACE AID#__________ DWQ #__________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority
2. Evaluator's name: S. Beck (CZR)
3. Date of evaluation: 12/5/07
4. Time of evaluation: 1615
5. Name of stream: —
6. River basin: North
7. Approximate drainage area: 25-50 acres
8. Stream order: 2
9. Length of reach evaluated: 100'
10. County: Currituck
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any):__________

Latitude (ex. 34.872312): __________ Longitude (ex. –77.556611):__________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other__________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): WD1 - East of Rest Area on Rt 157

14. Proposed channel work (if any):__________

15. Recent weather conditions: Sunny - Dry - Cold

16. Site conditions at time of visit: 1'-2' deep

17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:__________

19. Does channel appear on USGS quad map? [✓ YES] NO

20. Does channel appear on USDA Soil Survey? [✓ YES] NO

21. Estimated watershed land use: ____% Residential ____% Commercial ____% Industrial 50 % Agricultural 50 % Forested ____% Cleared / Logged ____% Other (__________)

22. Bankfull width: 10'-30'

23. Bank height (from bed to top of bank): 5-20'

24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)

25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 47 **Comments:** Canal feeds into Deep Creek

Called water - not a stream Dec 6, 07

by USACE

Evaluator's Signature__________ **Date** 12/5/07

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

WDI - Waters - not a stream

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	–
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	–
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
		Total Points Possible	100	100	100	
		TOTAL SCORE (also enter on first page)				47

* These characteristics are not assessed in coastal streams.

Waters - not a stream

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 12/5/07	**Project:** Mid-Currituck Bridge EIS	**Latitude:**
Evaluator: S. Geck (CZR)	**Site:** WP1 - Rt 158 (E)	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 27	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 10)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	0	[✓ 1]	2	3
3. In-channel structure: riffle-pool sequence	0	1	[✓ 2]	3
4. Soil texture or stream substrate sorting	0	[✓ 1]	2	3
5. Active/relic floodplain	0	1	[✓ 2]	3
6. Depositional bars or benches	0	[✓ 1]	2	3
7. Braided channel	[✓ 0]	1	2	3
8. Recent alluvial deposits	[✓ 0]	1	2	3
9[a] Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	[✓ 0]	0.5	1	1.5
12. Natural valley or drainageway	[✓ 0]	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)				
14. Groundwater flow/discharge	0	1	2	[✓ 3]
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	2	[✓ 3]
16. Leaflitter	1.5	1	0.5	[✓ 0]
17. Sediment on plants or debris	0	0.5	1	[✓ 1.5]
18. Organic debris lines or piles (Wrack lines)	0	[✓ 0.5]	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 8)				
20[b]. Fibrous roots in channel	[✓ 3]	2	1	0
21[b]. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	[✓ 0]	0.5	1	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	[✓ 0]	0.5	1	1.5
25. Amphibians	[✓ 0]	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	[✓ 0.5]	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	[✓ 1.5]
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5 SAV = 2.0; [✓ Other = 0]			

[b] Items 20 and 21 focus on the presence of upland plants, item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

USACE AID#________ DWQ #________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority

2. Evaluator's name: C. BECK (CZR)

3. Date of evaluation: 12/14/07

4. Time of evaluation: 1100

5. Name of stream: —

6. River basin: Currituck Sound

7. Approximate drainage area: 5-10 acres

8. Stream order: 1

9. Length of reach evaluated: 100'

10. County: Currituck

11. Site coordinates (if known): prefer in decimal degrees.

12. Subdivision name (if any):

Latitude (ex. 34.872312):

Longitude (ex. –77.556611):

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

South of Timbuck II Shopping Plaza on the Outer Banks – B-65 / 55

14. Proposed channel work (if any):

15. Recent weather conditions: Sunny, Dry

16. Site conditions at time of visit: Channel 0-4" deep

17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:

19. Does channel appear on USGS quad map? YES [✓ NO]

20. Does channel appear on USDA Soil Survey? YES [✓ NO]

21. Estimated watershed land use: ____% Residential 50 % Commercial ____% Industrial ____% Agricultural 50 % Forested ____% Cleared / Logged ____% Other (____)

22. Bankfull width: 5-10'

23. Bank height (from bed to top of bank): 1-2'

24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)

25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 69

Comments: Called Intermittent stream by USACE Nov 1, 07

- Dissipates into Maritime Swamp before reaching Currituck Sound

Evaluator's Signature C. Beck **Date** 12/14/07

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STREAM QUALITY ASSESSMENT WORKSHEET

55

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	5
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	4
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	5
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	6
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	5
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	6
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						69

* These characteristics are not assessed in coastal streams.

55

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 12/19/07	**Project:** Mid-Currituck Bridge	**Latitude:**
Evaluator: S. BECK	**Site:** Site B - Outer Banks Below Tim Buck II B-65	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 30.5	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 15.5)	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	[✓ 1] →	2	3
2. Sinuosity	0	1	[✓ 2]	3
3. In-channel structure: riffle-pool sequence	0	1	[✓ 2]	3
4. Soil texture or stream substrate sorting	0	1	2	[✓ 3]
5. Active/relic floodplain	0	1 →	2	[✓ 3]
6. Depositional bars or benches	0	[✓ 1] →	2	3
7. Braided channel	0	[✓ 1]	2	3
8. Recent alluvial deposits	0	[✓ 1]	2	3
9[a] Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	0	[✓ 0.5]	1	1.5
12. Natural valley or drainageway	0	0.5	[✓ 1]	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	[✓ No = 0]		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)				
14. Groundwater flow/discharge	0	1	2	[✓ 3]
15. Water in channel and > 48 hrs since rain, or Water in channel – dry or growing season	0	1	[✓ 2]	3
16. Leaflitter	1.5	1	0.5	[✓ 0]
17. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	[✓ 1]	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 7.5)				
20[b]. Fibrous roots in channel	[✓ 3]	2	1	0
21[b]. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	[✓ 0]	0.5	1	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	[✓ 0]	0.5	1	1.5
25. Amphibians	[✓ 0]	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	[✓ 0]	0.5	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	[✓ 0]	0.5	1	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; [✓ OBL = 1.5] SAV = 2.0; Other = 0			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Strong Intermittent (No Biology)

Sketch:

USACE AID#________ DWQ #________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority
2. Evaluator's name: S. BECK (CZR)
3. Date of evaluation: 8 July 08
4. Time of evaluation: 0840
5. Name of stream: EMS-A
6. River basin: Pasquotank
7. Approximate drainage area: ~100 acres
8. Stream order: 1
9. Length of reach evaluated: >100'
10. County: Currituck
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any):________

Latitude (ex. 34.872312):________ Longitude (ex. –77.556611):________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location): EMS-A - crosses US158 just North of Cooper Professional Services and Storage Sheds (Address: 5718)

(52)

14. Proposed channel work (if any): Fill
15. Recent weather conditions: Scattered showers almost every day - 80's - 90s
16. Site conditions at time of visit: water in pools - no flow - saturated elsewhere
17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:________
19. Does channel appear on USGS quad map? [✓ YES] NO
20. Does channel appear on USDA Soil Survey? YES NO
21. Estimated watershed land use: ____% Residential 35 % Commercial ____% Industrial 50 % Agricultural 15 % Forested ____% Cleared / Logged ____% Other (________)
22. Bankfull width: 5-15'
23. Bank height (from bed to top of bank): 3-6'
24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)
25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 29 **Comments:** Ditch Appears to connect Maple and Great Swamp

-Determined to be unimportant Intermittent by USACE and NCDWQ
-Does not require mitigation on 22 Oct 08

Evaluator's Signature Beck **Date** 7/8/08

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EMS-A

(52)

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	0
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	1
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
		Total Points Possible	100	100	100	
		TOTAL SCORE (also enter on first page)				29

* These characteristics are not assessed in coastal streams.

52

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 8 July 08	**Project:** Mid Currituck Bridge	**Latitude:**
Evaluator: S. Beck	**Site:** EMS-A (52)	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 23	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 11)

	Absent	Weak	Moderate	Strong
1[a]. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	0	[✓ 1]	2	3
3. In-channel structure: riffle-pool sequence	0	[✓ 1]	2	3
4. Soil texture or stream substrate sorting	0	[✓ 1]	2	3
5. Active/relic floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	0	1	[✓ 2]	3
7. Braided channel	[✓ 0]	1	2	3
8. Recent alluvial deposits	0	1	[✓ 2]	3
9[a] Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	[✓ 0]	0.5	1	1.5
12. Natural valley or drainageway	[✓ 0]	0.5	1	1.5
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	[✓ No = 0]		Yes = 3	

[a] Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

14. Groundwater flow/discharge	0	[✓ 1]	2	3
15. Water in channel and > 48 hrs since rain, **or** Water in channel -- dry or growing season	0	[✓ 1]	2	3
16. Leaflitter	1.5	[✓ 1]	0.5	0
17. Sediment on plants or debris	0	0.5	[✓ 1]	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	[✓ 1]	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 5.5)

20[b]. Fibrous roots in channel	3	[✓ 2]	1	0
21[b]. Rooted plants in channel	3	[✓ 2]	1	0
22. Crayfish	0	[✓ 0.5]	1	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	0	[✓ 0.5]	1	1.5
25. Amphibians	[✓ 0]	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	[✓ 0.5]	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	0	[✓ 0.5]	1	1.5
29[b]. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; [✓ OBL = 1.5] SAV = 2.0; Other = 0			

[b] Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

-26: Aquatic Beetles

Sketch:

USACE AID#________ DWQ #________ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority

2. Evaluator's name: S. Beck (CTR)

3. Date of evaluation: 9 July 08

4. Time of evaluation: 1200

5. Name of stream: EMS-B (East of 158)

6. River basin: Pasquotank

7. Approximate drainage area: ~500 acres

8. Stream order: 1

9. Length of reach evaluated: >100'

10. County: Currituck

11. Site coordinates (if known): prefer in decimal degrees.

12. Subdivision name (if any):________

Latitude (ex. 34.872312):________ Longitude (ex. –77.556611):________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

EMS-B Crosses 158 Just North of Hardees and Exxon, East side of Road 53

14. Proposed channel work (if any): Fill

15. Recent weather conditions: Scattered showers almost every day 80's - 90's

16. Site conditions at time of visit: Large pools w/ Flow

17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisberies Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:________

19. Does channel appear on USGS quad map? [✓ YES] NO

20. Does channel appear on USDA Soil Survey? YES [✓ NO]

21. Estimated watershed land use: 5 % Residential 20 % Commercial ____% Industrial 70 % Agricultural 5 % Forested ____% Cleared / Logged ____% Other (________)

22. Bankfull width: 20'

23. Bank height (from bed to top of bank): 2' - 6'

24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)

25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range sbown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate eacb reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 52

Comments: Ditch feeds into Currituck Sound

-Determined to be Perennial by USACE and NCDWQ on 22 Oct 08

-Requires Mitigation

Evaluator's Signature Beck **Date** 7/8/08

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

EMS-B (East)

(53)

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0–5	0–4	0–5	5
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0–6	0–5	0–5	2
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0–6	0–4	0–5	2
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0–5	0–4	0–4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0–3	0–4	0–4	2
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0–4	0–4	0–2	2
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0–5	0–4	0–2	3
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0–6	0–4	0–2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0–5	0–4	0–3	3
	10	**Sediment input** (extensive deposition = 0; little or no sediment = max points)	0–5	0–4	0–4	3
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0–4	0–5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0–5	0–4	0–5	3
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0–5	0–5	0–5	3
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0–3	0–4	0–5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact = 0; no evidence = max points)	0–5	0–4	0–5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0–3	0–5	0–6	2
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0–6	0–6	0–6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0–5	0–5	0–5	3
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0–4	0–4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0–4	0–5	0–5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0–4	0–4	0–4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0–4	0–4	0–4	3
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0–6	0–5	0–5	3
		Total Points Possible	100	100	100	
		TOTAL SCORE (also enter on first page)				52

* These characteristics are not assessed in coastal streams.

53

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 9 July 08	**Project:** Mid-Currituck Bridge	**Latitude:**
Evaluator: S. Beck (CZR)	**Site:** EMS-B (East of 158)	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 37.5	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 15)	Absent	Weak	Moderate	Strong
1ª. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	0	[✓ 1]	2	3
3. In-channel structure: riffle-pool sequence	0	1	[✓ 2]	3
4. Soil texture or stream substrate sorting	0	1	[✓ 2]	3
5. Active/relic floodplain	0	1	( )→ [✓ 2]	3
6. Depositional bars or benches	0	1	[✓ 2]	3
7. Braided channel	0	[✓ 1]	2	3
8. Recent alluvial deposits	0	[✓ 1]	2	3
9ª Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	[✓ 0]	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	[✓ 1]	1.5
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	[✓ No = 0]		Yes = 3	

ª Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)				
14. Groundwater flow/discharge	0	1	2	[✓ 3]
15. Water in channel and > 48 hrs since rain, <u>or</u> Water in channel -- dry or growing season	0	1	2	[✓ 3]
16. Leaflitter	1.5	[✓ 1]	0.5	0
17. Sediment on plants or debris	0	0.5	1	[✓ 1.5]
18. Organic debris lines or piles (Wrack lines)	0	[✓ 0.5]	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 12.5)				
20ᵇ. Fibrous roots in channel	[✓ 3]	2	1	0
21ᵇ. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	0	0.5	[✓ 1]	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	0	0.5	[✓ 1]	1.5
25. Amphibians	0	[✓ 0.5]	1	1.5
26. Macrobenthos (note diversity and abundance)	0	[✓ 0.5]	1	1.5
27. Filamentous algae; periphyton	0	[✓ 1]	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	[✓ 1]	1.5
29ᵇ. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; [✓ OBL = 1.5] SAV = 2.0; Other = 0			

ᵇ Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

26. aquatic beetles

Sketch:

USACE AID#____________ DWQ #____________ Site #_____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NC Turnpike Authority

2. Evaluator's name: S. BECK/CZR

3. Date of evaluation: 10 July 08

4. Time of evaluation: 09:00

5. Name of stream: EMS-C (East side of 158)

6. River basin: Pasquotank

7. Approximate drainage area: ~500 acres

8. Stream order: 1 (2 offsite)

9. Length of reach evaluated: >100'

10. County: Currituck

11. Site coordinates (if known): prefer in decimal degrees.

12. Subdivision name (if any):____________

Latitude (ex. 34.872312): ____________ Longitude (ex. –77.556611):____________

Method location determined (circle): GPS Topo Sheet Ortho (Aerial) Photo/GIS Other GIS Other____________

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

EMS-C Crosses 158 Just south of Shell Station and NAPA Autoparts (54)

14. Proposed channel work (if any): Fill

15. Recent weather conditions: Scattered Showers almost every day, 80's/90's

16. Site conditions at time of visit: Saturated several small Pools

17. Identify any special waterway classifications known: ____Section 10 ____Tidal Waters ____Essential Fisheries Habitat ____Trout Waters ____Outstanding Resource Waters ____Nutrient Sensitive Waters ____Water Supply Watershed ____(I-IV)

18. Is there a pond or lake located upstream of the evaluation point? YES [✓ NO] If yes, estimate the water surface area:____________

19. Does channel appear on USGS quad map? [✓ YES] NO

20. Does channel appear on USDA Soil Survey? YES [✓ NO]

21. Estimated watershed land use: 15 % Residential ____% Commercial ____% Industrial 50 % Agricultural 25 % Forested ____% Cleared / Logged ____% Other (____________)

22. Bankfull width: 5-8'

23. Bank height (from bed to top of bank): 0-1'

24. Channel slope down center of stream: ✓ Flat (0 to 2%) ____Gentle (2 to 4%) ____Moderate (4 to 10%) ____Steep (>10%)

25. Channel sinuosity: ____Straight ✓ Occasional bends ____Frequent meander ____Very sinuous ____Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 56 **Comments:**

-Determined to be Important Intermittent by USACE and NCDWQ on
-Requires Mitigation 22 Oct 08

Evaluator's Signature Beck **Date** 7/8/08

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

54

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	—
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	4
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	**Impact by agriculture, livestock, or timber production** (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	2
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	—
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	5
		Total Points Possible	100	100	100	
		TOTAL SCORE (also enter on first page)				56

* These characteristics are not assessed in coastal streams.

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North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 10 July 08	**Project:** mid-Currituck Bridge	**Latitude:**
Evaluator: S. Beck	**Site:** EMS-C (East side B-157)	**Longitude:**
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 28.5	**County:** Currituck	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1ª. Continuous bed and bank	0	1	2	[✓ 3]
2. Sinuosity	0	[✓ 1]	2	3
3. In-channel structure: riffle-pool sequence	0	[✓ 1]	2	3
4. Soil texture or stream substrate sorting	0	1	[✓ 2]	3
5. Active/relic floodplain	0	1	[✓ 2]	3
6. Depositional bars or benches	0	1	[✓ 2]	3
7. Braided channel	[✓ 0]	1	2	3
8. Recent alluvial deposits	0	[✓ 1]	2	3
9ª Natural levees	[✓ 0]	1	2	3
10. Headcuts	[✓ 0]	1	2	3
11. Grade controls	[✓ 0]	0.5	1	1.5
12. Natural valley or drainageway	0	[✓ 0.5]	1	1.5
13. Second or greater order channel on <u>existing</u> USGS or NRCS map or other documented evidence.	[✓ No = 0]		Yes = 3	

ª Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)				
14. Groundwater flow/discharge	0	[✓ 1]	2	3
15. Water in channel and > 48 hrs since rain, **or** Water in channel – dry or growing season	0	[✓ 1]	2	3
16. Leaflitter	[✓ 1.5]	1	0.5	0
17. Sediment on plants or debris	0	0.5	[✓ 1]	1.5
18. Organic debris lines or piles (Wrack lines)	0	[✓ 0.5]	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		[✓ Yes = 1.5]	

C. Biology (Subtotal = 9.5)				
20ᵇ. Fibrous roots in channel	[✓ 3]	2	1	0
21ᵇ. Rooted plants in channel	[✓ 3]	2	1	0
22. Crayfish	0	0.5	[✓ 1]	1.5
23. Bivalves	[✓ 0]	1	2	3
24. Fish	[✓ 0]	0.5	1	1.5
25. Amphibians	0	[✓ 0.5]	1	1.5
26. Macrobenthos (note diversity and abundance)	[✓ 0]	0.5	1	1.5
27. Filamentous algae; periphyton	[✓ 0]	1	2	3
28. Iron oxidizing bacteria/fungus.	0	[✓ 0.5]	1	1.5
29ᵇ. Wetland plants in streambed	FAC = 0.5; FACW = 0.75; [✓ OBL = 1.5] SAV = 2.0; Other = 0			

ᵇ Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

Appendix D

Qualifications of Additional Contributors

List of Additional Contributors to the Mid-Currituck Bridge Project NRTR

Investigator: Steve Beck
Education: BS Biology, Juniata College
Responsibilities: Wetland and stream delineations and assessments, aquatic and terrestrial community assessment, threatened and endangered species assessment, document preparation.
Experience: CZR Incorporated, 2006 to 2009
Discipline: Biology

Investigator: Lorrie Laliberte Boswell
Education: BA Conservation Biology, UNC-Wilmington
MS Coastal Marine and Wetland Studies, Coastal Carolina University
Responsibilities: Document preparation, impact evaluations, wildlife assessments.
Experience: CZR Incorporated, 2006 to present
Discipline: Ecology and biology

Investigator: Katharine Braly
Education: BS Marine Biology, UNC-Wilmington
MS Marine Science, UNC-Wilmington
Responsibilities: Biological assessment
Experience: CZR Incorporated, 2008 to present
Discipline: Marine science

Investigator: T. Travis Brown
Education: BS Wildlife Biology, Murray State University
MS Biology, Murray State University
Responsibilities: Aquatic and terrestrial community assessment, threatened and endangered species assessment, document preparation.
Experience: CZR Incorporated, 2007 to 2008
Discipline: Ecology

Investigator: Samuel Cooper
Education: MS, Marine Biology, UNC-Wilmington
BS, Biology, Northland College
Responsibilities: Technical Director, management of natural resources investigations and documentation, including affected

environment, environmental consequences, and supporting documents.
Experience: CZR Incorporated, 1988 to present
Discipline: Coastal Ecologist and Technical Director

Investigator: Julia Kirkland Berger
Education: MS, Geology, UNC-Wilmington
BA, Environmental Studies, UNC-Wilmington
Responsibilities: Document review, oversight of quality control, and assistance with document preparation.
Experience: CZR Incorporated, 1994 to 2002 and 2004 to present
Discipline: Senior Environmental Scientist

Investigator: Mark Grippo
Education: MS, Zoology and Comparative Anatomy, College of William and Mary
BS, Biology, Virginia Polytechnic Institute & State University
Responsibilities: Preparation of the essential fish habitat assessment
Experience: CZR Incorporated, 2001 to 2005
Discipline: Biologist

Investigator: Terry Jones
Responsibilities: Preparation of graphics and acreage calculations
Experience: CZR Incorporated, 2002 to present
Discipline: Graphics Technician and CADD Operator

Appendix E

Conceptual Mitigation Plan

MID-CURRITUCK BRIDGE

STIP NO. R-2576
CURRITUCK COUNTY
DARE COUNTY

Conceptual Mitigation Plan

Prepared for:

NORTH CAROLINA
Turnpike Authority

Prepared by:

CDG
Currituck Development Group

April 20, 2011

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INTRODUCTION

PURPOSE

The purpose of this document is to summarize the planned permit-related mitigation for environmental impacts for the proposed Mid-Currituck Bridge across Maple Swamp and Currituck Sound. The intent of this effort is to identify the likely project-related mitigation requirements and mitigation opportunities that could provide appropriate compensatory mitigation for permitted impacts. The Mid-Currituck Bridge project will require permits, certifications, and reviews from the US Coast Guard (USCG), US Army Corps of Engineers (USACE), the North Carolina Department of Environment and Natural Resources (NCDENR) – Division of Water Quality (NCDWQ), and Division of Coastal Management (NCDCM). These permits, certifications, and reviews include the Section 404 (USACE), the Section 401 Water Quality Certification (NCDWQ), the Coastal Area Management Act (CAMA) consistency review (NCDCM), and a CAMA major permit (NCDCM). This document addresses conceptual impact mitigation related to each of these permits, certifications, and reviews.

BACKGROUND

The North Carolina Turnpike Authority (NCTA), a division of the North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing an Environmental Impact Statement (EIS) to evaluate proposed improvements in the Currituck Sound area. In order to meet the three underlying needs for the project, NCTA is examining a new crossing of Currituck Sound between US 158 and NC 12 as part of the detailed study of alternatives in the EIS. The focus of this report will be on NCTA's Preferred Alternative, known as MCB4/A/C1 with refinements to avoid and minimize impacts.

The Preferred Alternative consists of improvements to NC 158 on the Currituck County mainland, two bridges that connect US 158 to NC12 on the Currituck Outer Banks, and improvements to NC 12. One of two bridges is approximately 1.5 miles long and crosses Maple Swamp west of Currituck Sound between US 158 and the community of Aydlett. The second bridge is the Mid-Currituck Bridge across Currituck Sound which would be approximately 4.7 miles in length and would intersect NC 12 approximately two miles north of the Albacore Street retail area in Corolla (Figure 1).

SETTING

Currituck Sound

Currituck Sound is an oligohaline (brackish) estuary extending from the North Carolina/Virginia state line approximately 29 miles south to its confluence with Albemarle Sound. Currituck Sound has a surface area of approximately 98,000 acres or 153 square miles, varies in width from 3 to 8 miles, and contains numerous islands. Water is supplied to Currituck Sound from three primary sources: streams, precipitation, and ocean water. The main sources of fresh water include several feeder streams, ground water, and direct precipitation. Currituck Sound has no direct connection to the Atlantic Ocean; however, there are direct shallow connections to the Albemarle Sound to the south and the Chesapeake Bay to the north that do have direct connections to the Atlantic Ocean. The Atlantic Intracoastal Waterway (AIWW) provides a hydrologic and transportation corridor from Albemarle Sound to the Chesapeake Bay that connects to Currituck Sound. The AIWW follows North River in North Carolina (a tributary to Albemarle Sound west of Currituck Sound) and then North Landing River in conjunction with the Albemarle Chesapeake Canal and Elizabeth River to the north to the Chesapeake Bay. The AIWW opens into Currituck Sound for approximately 4 miles at its northern end near Knotts Island. The entire length of the AIWW is dredged from Albemarle Sound to North Landing River in Virginia, including the portion adjacent to Currituck Sound.

A 2001 US Geological Survey Water-Resources Investigations Report (01-4097) indicated that increased salinity in the northern portion of Currituck Sound has been attributed to northerly winds driving brackish water south from the Chesapeake Bay. The same data also suggested that increased salinity in the southern portion of Currituck Sound may be a result of southerly winds driving brackish water north from Albemarle Sound.

Water depths in Currituck Sound are generally shallow (less than 7 feet below mean lower low water) but fluctuate substantially. Winds appear to have a greater impact on water levels in Currituck Sound than astronomical tides. Winds from the south typically produce higher water levels in Currituck Sound, whereas winds from the north typically produce lower water levels. The National Oceanic and Atmospheric Administration (NOAA) bathymetric data charts for Currituck Sound are shown on Figure 2. At the Wright Memorial Bridge, water depths are 5 to 7 feet with shallower areas near each shore. Just to the north of the Wright Memorial Bridge there are some areas with water depths that are greater than 7 feet. Further north, there are a series of islands and a narrowing of Currituck Sound called the Big Narrows. Water depths in this narrows area tend to be very shallow ranging from 1 to 3 foot depth. The widest water route through the islands is about a half mile wide. This area is an impediment to vessel traffic through Currituck Sound. Immediately north of the island and Big Narrows area is the C1 corridor for the Mid-Currituck Bridge. A survey of Currituck Sound bottom elevations along the centerline of the C1 bridge corridor showed water depths ranging from 3 to 9 feet. To the north of the proposed corridor, the water depths in Currituck Sound continue to vary substantially from 7 feet and below. This is true for the entire northern portion of Currituck Sound, including the areas adjacent to the AIWW.

Based on available information, it appears that Currituck Sound functions as two connected bodies of water with the narrows and island area separating the two. The southern portion of Currituck Sound has greater connectivity and association with Albemarle Sound south of the Wright Memorial Bridge. The northern portion of Currituck Sound has greater connectivity and association with Chesapeake Bay and the AIWW. The proposed Mid-Currituck Bridge C1 corridor is located just to the north of the narrows and island area.

Currituck Sound historically has supported populations of submerged aquatic vegetation (SAV). In Currituck Sound, these plants are most likely to establish in water depths of less than 4 feet. The shallower the water the greater the potential for SAV as light penetration is increased. Water depth is not the only factor relative to the establishment of SAV. Also the composition of the bottom sediments along with water flow speeds, water clarity, and wave action have a bearing on SAV population. In the vicinity of the C1 revised (straight bridge) corridor, current SAV populations are in the shallow waters near the east end of the crossings. Stands include freshwater eelgrass (*Vallisneria americana*), widgeon grass (*Ruppia maritima*), Eurasian water milfoil (*Myriophyllum spicatum*), and sago pondweed (*Stuckenia pectinata*) (Luczkovich 2010).

SAV beds along the eastern shore of Currituck Sound are significant, with 48.0 acres within the study survey area, and some exceeding 50 percent surface coverage, or density. Under the C1 revised alignment on the eastern side, there are approximately 4.8 acres of SAV habitat identified.

Within the study survey area on the western side of Currituck Sound small areas of SAV too sparse to be detected with the acoustic analysis methods used in the October 2010 survey were observed. The occurrence of sparse SAV plants was confirmed by divers through ground-truthing. A small area of sparse SAV close to the shoreline with density less than 10 percent occurred in the study survey area on the western side (Luczkovich 2010).

Tidal freshwater marshes are found along the shorelines of Currituck Sound; however, there are no tidal freshwater marshes within the C1 corridor.

Maple Swamp

Maple Swamp is an approximately 4,600-acre forested wetland located within a basin roughly six miles long by 1 to 1.5 miles wide, although much of this complex, particularly in and around the project area, has been recently timbered. Within the project area, Maple Swamp is dominated by two wetland communities as defined in Schafale and Weakley (1990). These include areas of nonriverine swamp forest and areas of bay forest. The nonriverine swamp forest is dominated by red maple (*Acer rubrum*) and tupelo (*Nyssa biflora*) along with loblolly bay (*Gordonia lasianthus*), sweetgum (*Liquidambar stryaciflua*), redbay (*Persea palustris*), and sweetbay magnolia (*Magnolia virginiana*). Understory species include American holly (*Ilex opaca*), lowbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), and dog hobble (*Leucothoe axillaris*). Areas of bay forest are generally dominated by loblolly bay, red bay, and sweetbay magnolia. Understory species are similar to the nonriverine swamp forest but generally lack American holly.

The area of Maple Swamp to be spanned by the proposed 1.5 mile long Maple Swamp bridge is very flat between the two flanking ridges, with a nearly constant ground elevation of approximately 2 feet above mean sea level (ft msl) for the entire east-west width of the swamp. The elevation in the middle of the swamp may be slightly lower than at the edges, but this potential difference appears to be at most on the order of inches. In a north-south direction, Maple Swamp very gradually slopes from the south (at approximate elevation 6 ft msl, near Macedonia Church Road) to the north (at approximate elevation 0 ft msl, adjacent to Currituck Sound). The ground surface topography of Maple Swamp and surrounding areas has a significant influence on the shallow groundwater flow system, as described below and in Preliminary Assessment of Maple Swamp Groundwater System Technical Memorandum (Parsons Brinckerhoff, 2010).

In general, the uppermost geological units beneath the Maple Swamp area include the shallow aquifer system, the Yorktown confining unit, and the Yorktown aquifer. These aquifer layers are sedimentary in nature, deposited and eroded in generally horizontal strata over previous geologic ages through the action of stream flow, sea-level fluctuation, and other geological processes. The shallow aquifer system is generally unconfined, and the water table forms the effective top of the aquifer. This shallow aquifer, which is comprised mainly of fine to medium-grained sands interbedded with layers of clays and slits, extends from ground surface to a maximum depth of approximately -95 ft msl at the project location across Maple Swamp (Phase 1A Preliminary Geotechnical Report, Based on Potential Route(s) for the Mid-Currituck Bridge Project CDG, 2009). A thin layer of organic peat, ranging from approximately 0.5 to 2-ft thick, is present throughout most of Maple Swamp at ground surface above the surficial sands. The shallow, unconfined aquifer underlying Maple Swamp is the most critical aquifer with regard to wetland function and water levels (Preliminary Assessment of Maple Swamp Groundwater System Technical Memorandum, Parsons Brinckerhoff, 2010).

IMPACTS

Construction of the Preferred Alternative, MCB4/A/C1, would result in placing fill in wetlands under the jurisdiction of the USACE and NCDWQ. Impacts to wetlands would be associated with the US 158/Mid-Currituck Bridge interchange and improvements to US 158 and NC 12. Impacts to open waters and SAV beds/habitat and potential SAV habitat would be associated with construction of the bridge over Currituck Sound.

WETLANDS

A total of 7.9 acres of vegetated wetlands, primarily forested, would be impacted by the construction of the Preferred Alternative. Wetland types that would be impacted include palustrine forested broad-leaved evergreen (PFO1), palustrine forested broad-leaved deciduous (PFO3), and palustrine forested needle-leaved evergreen (PFO4).

SUBMERGED AQUATIC VEGETATION

For the purposes of this document, the following SAV related definitions are used:

- “SAV Habitat” is as defined by the NC Marine Fisheries Commission (15A NCAC 03I .0101(4)(i)) as submerged lands that are vegetated with one or more species of submerged aquatic vegetation or have been vegetated by one or more species of submerged aquatic vegetation within the past 10 annual growing seasons, and that meet the average physical requirements of water depth (six feet or less), average light availability (secchi depth of one foot or more), and limited wave exposure that characterize the environment suitable for growth of SAV.

- “Potential SAV Habitat” is defined as expanses with six (6) foot water depth or less including suitable bottom for SAV growth and are not included in “SAV Habitat” as defined by the NC Marine Fisheries Commission (15A NCAC 03I .0101(4)(i)).
- “Unsuitable SAV Habitat” is defined as expanses with greater than six (6) foot water depth or has unsuitable bottom characteristics for SAV growth.
- “SAV Beds” is defined as submerged lands that are currently vegetated with one or more species of SAV in sufficient density to warrant classification. In other words, the first portion of the NC Marine Fisheries Commission definition of SAV habitat.

Based on SAV surveys conducted during 2007 and 2010 and as shown in Figure 3, SAV habitat is primarily located on the east side of Currituck Sound and extend roughly 4,000 feet from the eastern shore of the Outer Banks into Currituck Sound (Forte and Martz, 2007 and Luczkovitch, 2010). Two areas that are considered as potential SAV habitat are located 1) approximately 8,000 feet from the eastern shore and 2) approximately 1,900 feet from the western shore (Figure 3).

Impacts to SAV habitat and potential SAV habitat associated with construction of the Preferred Alternative would be primarily associated with shading. Approximately 4.8 acres of SAV habitat and 3.9 acres of potential SAV habitat would be shaded by construction of the Preferred Alternative. In addition, approximately 0.08 acres of SAV habitat could be impacted by the piles associated with the temporary construction trestle on the west used to construct the permanent bridge.

BOTTOM DISTURBING ACTIVITIES

Dredging

TEAC meetings with environmental resource and regulatory agencies during 2010 and later have resulted in the elimination of all dredging as an option for the construction of the bridge on the MCB4/C1 corridor. Therefore, there would be no impacts associated with dredging to SAV or the bottom of Currituck Sound during the construction of the Preferred Alternative.

CONCEPTUAL MITIGATION PLAN

The primary purpose of compensatory mitigation is to replace the aquatic resource functions that are lost or impaired through permitted impacts. This report focuses on project-specific, “on-site” compensatory mitigation opportunities within the general vicinity of the Mid-Currituck Bridge project that would replace the aquatic resource functions that may be lost or impaired. Potentially, the loss or degradation of these functions could impact water storage, nutrient cycling, and habitat within the project area.

COMPENSATORY WETLAND MITIGATION REQUIREMENTS

In North Carolina compensatory wetland mitigation requirements can be met in a number of ways: acquisition of credits from an approved compensatory mitigation bank, payment to the North Carolina Ecosystem Enhancement Program (NCEEP), a state administered in-lieu-fee program, and project-specific mitigation. This report further explains project-specific compensatory mitigation opportunities within the proposed right of way and properties that may be landlocked due to construction of the project. However, all three of the mitigation options are available and may be used to develop a final comprehensive compensatory mitigation proposal for the Mid-Currituck Bridge project.

The USACE, the NCDWQ, and the NCDCM generally require two acres of compensatory mitigation for each acre of permitted wetland impact. The agencies generally apply a compensatory mitigation ratio of 2:1 for permitted impacts with a minimum 1:1 ratio of restoration and the remainder of the mitigation requirement met through enhancement (2:1), preservation (5:1), and creation (3:1). Regulatory agencies prefer restoring wetlands where they once occurred over other forms of mitigation including creation (building a wetland where none formerly existed), enhancement (increasing one or more functions within an existing wetland) and preservation (conserving an existing wetland). In-kind mitigation is defined as providing or managing substitute resources to replace the functional values of the resources lost through permitted impacts, where such substitute resources are also physically and biologically the same or closely approximate the resources lost (e.g. mitigating impacts to a cypress swamp by restoring or creating a cypress swamp).

FORESTED WETLANDS

For the purposes of this conceptual mitigation plan, it is assumed that the compensatory mitigation ratio for permitted impacts to forested wetlands would be 2:1 with a minimum ratio of 1:1 for restoration, with the remainder of the requirement being met through enhancement, preservation, or creation. If sufficient on-site opportunities within the right of way are not available, the remainder of the mitigation requirement could be met through a combination of approaches including the NCDOT Ballance Farm Mitigation Site, payment to NCEEP, or wetland preservation. Based on the projected wetland impacts of the Preferred Alternative (7.9 acres) and applying the 1:1 requirement for restoration, 7.9 acres of restoration would be required. The remainder of the mitigation requirement could be satisfied through 15.8 acres of wetland enhancement or 39.5 acres of wetland preservation or a combination of enhancement and preservation.

Within the right of way of the Preferred Alternative, all areas of Maple Swamp have been logged (15.58 acres) or are proposed for permanent clearing (27.77 acres). The *Access Management Report (Preliminary Service Road Study)* prepared by CDG in April 2011 identifies six parcels that would be landlocked by the Preferred Alternative (Figure 4). These parcels collectively contain approximately 190.4 acres of hydric or possibly hydric soils and 154.3 acres of National Wetlands Inventory (NWI) wetlands (Table 1 and Figure 5). These parcels are almost completely forested, except for relatively small cleared areas on Parcels 18, 19, 25, and

26. These cleared areas partly coincide with the boundaries of upland areas in NWI mapping (Figure 5). Based on soils and NWI information, these parcels could collectively provide approximately 150+ acres of preservation.

Ballance Farm Mitigation Site

The Ballance Farm Mitigation Site (Site) located in Currituck County approximately 15 miles north of the proposed Mid-Currituck Bridge was originally a 469-acre site from which NCDOT purchased 430 acres. The Site consisted of 297 acres of agricultural fields, 50 acres of tidal freshwater marsh, 51 acres of forested wetland, 5.3 acres of forested uplands, and 26 acres of roads and ditches. The Ballance Farm project includes the creation of 61 acres of coastal marsh wetland and 50 acres of coastal marsh preservation; 236 acres of forested wetland restoration and 51 acres of forested wetland preservation; and 5.3 acres of upland habitat preservation. Current available balances are: 18.00 acres of coastal marsh creation; 48.15 acres of coastal marsh preservation; 196.01 acres of forested wetland restoration; and 34.55 acres of forested wetland preservation. Monitoring reports and additional information concerning the Ballance Farm Mitigation site can be found at:
http://www.ncdot.org/doh/preconstruct/pe/neu/Monitoring/2004Monitoring/Ballance_ng.pdf

SUBMERGED AQUATIC VEGETATION

SAV impacts for this project involve potential shading which could be caused by the permanent bridge and a relatively small amount of potential direct impacts due to piling from the temporary work trestle on the east. Based on the projected impacts of the Preferred Alternative and utilizing a temporary construction trestle, mitigation would be required for approximately 4.8 acres (permanent bridge over SAV habitat) and 3.9 acres (permanent bridge over potential SAV habitat), plus the minor 0.08 acres from temporary piling. Applying a 2:1 ratio to 8.78 acres yields 17.56 acres of SAV mitigation which could be required.

Summary of shading and pile impacts:

- Permanent bridge shading of SAV habitat (exists on east side) -- 4.8 acres
- Permanent bridge shading of potential SAV habitat (6 foot depth or less) -- 3.9 acres
- Temporary work trestle piles in SAV beds/habitat (east side) -- 0.08 acres
- Combined permanent bridge shading both SAV habitat and potential SAV habitat - 8.78 acres

Historically, restoration of SAV has been difficult compared to restoration of other aquatic resource types (marshes, forested wetlands, and streams). In the past, SAV restoration efforts have met limited success and could be cost prohibitive for larger areas. SAV restoration efforts have primarily focused on transplanting plant material from an existing site (either entire plants or tubers) or seedlings grown in a nursery to the restoration site. However, the expense involved with this method was typically high and success was often mixed.

Table 1: Characteristics of Landlocked Parcels

Parcel	PIN	Owner	Acreage	Hydric Soils	NWI Wetlands
17	8995-93-1255	Robert G. Young 1501 Princess Anne Rd. Virginia Beach, VA 23456	12.4	• 12.0 acres Tomotley fine sandy loam (3-75% hydric) • 0.4 acre State fine sandy loam (upland)	• 12.4 acres PFO6F
18	9905-02-3923	Mildred Markert Trustee PO Box 4 Coinjock, NC 27923	25.2	• 14.3 acres Tomotley fine sandy loam (3-75% hydric) • 9.0 acres Dorovan mucky peat (85% hydric) • 1.9 acre State fine sandy loam (upland)	• 22.3 acres PFO6F • 2.9 acres upland
19	9905-00-3623	Mildred Quidley Trustee 5067 Caratoke Hwy. Coinjock, NC 27923	81.9	• 45.0 acres Tomotley fine sandy loam (3-75% hydric) • 26.1 acres Dorovan mucky peat (85% hydric) • 6.8 acres Augusta fine sandy loam (5% hydric) • 2.8 acres Nimmo loamy sand (10-80% hydric) • 1.0 acres Bojac loamy sand (upland) • 0.2 acre Portsmouth fine sandy loam (3-75% hydric)	• 61.9 acres PFO6F • 19.5 acres upland • 0.5 acre PFO1A
25	9905-20-5908		25.2	• 13.5 acres Wasda muck (10-80% hydric) • 5.9 acres Dragston loamy fine sand (2-3% hydric) • 2.9 acres Bojac loamy sand (upland) • 2.5 acres water • 0.2 acre Altavista fine sandy loam (5% hydric) • 0.1 acre Munden loamy sand (5% hydric) • 0.1 acre Augusta fine sandy loam (5% hydric)	• 12.6 acres upland • 7.3 acres PFO1A • 5.3 acres PFO6F
26	9905-21-1450	Marcella R. Walker 100 Waterview Dr. Grandy, NC 27939	23.3	• 11.8 acres Wasda muck (10-80% hydric) • 4.3 acres Dragston loamy fine sand (2-3% hydric) • 3.4 acres Altavista fine sandy loam (5% hydric) • 3.1 acres State fine sandy loam (upland) • 0.5 acre Bojac loamy sand (upland) • 0.2 acre Augusta fine sandy loam (5% hydric) • 0.01 acre water	• 13.4 acres upland • 9.2 acres PFO1A • 0.7 acre PFO6F
27	9905-31-7547	Edward M. Markert PO Box 56 Coinjock, NC 27923	34.7	• 20.5 acres Ponzer muck (10-80% hydric) • 14.2 acres Wasda muck (10-80% hydric)	• 30.6 acres PFO6F • 4.1 acres PFO1A

However, seed dispersal restoration efforts in recent years have been more successful. Lessons learned from these recent success stories increase the feasibility of using SAV restoration as compensatory mitigation for impacts. Recent efforts in eelgrass restoration in the coastal bays of the Eastern Shore of Virginia have been met with great success in restoring large areas through seed dispersal. In this method, seeds are collected from the reproductive shoots of eelgrass within existing beds and then dispersed to the restoration sites. This cost effective method has led to substantial increases in SAV coverage in restoration areas. This technique is currently being applied for restoration efforts using wild celery, wigeon grass, and redhead grass. Using seed dispersal to restore a moderate sized area of SAV may be a cost effective and desirable approach for compensatory mitigation for SAV impacts.

The conceptual mitigation plan for impacts to SAV beds could include in-kind restoration in the project area at a suitable site at a 2:1 ratio. SAV restoration would follow NCDOT mitigation protocols which is available at:
(http://www.ncdot.org/doh/preconstruct/pe/neu/neuprocedures/SpecialTopics.html).

However, even with advances in restoration techniques, SAV restoration still carries risk. Weather during the establishment period (e.g. extreme heat or cold) could affect the survival of plantings. Likewise, severe storm events could uproot seedlings and herbivores such as waterfowl and turtles could decimate the plantings. Additionally, the cyclical nature of SAV coverage means that even established beds expand and contract during certain years.

For other discussion purposes, forms of compensatory mitigation for SAV impacts could be appropriate and combined with a restoration effort given the historical difficulty of restoring this type of ecosystem. Such mitigation could involve efforts to improve conditions for SAV propagation and survival within Currituck Sound. These measures could include: 1) retrofitting of existing stormwater best management practices (BMPs) that discharge into Currituck Sound, and 2) funding to support SAV research. Offsite mitigation could include 3) the creation and/or expansion of oyster reefs in appropriate areas such as the Pamlico Sound. Additional mitigation strategies could involve 4) protection and establishment of riparian buffers on the Currituck County mainland, 5) contribution of funds to promote agricultural BMPs, 6) stormwater management improvement projects, 7) acquisition of properties identified as important for the protection of water quality (as reported in the *Countywide Land Parcel Prioritization Strategy for Water Quality Enhancement* prepared by the North Carolina Coastal Land Trust in 2006), 8) participation in the Currituck Sound Ecosystem Restoration Project coordinated by the USACE, and other measures that would improve water quality within Currituck Sound. Lastly, although more costly, other methods could be 9) construction of terraces at depth-appropriate locations to enhance SAV beds, and 10) restoration of eroded dredge spoil islands.

The specifics of any SAV compensatory mitigation plan would involve coordination with the environmental regulatory and resource agencies. In addition, coordination with East Carolina University and/or Elizabeth City State University on the development of a SAV mitigation strategy would be advantageous.

SUMMARY

This Conceptual Mitigation Plan identifies the three (3) potential impact areas associated with the project: wetlands, SAVs, and dredging.

Several agency concerns about dredging resulted in the elimination of dredging from the project. Both wetlands and SAV issues were reviewed and summarized as to the amount and possible mitigation options and the various risks for those options assessed.

Efforts in this document are to provide the NCTA with a collective summary of what choices or combinations of choices are available to satisfy required mitigation. While the intent is to list options that may have been tried on past projects, any options chosen would have to consider a balance of the best value of the mitigation approach in conjunction with the budget constraints of the project.

REFERENCES

Currituck Development Group, October 2009. *Phase 1A Preliminary Geotechnical Report, Based on Potential Route(s) for the Mid-Currituck Bridge Project*. Report prepared for North Carolina Turnpike Authority.

CZR, Incorporated. November 2009. *Mid-Currituck Bridge Study, Natural Resources Technical Report*. Prepared for Parsons Brinckerhoff and the North Carolina Turnpike Authority.

CZR. Incorporated. January 2011*. Mid-Currituck Bridge Study STIP No. R-2576 (Task Order 10)– Three-tiered evaluation of Maple Swamp, Currituck County, NC to determine the extent of forested and non-forested wetland areas as a result of recent timbering*. Prepared for Parsons Brinckerhoff and the North Carolina Turnpike Authority.

Division of Coastal Management (DCM). 1996. GIS Wetland Type Mapping for the North Carolina Coastal Plain. Department of Environment and Natural Resources, Raleigh, NC.

Forte, M. And Martz, T. 2007. Currituck Sound Hydrographic and Submerged Aquatic Vegetation Survey, U.S. Army Corps of Engineers Study, ERDC/CHL/FRF Report 07-1, Field Research Facility, Coastal and Hydraulics Laboratory, U.S. Army Corps of Engineers Research and Development Center, 1261 Duck Road, Kitty Hawk, NC 27949.

Luczkovich, J.L. October 2010. *Survey of the Submerged Aquatic Vegetation in the Proposed Alignment for the Mid-Currituck Bridge*. Institute for Coastal Science and Policy, East Carolina University, Greenville, NC.

North Carolina Coastal Land Trust. November 2006. *Countywide Land Parcel Prioritization Strategy for Water Quality Enhancement*, Currituck County, NC. Wilmington, NC. Available at http://co.currituck.nc.us/pdf/documents-plans/Water-Quality-Enhancement-2006.pdf.

Parsons Brinckerhoff, October 2010. Mid-Currituck Bridge Project, *Preliminary Assessment of Maple Swamp Groundwater System Technical Memorandum*. Prepared for North Carolina Turnpike Authority.

Schafale, M. P.; Weakley, A. S. 1990. Classification of the natural communities of North Carolina: third approximation. NC Natural Heritage Program, Division of Parks and Recreation, NC Department Environment and Natural Resources, Raleigh, NC.

United States Army Corps of Engineers. September 2010. *Currituck Sound Ecosystem Restoration Feasibility Study*. Interagency Briefing, Wilmington District (SAW).

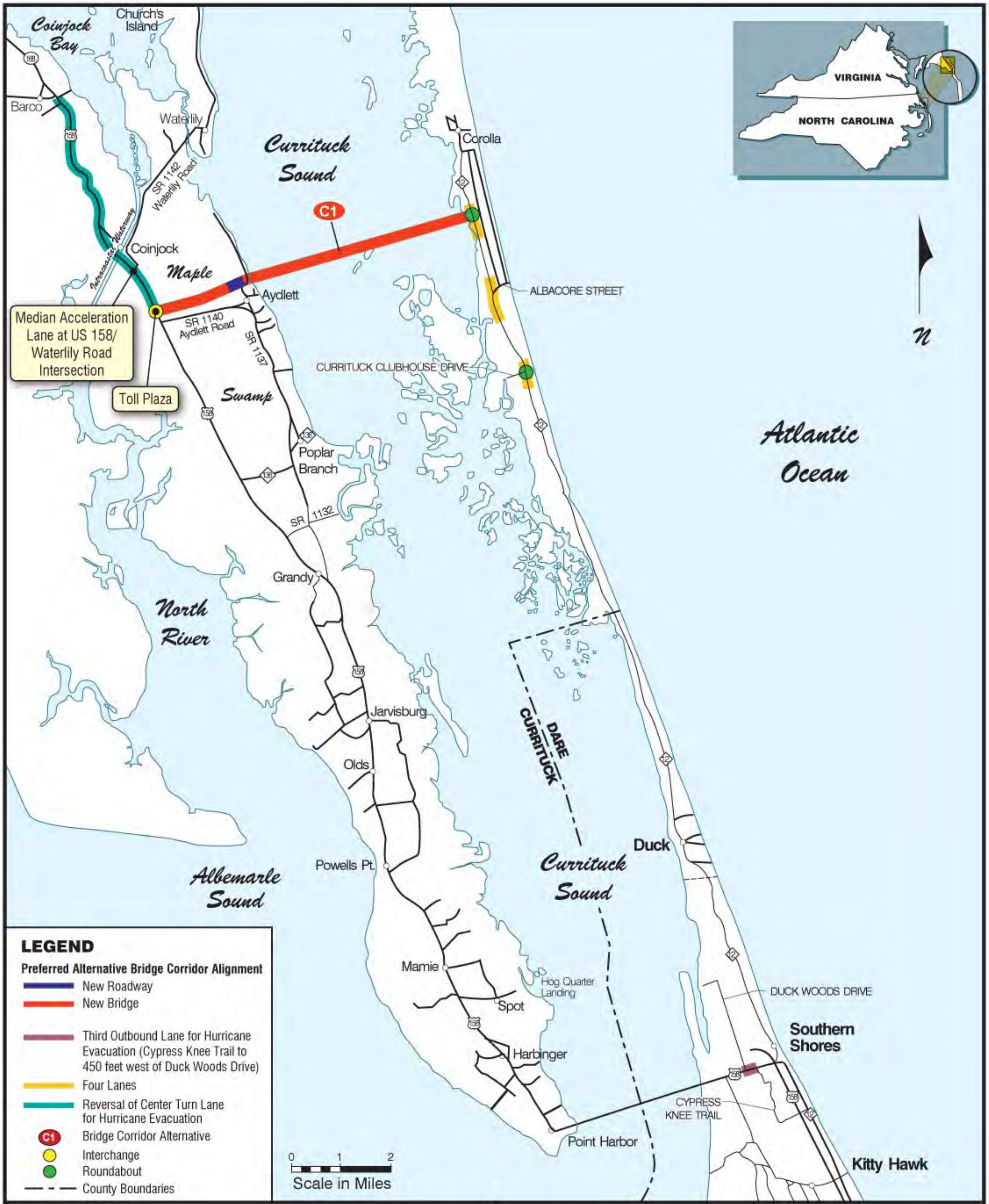


Figure 1

Preferred Alternative

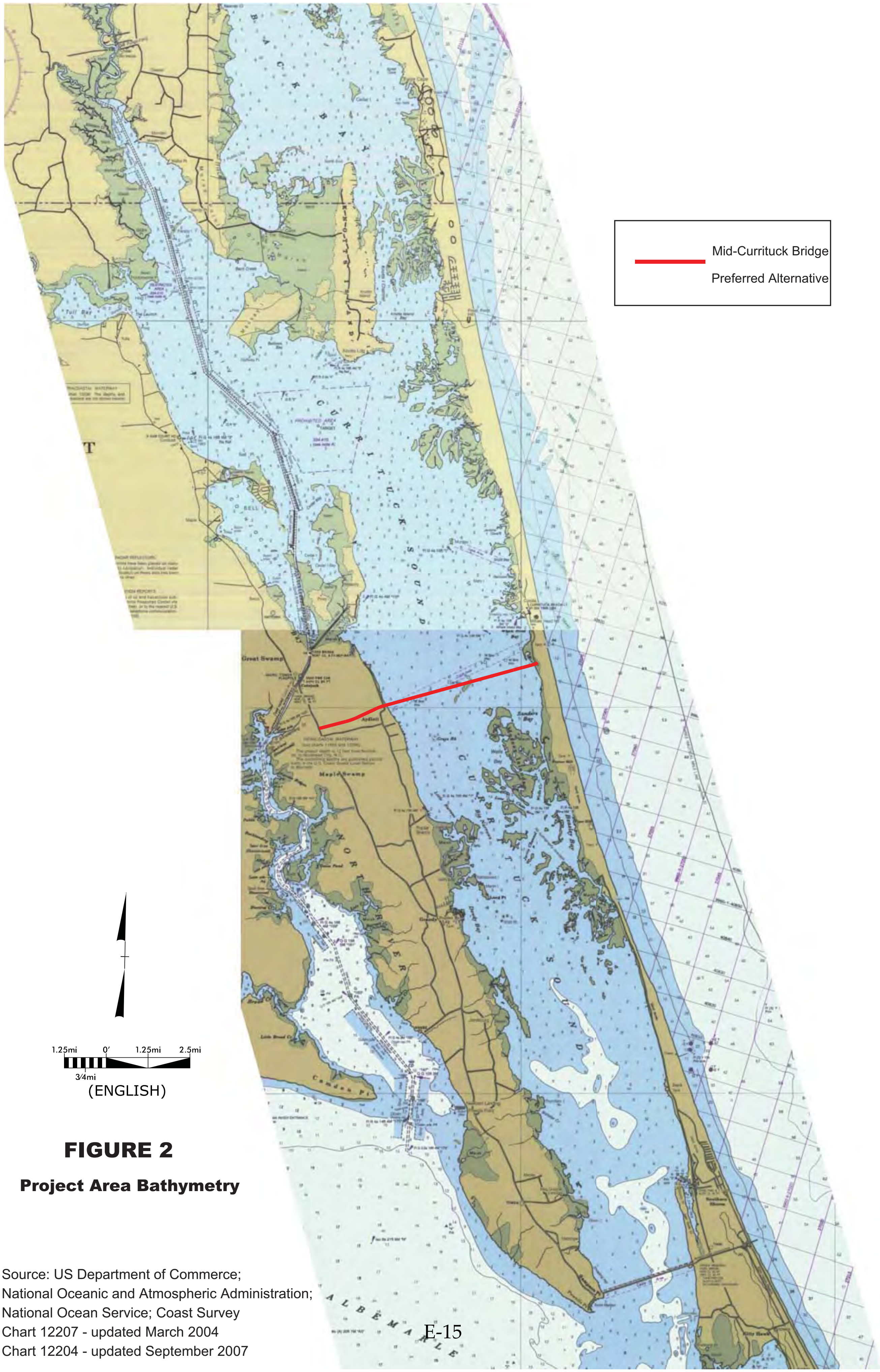
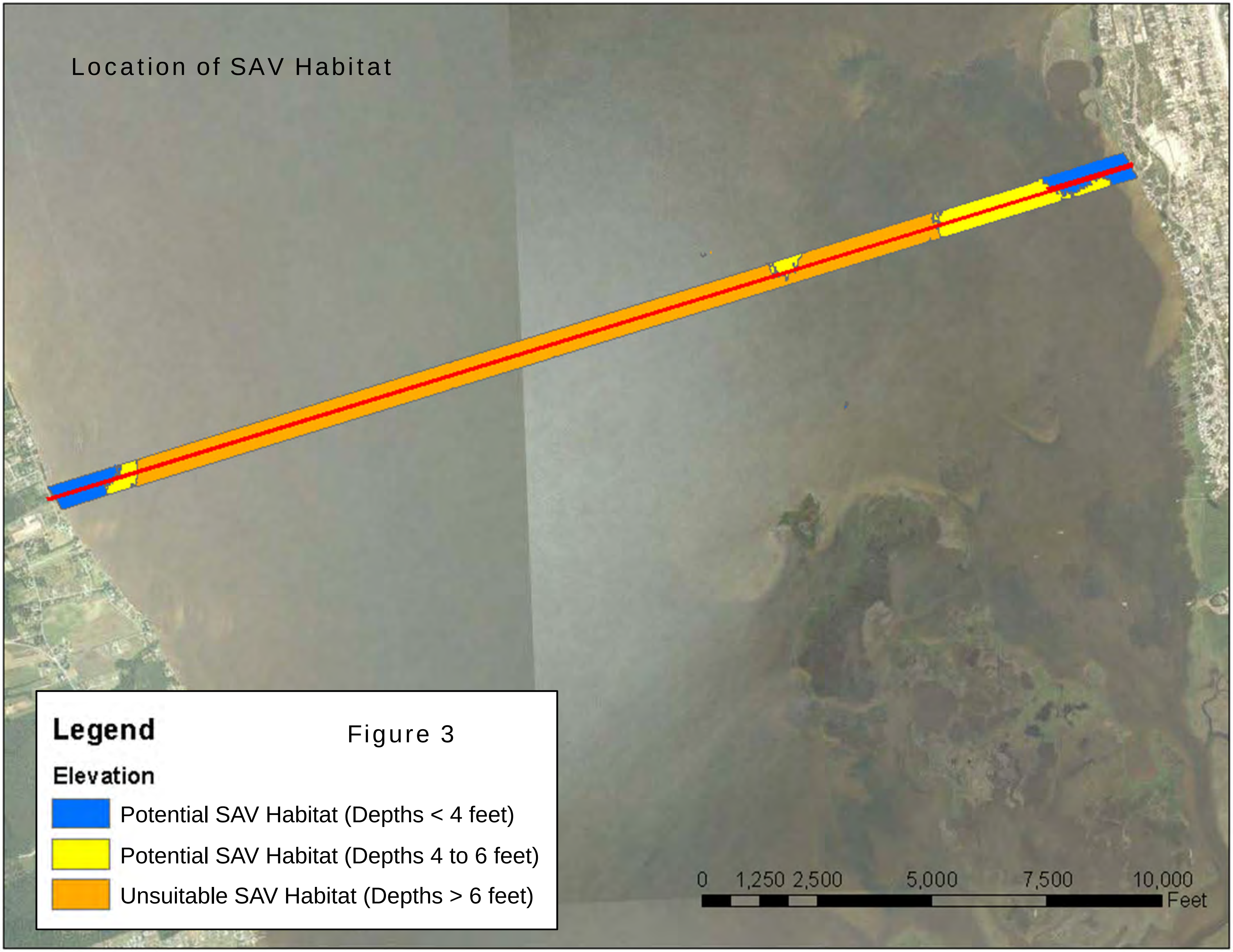


FIGURE 2

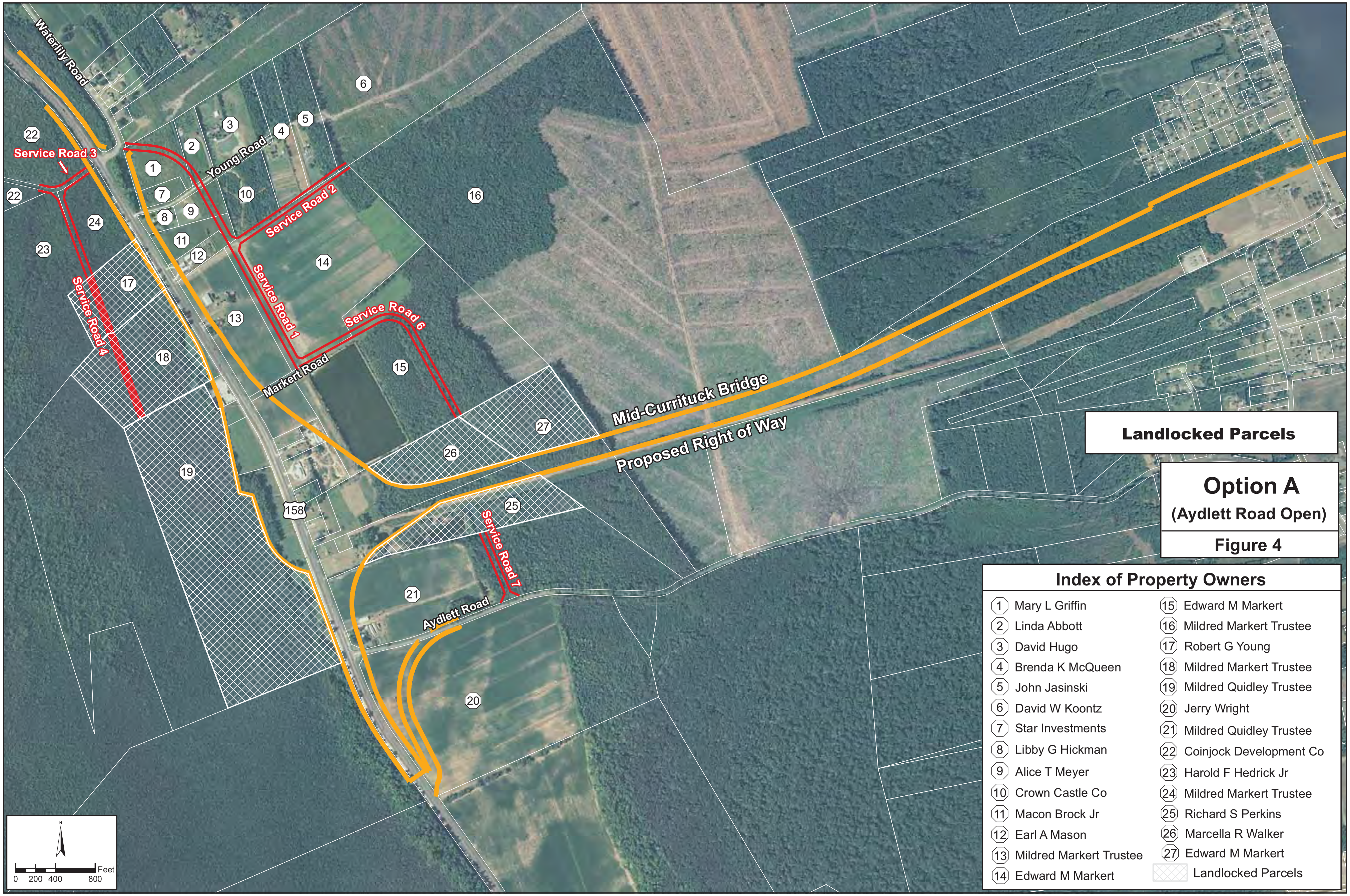
Project Area Bathymetry

Source: US Department of Commerce;
National Oceanic and Atmospheric Administration;
National Ocean Service; Coast Survey
Chart 12207 - updated March 2004
Chart 12204 - updated September 2007



Location of SAV Habitat

Figure 3



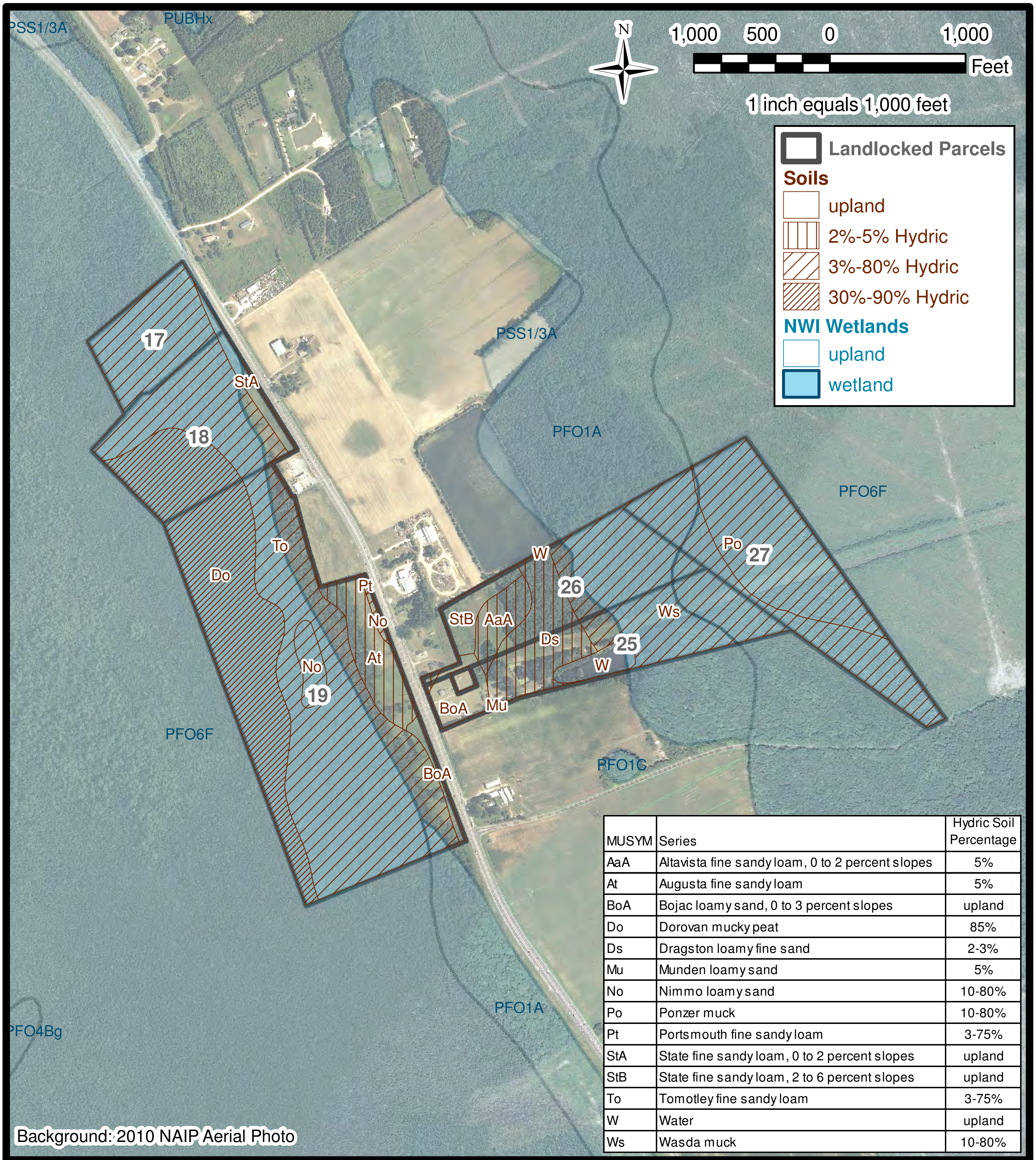
Landlocked Parcels

Option A
(Aydlett Road Open)

Figure 4

Index of Property Owners

①	Mary L Griffin	⑮	Edward M Markert
②	Linda Abbott	⑯	Mildred Markert Trustee
③	David Hugo	⑰	Robert G Young
④	Brenda K McQueen	⑱	Mildred Markert Trustee
⑤	John Jasinski	⑲	Mildred Quidley Trustee
⑥	David W Koontz	⑳	Jerry Wright
⑦	Star Investments	㉑	Mildred Quidley Trustee
⑧	Libby G Hickman	㉒	Coinjock Development Co
⑨	Alice T Meyer	㉓	Harold F Hedrick Jr
⑩	Crown Castle Co	㉔	Mildred Markert Trustee
⑪	Macon Brock Jr	㉕	Richard S Perkins
⑫	Earl A Mason	㉖	Marcella R Walker
⑬	Mildred Markert Trustee	㉗	Edward M Markert
⑭	Edward M Markert	▨	Landlocked Parcels



MUSYM	Series	Hydric Soil Percentage
AaA	Altavista fine sandy loam, 0 to 2 percent slopes	5%
At	Augusta fine sandy loam	5%
BoA	Bojac loamy sand, 0 to 3 percent slopes	upland
Do	Dorovan mucky peat	85%
Ds	Dragston loamy fine sand	2-3%
Mu	Munden loamy sand	5%
No	Nimmo loamy sand	10-80%
Po	Ponzer muck	10-80%
Pt	Portsmouth fine sandy loam	3-75%
StA	State fine sandy loam, 0 to 2 percent slopes	upland
StB	State fine sandy loam, 2 to 6 percent slopes	upland
To	Tomotley fine sandy loam	3-75%
W	Water	upland
Ws	Wasda muck	10-80%

NORTH CAROLINA
Turnpike Authority

LANDLOCKED PARCELS
CHARACTERISTICS

Mid-Currituck Bridge

Currituck County, North Carolina

Dwn By: ES	Ckd By: REF
Date: APR 2011	
Scale: As Shown	
Project No.: 100009758	

FIGURE
5

Appendix F

Section 7 Consultation Concurrence Letters

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

July 8, 2011

Steven D. Dewitt, P.E.
North Carolina Turnpike Authority
1578 Mail Service Center
Raleigh, North Carolina 27699-1578

Dear Mr. Dewitt:

This letter is in response to your letter of June 28, 2011 and accompanying Biological Assessment for the Mid-Currituck Bridge project in Currituck and Dare Counties (STIP No. R-2576). The Biological Assessment provides the biological conclusions for the following federally listed species which are within the purview of the U.S. Fish and Wildlife Service (Service). These comments are provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

Scientific Name	Common Name	Biological Conclusion
Canis rufus	Red wolf	No Effect
Trichechus manatus	West Indian manatee	MA-NLAA*
Charadrius melodus	Piping plover	MA-NLAA*
Picoides borealis	Red-cockaded woodpecker	No Effect
Sterna dougallii dougallii	Roseate tern	No Effect
Eretmochelys imbricata	Hawksbill sea turtle	No Effect
Dermochelys coriacea	Leatherback sea turtle	No Effect
Chelonia mydas	Green sea turtle	No Effect
Caretta caretta	Loggerhead sea turtle	MA-NLAA*
Lepidochelys kempii	Kemp's ridley sea turtle	No Effect
Amaranthus pumilus	Seabeach amaranth	No Effect

*MA-NLAA = May Affect, Not Likely to Adversely Affect

Based on available information, the Service concurs with your conclusion that the proposed project may affect, but is not likely to adversely affect the West Indian manatee, piping plover, and loggerhead sea turtle. Our concurrence for the West Indian manatee is also based, in part, on your commitment to implement the Services "*GUIDELINES FOR AVOIDING IMPACTS TO THE WEST INDIAN MANATEE: Precautionary Measures for Construction Activities in North Carolina Waters*". Also, based on available information, the Service concurs with your conclusion that the project will have no effect on the red wolf, red-cockaded woodpecker, roseate tern, Hawksbill sea turtle, leatherback sea turtle, green sea turtle, Kemp's ridley sea turtle, and seabeach amaranth. We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied for this project. We remind you that obligations under Section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered in this review; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by this identified action.

The Service appreciates the opportunity to review this project. If you have any questions regarding our response, please contact Mr. Gary Jordan at (919) 856-4520 (Ext. 32).

Sincerely,

Gary Jordan
for Pete Benjamin
Field Supervisor

cc: Bill Biddlecome, USACE, Washington, NC
Travis Wilson, NCWRC, Creedmoor, NC
Chris Militscher, USEPA, Raleigh, NC
George Hoops, FHWA, Raleigh, NC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5312; FAX (727) 824-5309
http://sero.nmfs.noaa.gov

OCT 18 2011 F/SER31:JC

Mr. Steven DeWitt
Chief Engineer
North Carolina Turnpike Authority
1578 Mail Service Center
Raleigh, NC 27699-1578

Re: State Project No. R-2576

Dear Mr. DeWitt:

This responds to your letter dated June 28, 2011, requesting National Marine Fisheries Service (NMFS) concurrence with your determinations pursuant to Section 7 of the Endangered Species Act (ESA) for construction of a bridge in Currituck County spanning Currituck Sound from the mainland to the Outer Banks. This consultation is being conducted by the North Carolina Transportation Authority (NCTA), a subdivision of the North Carolina Department of Transportation (NCDOT), as the non-federal representative designated by the Federal Highway Administration, North Carolina Division. NMFS has had a few communiqués with NCTA over the past year regarding this project, dating back to June 4, 2010, and most recently on August 9, 2010, to discuss the consultation requirements between NCDOT and NMFS and, finally, to respond to a NMFS request for additional information. You determined the project may affect, but is not likely to adversely affect, loggerhead and green sea turtles and would have no effect on three other species of sea turtles (hawksbill, leatherback, and Kemp's ridley). NMFS' determinations regarding the effects of the proposed action are based on the description of the action in this informal consultation. You are reminded that any changes to the proposed action may negate the findings of the present consultation and may require reinitiation of consultation with NMFS.

The project is located within Currituck Sound and both eastern and western shorelines where the 4.7-mile bridge (Mid-Currituck Bridge) would be constructed. Approximate waypoints between the eastern and western shorelines are (eastern shoreline) latitude 36.351069°N, longitude 75.827228°W, and (western shoreline) latitude 36.333522°N, longitude 75.905678°W (North American Datum of 1983), Currituck County, North Carolina. NCTA proposes to construct a new, 4.7-mile-long, two-lane toll bridge spanning the western mainland shoreline and the eastern Outer Banks shoreline. Approximately 20,000 feet (3.8 miles) of bridge construction would involve in-water construction, completed from shallow-draft barges. NCTA will use a combination of work trestle and barges for constructing both the substructure (piles and pile caps) and superstructure (beams and deck), including:

Western Shoreline

- 1,900-ft-long work trestle extending from the western shoreline (based on the absence of submerged aquatic vegetation (SAV) on the western side, a closed-surface work trestle may be utilized). The closed surface work trestle will be approximately 50 ft wide and will hold a parked crane to pass necessary materials onto barges. The bridge on this side of Currituck Sound would be constructed from the work trestle.
- Remaining bridge construction would be from small, shallow-draft barges for approximately 3.8 miles. The barges would be launched from the trestle extending off the shoreline from Narrow Shore Road in the town of Aydlett.

Eastern Shoreline (Outer Banks)

- Bridge work will be conducted from a temporary, 50-ft-wide trestle for approximately 4,500 ft (0.8 mile) over habitat that includes scattered SAV. Bridge erection equipment would operate atop the trestle to place the components of the bridge foundation and spans. This trestle would remain open (beams only to support a crane) to minimize the shading of SAV during construction. The temporary construction trestle would have two, 4-ft-wide runners to support the construction equipment, with 20-ft spacing in between the runners to reduce the shading effect of the trestle on seagrass resources. Marine industry standard pans will be placed under construction equipment operating on the open trestle to capture any accidental release of petroleum products from equipment. Further, moratorium dates have been established for bridge construction work from the eastern side of the sound due to the presence of SAV.

Bridge piles will be driven using pressurized water to wash out holes for pile setting; vibratory and impact hammers will be used. Turbidity curtains will be used for all in-water construction throughout the project duration and the applicant will comply with the NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (enclosed). The shallow-water habitats (6 feet or less) within Currituck Sound provide potential habitat for SAV. According to the North Carolina Marine Fisheries Commission (NCMFC), SAV survey data exist[1] that include the action area from several annual growing seasons (2003, 2006, 2007, and 2010). Bridge construction will occur intermittently over a period of 52 months, with time-of-year restrictions to accommodate SAV growing season, for a total of approximately 19 months in seagrass areas: Construction season 1 – October 1 to February 14 (non-moratorium window for SAV for all 4 seasons) would allow for approximately 35 percent of both work trestle and permanent bridge pilings along with deck construction; Construction seasons 2 and 3 – during these two seasons, the remaining temporary work trestle and permanent bridge construction would be completed; Construction season 4 – the temporary work trestle will be removed and dismantled. Construction would likely begin in early 2013. If during post-construction monitoring it is determined that SAV beds have been permanently disturbed, then NCTA will provide in-kind restoration in the project area at an agreed 2:1 ratio in accordance with SAV protocols in North Carolina. No dredging is associated with this project. No permanent light fixtures are proposed to date for the bridge or the approaches. There is discussion amongst stakeholders to include in the final bridge plan a pedestrian/bicycle access across the bridge. However, if a decision is reached to add pedestrian/bicycle access across the bridge, then there would be some lighting placed along the pathway. However, corrective light management would include the use of low-wattage, long-wavelength lighting, which is either shielded, such that the light is visible only on the road, or embedded in the roadway itself (pers. comm. between Joe Cavanaugh, NMFS, and Tracy Roberts, P.E., NCTA, August 9, 2011). Therefore, this consultation is based on the assumption that any lighting fixtures associated with this bridge will not be visible on the adjacent Atlantic beaches, even with sky-glow.

Three ESA-listed species of sea turtles (the endangered Kemp's ridley and the threatened/endangered[2] green, and the threatened loggerhead) and the shortnose sturgeon can be found in or near the action area

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[1] Luczkovich, J.J. 2010. *Survey of the Submerged Aquatic Vegetation in the Proposed Alignment for the Mid-Currituck Bridge*. A report to the North Carolina Turnpike Authority.

[2] Green turtles are listed as threatened, except for breeding populations in Florida and the Pacific coast of Mexico, which are listed as endangered.

and may be affected by the project. Atlantic sturgeon, proposed for listing under the ESA, also can be found in or near the action area. There is no critical habitat under NMFS' purview designated in or near the project area for the species considered in this consultation; therefore, none will be affected.

NMFS believes that the project is not likely to adversely affect sea turtles under our purview. We have analyzed the proposed action and believe the only routes of potential effects to sea turtles are from interactions with construction machinery, temporary construction-associated turbidity, avoidance of the construction area resulting in lost foraging opportunities, and partially obstructed passage through Currituck Sound during bridge construction. Potential effects from interactions with construction machinery will be discountable and/or insignificant because: (1) implementation of construction guidelines will aid in preventing interactions with any turtles that may pass through the project site; (2) sea turtles are highly mobile and will be able to avoid areas of active construction; and (3) compliance with NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (enclosed), will aid in preventing interactions with any turtles that may pass through the project site during construction. Potential effects from lost foraging opportunities will be insignificant because: (1) sea turtles will still be able to forage underneath the bridge post-construction; (2) the project will impact only a very small portion of the available foraging habitat (sea turtles will be able to forage in nearby areas even during demolition and construction); and (3) the area does not provide habitat that would be considered of outstanding or higher value than alternative, nearby habitat available to sea turtles, such that long-term avoidance of the entire project area (which is highly unlikely) would have detrimental effects on them, even over the project life (intermittent work over 52 months). The potential for construction-associated turbidity to adversely affect sea turtles is insignificant because construction would be limited to that occurring during barge access and pile placement, and only occur in a relatively small portion of Currituck Sound at any one time. The effect of partially obstructed passage during or post-bridge construction on sea turtles transiting through Currituck Sound will be insignificant due to the broad width of Currituck Sound where the bridge spans it, thereby posing no impediment to sea turtle passage into or out of the sound during construction or by the finished bridge.

NMFS believes the project is not likely to adversely affect shortnose sturgeon or Atlantic sturgeon. NMFS believes that there are no potentially adverse effects to shortnose or Atlantic sturgeon spawning since there are no potential routes to known spawning rivers for either species through Currituck Sound. The only potential effects to either sturgeon species are from lost foraging opportunities by disruption of their foraging habitats, temporarily during construction and long-term from completed, in-water structures. NMFS has determined these effects will be insignificant because: (1) access throughout Currituck Sound will not be restricted during construction other than to localized areas during piling placement and, if shortnose or Atlantic sturgeon are present, they will be able to avoid the construction activities; (2) implementation of best management practices will reduce or eliminate in-water effects to benthic prey and small localized disturbances to benthic prey would be expected to quickly recover post-construction; (3) work trestles and all other in-water construction materials (e.g., turbidity curtains) will be removed post-construction; and (4) the permanent bridge pilings will not impede sturgeon transit/access due to the broad width of Currituck Sound. Based on this, NMFS believes the proposed work is not likely to adversely affect shortnose sturgeon or the proposed endangered South Atlantic DPS of the Atlantic sturgeon.

This concludes the Federal Highway Administration and NCDOT/NCTA's consultation responsibilities under the ESA for species under NMFS' purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

We have enclosed additional information on other statutory requirements that may apply to this action, and on NMFS' Public Consultation Tracking System, which will allow you to track the status of ESA consultations. If you have any questions, please contact Joseph Cavanaugh at (727) 551-5097 or by e-mail at Joseph.Cavanaugh@noaa.gov.

Sincerely,

James E. Weaver

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures (2)

File: 1514-22. L.1
Ref: I/SER/2011/02987

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

PCTS Access and Additional Considerations for ESA Section 7 Consultations
(Revised 7-15-2009)

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.