Attachment 16:

Mid-Currituck Bridge Cumulative Effects Report for Coastal Resources, June 2021

Mid-Currituck Bridge Cumulative Effects Report for Coastal Resources

Prepared for:

North Carolina Department of Transportation
North Carolina Turnpike Authority

June 2021

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List of Acronyms

AEC	Area of Environmental Concern
APE	Area of Potential Effect
ASMFC	Atlantic States Marine Fisheries Commission
CAMA	Coastal Area Management Act
CWHF	Corolla Wild Horse Fund
FEIS	Final Environmental Impact Statement
FLSNV	First Line of Stable Natural Vegetation
GIS	Geographic Information System
NAAQS	National Ambient Air Quality Standards
NCCHPP	North Carolina Coastal Habitat Protection Plan
NCCRC	North Carolina Coastal Resource Commission
NCDCM	North Carolina Division of Coastal Management
NCDMF	North Carolina Division of Marine Fisheries
NCDNCR	North Carolina Department of Natural and Cultural Resources
NCDOT	North Carolina Department of Transportation
NCDWQ	North Carolina Division of Water Quality
NCDWR	North Carolina Division of Water Resources
NCEMC	North Carolina Environmental Management Commission
NCMFC	North Carolina Marine Fisheries Commission
NCTA	North Carolina Turnpike Authority
NCWRC	North Carolina Wildlife Resources Commission

NERR	National Estuarine Research Reserve
N.E.S.T.	Network for Endangered Sea Turtles
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge
PDA	Probable Development Area
PNA	Primary Nursery Area
ORW	Outstanding Resource Waters
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Office
USACE	U.S. Army Corps Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

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1 Purpose, Goals, and Objectives for this Study

This document serves as supporting documentation to the Coastal Area Management Act (CAMA) Major Permit application for the construction of the Mid-Currituck Bridge in Currituck County, North Carolina. The intent of this document is to provide a qualitative analysis of potential cumulative effects associated with the construction of the Mid-Currituck Bridge Selected Alternative. This analysis is specific to coastal resources as identified in CAMA and the supporting rules of the North Carolina Coastal Resources Commission (NCCRC), primarily the resources identified in Subchapter 7H - State Guidelines for Areas of Environmental Concern (AEC).

1.1 Purpose

In accordance with § 113A-120(a)(10), an application for a CAMA Major Permit shall be denied upon finding:

> *"In any case, that the proposed development would contribute to cumulative effects that would be inconsistent with the guidelines set forth in subdivisions (1) through (9) of this subsection. Cumulative effects are impacts attributable to the collective effects of a number of projects and include the effects of additional projects similar to the requested permit in areas available for development in the vicinity."*

With regard to performing a cumulative effects analysis to satisfy this portion of CAMA, it should also be noted that while the CAMA definition did not specifically mention the terms "secondary impacts" or "indirect impacts", use of the term "C*umulative effects are impacts attributable to the collective effects of a number of projects…"* in the CAMA language appears to be a functional equivalent to "secondary impacts" and/or "indirect impacts." Therefore, this study includes an analysis of these types of impacts. It should be noted that the CAMA definition of cumulative effects utilized in this study is different than the definitions of indirect effects and cumulative effects found in the Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina (NCDOT, 2001), and subsequently utilized in the Mid-Currituck Bridge Study Indirect and Cumulative Effects Technical Report (East Carolina University and Parsons Brinckerhoff Inc., 2011).

While CAMA allows for a consideration of cumulative effects in CAMA Major Permit decisions, under the regulatory processes of the North Carolina Division of Coastal Management (NCDCM), specific cumulative effects analyses have rarely, if ever, been prepared in support of individual CAMA Permit applications. The lack of preparation of cumulative effects analyses appears to be primarily because many of the rules of the NCCRC are designed in a manner that helps to limit cumulative effects of numerous projects of a certain type by limiting by rule the amount of allowable impacts for individual projects. For example, incorporation of public trust waters by private docking facilities is managed by rules limiting the size and distance offshore of each individual facility. Additionally, substantial protections are afforded to more valuable

coastal resources, such as coastal wetlands, Primary Nursery Areas (PNAs), and areas of submerged aquatic vegetation (SAV).

The CAMA Major Permit application review process also can be used to address cumulative effects. This application review process routinely involves coordination with the following resource and permitting agencies:

- North Carolina Division of Community Assistance
- North Carolina Division of Coastal Management (NCDCM)
- North Carolina Division of Water Resources (NCDWR)
- North Carolina Division of Marine Fisheries (NCDMF)
- North Carolina Division of Energy, Mineral, and Land Resources
- North Carolina Division of Public Health
- North Carolina Wildlife Resources Commission (NCWRC)
- North Carolina Department of Natural and Cultural Resources (NCDNCR)
- North Carolina Department of Transportation (NCDOT)
- North Carolina State Property Office
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS)
- Local governmental authority where the project is located.

Each of these individual agencies may provide comments, recommendations, or objections to NCDCM for their consideration when making a final CAMA Permit decision. These comments routinely address direct impacts of a project, but they may also include concerns or objections relating to potential cumulative effects of the individual project.

The above referenced components of NCCRC rules and the CAMA Major Permit application review process partially address cumulative effects, but the unique situation involving the construction of the Mid-Currituck Bridge warrants a separate cumulative effects analysis to supplement the CAMA Major Permit application package. The Mid-Currituck Bridge is not a bridge replacement project. Rather, it is the construction of a new location bridge that will serve a broad area not directly served by a bridge from the mainland of Currituck County. Additionally, portions of the Currituck County Outer Banks area are not heavily developed, especially the location generally north of Corolla not accessible by paved roads. It is for these unique reasons that the North Carolina Turnpike Authority (NCTA) and the North Carolina Department of Transportation (NCDOT) decided that for this particular project a cumulative effects analysis of coastal resources is warranted. However**,** considering the unique circumstances leading to this decision, this analysis should not be considered to set a precedent for future transportation projects within North Carolina's coastal zone.

1.2 Goals

This study provides a qualitative analysis of potential cumulative effects on coastal resources within areas determined to experience potential additional development resulting from the construction of the Mid-Currituck Bridge. This study also is intended to complement the prior Mid-Currituck Bridge Study - Indirect and Cumulative Effects Technical Report (East Carolina University and Parsons Brinckerhoff Inc., 2011).

Intended to supplement the CAMA Major Permit application package, this study includes an analysis of potential cumulative effects to each coastal resource as identified in CAMA enabling legislation and NCCRC rules. It should be noted this study also documents NCCRC rules that can be interpreted as providing a level of protection from future cumulative effects and offers additional suggestions on ways to further reduce or mitigate potential cumulative effects, should NCDCM determine that such actions are warranted. This report is also being completed in the context of a water quality-focused cumulative impact study, which will be primarily for the NCDWR to use in its 401 Water Quality Certification decision-making.

1.3 Objectives

To accomplish the above-stated goals, this study implemented the following steps:

- Identified a study time frame
- Identified the geographic area (study area) to be considered
- Identified the resources to be analyzed
- Utilized a geographic information system (GIS) analysis and other readily available public information to define or identify present conditions and estimate future trends
- Assessed cumulative effects to identified coastal resources resulting from the construction of the Mid-Currituck Bridge and to identified development trends within the study area and time frame
- Examined existing regulations within CAMA and NCCRC rules that help limit or mitigate cumulative effects
- Identified additional resource protection measures or suggestions that may help to maintain and enhance future protections for each coastal resource

2 Cumulative Effects Study Methodology

This study is intended to use readily available public data and information to provide a qualitative, as opposed to quantitative, cumulative effects study. This report relies heavily on existing GIS analysis data, current aerial photography, and easily accessible documentation and data sources. Field verifications were not conducted as a part of this study.

The steps described in the following sections were utilized to identify and analyze cumulative effects on coastal resources:

2.1 Determination of Time Frame to be Studied

There is no detailed or specific guidance in CAMA or NCCRC rules regarding the desired time frame to be studied as a part of a cumulative effects analysis. However, the North Carolina Division of Water Quality (NCDWQ, now NCDWR), in its April 10, 2004, policy on cumulative impacts (NCDWQ, 2004), states that the time frame for an analysis should consider the time frames of known proposed projects, a 10-year time frame, or a 20-year time frame. Based on this policy and the subsequent time frame chosen in the water quality-focused cumulative impact analysis, this cumulative effects analysis to satisfy CAMA requirements used a consistent 20-year time frame (i.e., beginning in 2020 and extending through 2040). Use of a 20-year study period is also justified by the fact that the end of this study period (2040) would correspond with the design year (2040) for the project (USDOT, FHWA, and NCTA, 2012).

2.2 Determination of Geographic Area to be Studied

The areas chosen for detailed study were determined by the cumulative impact results from the 2019 Reevaluation of the Final Environmental Impact Statement (FEIS) (USDOT, FHWA, and NCTA, 2019a). Three Probable Development Areas (PDAs) were selected. The three PDAs (Figure 1), which were also the PDAs included in the water quality-focused cumulative impact analysis, are described as follows:

- **Road Accessible Outer Banks PDA -** The majority of the predicted development difference between the Selected Alternative and the No-Build Alternative on the Outer Banks is in this area. It is also the area where water quality concerns raised by the NCDWR are focused. Notable characteristics of this PDA include its high-volume of existing development and the accessibility provided by NC 12. This PDA contains approximately 4,102 acres and includes the Currituck County Outer Banks between the Dare/Currituck County line and the northern paved end of NC 12.
- **Non-Road Accessible Outer Banks PDA -** Although this area contains only a small portion of the overall development difference between the Selected and No-Build Alternatives, it contains large protected areas and other valuable natural habitats. New development units will have to rely on individual septic systems as well as individual wells. Notable characteristics of the PDA include its sparse existing development, limited accessibility, and relatively strong land use protections. This PDA contains

approximately 4,873 acres and includes the Currituck County Outer Banks from the northern paved end of NC 12 to the North Carolina/Virginia border. It should also be noted that the Non-Road Accessible Outer Banks PDA excludes areas that, because of the presence of protected parklands, have no potential for increased growth. However, because these excluded areas do contain coastal resources, they were considered in this study.

- **U.S. 158 Interchange PDA** - Generally, this area is currently rural, but construction of the bridge is expected to induce up to 68 acres of commercial development. Although the developable land is considered to be suitable for commercial use, the area is bordered in part by the forested wetlands of Maple Swamp (east of US 158) and Great Swamp (west of US 158). Notable characteristics of the PDA include its current low-density development and proximity to the proposed U.S. 158 interchange. This PDA contains approximately 282 acres and includes the area east of U.S. 158 between Waterlily Road and approximately 0.75 miles south of Aydlett Road, excluding the proposed interchange area.

A potential fourth service or impact area near Duck, North Carolina, was considered for inclusion in the water quality-focused cumulative impact analysis. This area was subsequently excluded from the water quality-focused cumulative impact analysis, as well as from this cumulative effects analysis on coastal resources, because it includes a small portion of the development difference noted in the three other evaluated PDAs. Most of Duck is already developed and future new development will be on the few remaining vacant parcels within existing subdivisions.

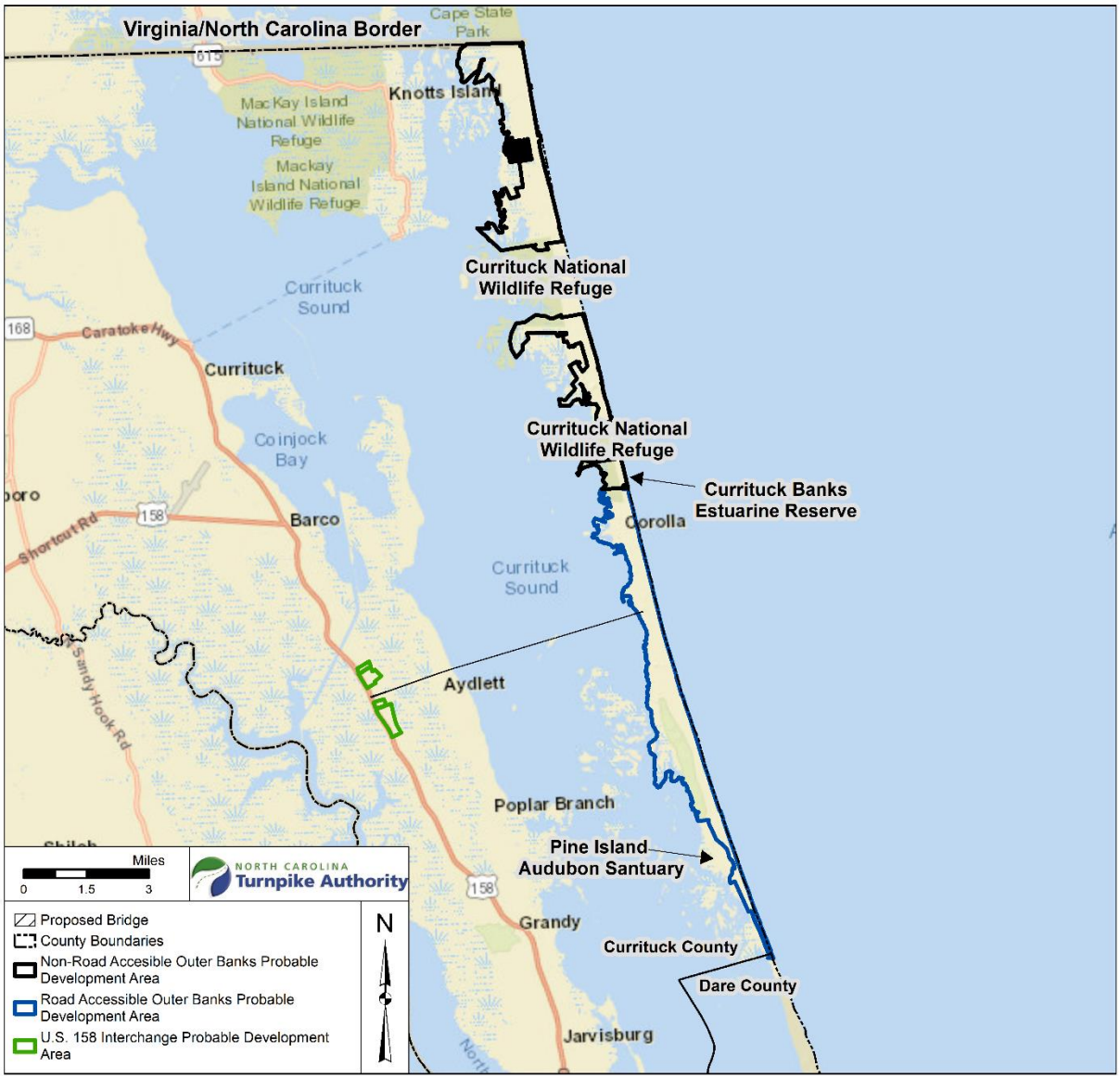

Figure 1: Locations of the Three Probable Development Areas

2.3 Identification of Resources to be Analyzed

The following coastal resources appear to fall under the resource protection mandates of CAMA, the State Dredge and Fill Law (§ 113-229), and NCCRC rules, and were therefore included in this study:

- air quality,
- coastal wetlands,
- cultural and historic resources,
- fisheries and shellfish resources,
- mitigation sites,
- outstanding resource waters,
- parklands,
- primary nursery areas,
- public water supplies,
- recreational access and use of public trust waters,
- recreational access and use of oceanfront beaches,
- submerged aquatic vegetation,
- transportation systems,
- urban waterfronts,
- water quality,
- wetlands (non-coastal), and
- wildlife and wildlife habitat.

2.4 Utilization of GIS Analysis and Other Readily Available Information to Define or Identify Present Conditions and to Estimate Future Trends

A GIS spatial analysis was utilized to determine the development potential of the three PDAs for the 20-year time frame of this analysis. This time frame also coincides with the 2040 design year time frame used in the traffic forecast for the Mid-Currituck Bridge. Details of this analysis are explained in Chapter 7 of the water quality-focused cumulative impact analysis. This report on coastal resources will summarize this GIS spatial analysis.

The results of the GIS spatial analysis approximated how much planned and expected development could occur within the three PDAs from the construction of the Mid-Currituck Bridge. This spatial analysis was conducted at a regional planning level, which does not necessarily indicate that any of the specific parcels identified will be developed. Instead, the analysis captures the general pattern and potential scope of planned and expected development which would occur among the available parcels over the next 20 years. This analysis quantifies which land is still available for planned and expected development in the three PDAs based on readily available data.

Determining the presence of existing development was the first step in identifying parcels suitable for future planned and expected development. For this study, a developed parcel was defined as a parcel with one or more residential, commercial, or recreational structures. Therefore, if a parcel has existing commercial or residential development, it was assumed that the parcel has minimal redevelopment potential. The potential for redevelopment of existing developed areas is addressed in detail in Chapter 7 and Chapter 15 of the water quality-focused cumulative impact analysis. Existing commercial or residential development includes neighborhoods, shopping centers, and other similar land uses. Existing development was determined by utilizing the parcel use description found within the NC OneMap parcel dataset.

When analyzing the development potential of undeveloped parcels within the three PDAs, the following eight development criteria were examined:

- existing development on the parcel,
- size of the parcel,
- areas managed for conservation,
- open space designations,
- estuarine wetland presence,
- shoreline setback regulations,
- freshwater wetland coverage, and
- soil suitability for septic tanks.

A "developable parcel" in the context of this spatial analysis is defined as a platted parcel from Currituck County that is not prohibitively constrained by any of the eight factors listed above. These eight criteria were used to determine developability based on current land use, existing environmental conditions, current development rules/regulations, and existing development. These parcels were identified by a detailed process to approximate the number of parcels which do not have existing development, and which could potentially support future development. Parcels not deemed as developable are precluded from this study because developing these parcels would involve extensive efforts to comply with current development rules and regulations. This does not imply that these parcels are not developable, but rather that they are not readily developable because of identified current parcel site constraints. Because this is a regional planning effort, this approximation is not intended to predict the precise number or location of parcels that would develop over the 20-year time frame for this study.

The GIS analysis identified approximately 8,365 developed and undeveloped parcels within the three PDAs; 2,283 were determined to have potential for planned and expected development based on the eight development criteria outlined above. There are approximately 1,742 developable parcels in the Non-Road Accessible Outer Banks PDA, 535 developable parcels in the Road Accessible Outer Banks PDA, and six developable parcels in the U.S. 158 Interchange PDA. Further breaking down this information, an estimated 432 potentially developable waterfront (non-oceanfront) parcels are located within the Road Accessible and Non-Road Accessible Outer Banks PDAs, as well as 210 potentially developable oceanfront lots.

It is important to note that the number of developable parcels as described in the following analysis is an approximation based on the general date of the aerial photographs used for this report (2016); the exact number may be different. However, the general patterns and locations of these parcels should be sufficiently accurate in the context of this regional planning analysis. Additionally, it is not anticipated that all of the identified developable parcels within the Non-Road Accessible Outer Banks PDA will be developed over the next 20 years.

2.5 Assessment of Cumulative Effects on Identified Coastal Resources Resulting from Construction of the Mid-Currituck Bridge

For each coastal resource identified in Section 2.3, the importance of the resource within the context of CAMA is described. A general description of the distribution of each resource within and adjacent to the three PDAs is described based upon readily available information, such as an analysis of available GIS information and examination of existing aerial photography. Potential direct impacts resulting from construction of the Mid-Currituck Bridge were identified based on information provided in the 2012 FEIS (USDOT, FHWA, NCTA, 2012) and the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a). Cumulative effects were also analyzed, again using available GIS information and existing aerial photography, as well as information obtained through internet searches. This analysis did not involve field studies or ground-truthing efforts.

It should also be noted that because CAMA (§ 113A-120(a)(10)) defines cumulative effects as the result of impacts from "projects" on coastal resources, for the purposes of this study, sea level rise is not considered a project. Therefore, sea level rise was not considered a potential cumulative effect of the construction of the Mid-Currituck Bridge. However, the effect of sea level rise on various water quality related issues is addressed in detail in the water quality-focused cumulative impact analysis (mainly Chapter 12).

2.6 Compilation of Coastal Resources Commission Rules that Limit or Mitigate Cumulative Effects

While not specifically written to address cumulative effects, NCCRC rules do provide a level of protection from future cumulative effects. For example, NCCRC rules limit the size of individual docks and piers, which do serve to cumulatively reduce impacts of these structures over time. For identified coastal resources, this study documented NCCRC rules that can be interpreted as providing a level of protection from future cumulative effects. Additional suggestions for further reduction or mitigation of potential cumulative effects are also provided.

2.7 Determination of Additional Resource Protection Suggestions that May Help to Maintain and Enhance Future Protections for Each Coastal Resource

For each coastal resource analyzed, this study offers additional suggestions or ideas on ways to further reduce or mitigate potential cumulative effects, should NCDCM determine that such actions are warranted.

3 Coastal Resources Cumulative Effects Analysis

3.1 Air Quality

3.1.1 Importance

CAMA in § 113A-113(3)(b) and § 113A-113(6)(e) identifies air pollution and air quality as factors that should be considered during the designation of AECs. NCCRC rules acknowledge the importance of air quality in 15A NCAC 07H.0208(a)(2)(B) by requiring that, before issuing a CAMA permit, a determination shall be made that a proposed project complies with state and federal air quality standards.

3.1.2 Distribution

Resources with the potential to be affected by air quality are present throughout all three PDAs.

3.1.3 Potential Threats

The United States Environmental Protection Agency identifies mobile sources such as automobiles, planes, and trains as the greatest contributor to air pollution, with impacts from power plants and factories also serving as major pollution contributors (Scientific American, 2014).

3.1.4 Cumulative Effects Analysis

The 2012 FEIS (USDOT, FHWA, and NCTA, 2012) and 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) provide detailed information on air quality impacts from the Mid-Currituck Bridge, including an analysis of mobile source air toxics. Section 3.4.2 of the 2012 FEIS (USDOT, FHWA, and NCTA, 2012) included the following statement:

> *"The proposed project is in Currituck and Dare counties, which have been determined to comply with the National Ambient Air Quality Standards (NAAQS) and, therefore, are in attainment. This project is not anticipated to create any adverse effects on the air quality of this attainment area. The detailed study alternatives, including the Preferred Alternative, would reduce regional emissions of mobile source air toxics, with the greatest reduction associated with the reduced vehicle-miles of travel with MCB2 and MCB4."*

The Section 4.4.2.2 of the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) again found that the Preferred Alternative will not have direct adverse effects on air quality. Table 4-8 of the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) indicates that in 2040, with the Bridge Alternative, there would be 416.1 total annual million vehicle-miles traveled on the road network, compared with 426.8 million vehicle-miles traveled with the No-Build Alternative. These estimates take into account constrained development associated with the No-Build Alternative. The Mid-Currituck Bridge would substantially reduce the travel distance for those traveling between the mainland and the Outer Banks, thus reducing annual vehicle-miles traveled and motor vehicle emissions. Table 3-6 of the 2019 Reevaluation of the

FEIS (USDOT, FHWA, and NCTA, 2019a) indicates that in 2040 the No-Build Alternative would have 34.4 total congested annual million vehicle-miles traveled compared with 35.6 total congested annual million vehicle-miles traveled with the Mid-Currituck Bridge. The key benefit to air quality of the bridge is its reduction of total annual vehicle-miles traveled.

The planned and expected development resulting from the bridge may increase boating use of the public trust waters adjacent to the Road Accessible and Non-Road Accessible Outer Banks PDAs (see Section 3.2.4 of this study for analysis of potential increase in boat use). With regard to potential impacts to air quality resulting from an increase, the study of mobile source air toxics found in the 2012 FEIS (USDOT, FHWA, and NCTA, 2012) did not include marine recreational vessels in its analysis. However, many of North Carolina's coastal counties and communities have substantial populations (OSBM, 2019), and subsequent development densities, resulting in greater boat use than in Currituck County. Even so, all counties within North Carolina's coastal zone are currently in attainment with the Environmental Protection Agency's NAAQS standards (NCDEQ, 2020). It is therefore not expected that increased growth and development patterns resulting from the construction of the Mid-Currituck Bridge will have adverse effects on air quality within the study area.

3.1.5 Summary

Although construction of the Mid-Currituck Bridge will potentially result in an increase in traffic, the new bridge is also expected to lead to enhanced and improved traffic flows within the three PDAs. Adverse impacts to air quality are not expected.

3.1.6 Rules That Protect Air Quality

- 15A NCAC 07H.0208(a)(2)(A), which requires that CAMA permits not be issued for any project that violates State and federal air quality standards.
- 15A NCAC 07H.0601, which requires that no development be authorized for any project that violates any rule, regulation, or law of the State of North Carolina, which includes air quality standards established by the North Carolina Environmental Management Commission (NCEMC).

3.1.7 Additional Resource Protection Suggestions

- While not typically a part of the NCDCM CAMA Major Permit application review process, it is suggested that in this unique situation, a copy of the Mid-Currituck Bridge CAMA Major Permit application package be provided to the North Carolina Division of Air Quality for their review and comment. This action should further ensure that both direct and cumulative air quality impacts associated with the construction of the Mid-Currituck Bridge are consistent with State air quality standards.
- Based on the Currituck County Land Use Plan (Currituck County, 2006), and the Currituck County Unified Development Ordinance (Currituck County, 2020) there do not appear to be enforceable policies that directly address air quality within the three PDAs (Currituck County, 2006). Should issues with air quality become a greater concern in the

future, it is suggested that the County could revise their land use plan and/or unified development ordinance to incorporate greater air quality protection policies and standards.

3.2 Coastal Wetlands

3.2.1 Importance

Coastal wetlands are one of the most protected coastal resources within North Carolina's coastal zone. The State Dredge and Fill Law identifies "marshlands" as a resource worthy of protection. The definition for "marshlands" found at § 113-229(n)(3) appears to have been utilized as the foundation for the term "coastal wetlands" found in NCCRC rules (15A NCAC 07H.0205(a)). It should be noted that CAMA appears to use the term "coastal wetlands" in lieu of the term "marshlands" (§ 113A-113(b)(1)).

NCCRC rules state the significance of coastal wetlands in 15A NCAC 07H.0205 as:

> *"The unique productivity of the estuarine and ocean system is supported by detritus (decayed plant material) and nutrients that are exported from the coastal wetlands. Without the wetlands, the high productivity levels and complex food chains typically found in the estuaries could not be maintained. Additionally, coastal wetlands serve as barriers against flood damage and control erosion between the estuary and the uplands."*

These rules go on to state that the management objective for coastal wetlands is:

> *"…to conserve and manage coastal wetlands so as to safeguard and perpetuate their biological, social, economic and aesthetic values, and to coordinate and establish a management system capable of conserving and utilizing coastal wetlands as a natural resource necessary to the functioning of the entire estuarine system."*

The Currituck County Land Use Plan (Currituck County, 2006) also addresses the importance of coastal wetlands in Plan Policy ES3, which states that coastal wetlands:

> *"shall be conserved for the valuable functions they perform in protecting water quality and in providing critical habitat for the propagation and survival of important plant and animal species. CAMA use standards and policies for coastal wetlands shall be supported. Uses approved for location in a coastal wetland must be water dependent (i.e. utility easements, bridges, docks and piers) and be developed so as to minimize adverse impacts."*

The Imagine Currituck 2040 Vision Plan (Currituck County, 2019), which is intended to provide a framework for the preparation of an update to the current land use plan, also contains several references to the importance of coastal wetlands.

3.2.2 Distribution

Much of the Road Accessible and Non-Road Accessible Outer Banks PDAs are bounded on the Currituck Sound side by vast areas of coastal wetlands. Page 3-2 of the Currituck County Land Use Plan (Currituck County, 2006) references areas of coastal wetland adjacent to Currituck Sound and along the western portion of the Outer Banks, with substantial amounts of coastal wetlands located on the west side of Knotts Island. The Imagine Currituck 2040 Vision Plan

(Currituck County, 2019) contains similar statements concerning coastal wetland distribution in Currituck Sound. There are no coastal wetlands located within or immediately adjacent to the U.S. 158 Interchange PDA.

3.2.3 Potential Threats

Potential threats to coastal wetlands in the area include climate change/sea level rise, shoreline erosion, loss of habitat due to dredging projects, impacts to coastal wetlands due to construction and use of piers, docks, and marina facilities, shoreline stabilization measures, loss of riparian buffers, and declining water quality.

3.2.4 Cumulative Effects Analysis

With regard to direct impacts to coastal wetlands associated with the Mid-Currituck Bridge project, page 4-30 of the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) stated the following:

> *"The FEIS found that Preferred Alternative* ***would not affect CAMA wetlands****. This remains true based on the updated jurisdictional delineations as affirmed in the field by a NCDEQ-DCM representative in March 2016 and September 2017."* (Emphasis added)

When examining the potential for cumulative effects to coastal wetlands from docks, piers, marinas, and related boat and marine vessel use resulting from the Mid-Currituck Bridge project, the number of existing and new docking facilities within the project area should be considered. Using existing aerial photography from 2017 and 2018, there appear to be approximately 300 docking facilities on the Currituck Sound side of the Road Accessible and Non-Road Accessible Outer Banks PDAs. Most of these existing docks (approximately 230) exist within one large artificial canal system at the northern end of the Non-Road Accessible Outer Banks PDA. Another major concentration (approximately 56 dock structures plus the Whalehead Club Marina) exists along an approximate 3.4 mile stretch of shoreline from the Whalehead Club Marina south to the location of the Corolla Raceway (Sunset Boulevard in Corolla). These docks appear to be largely concentrated in areas with minimal to no adjacent coastal wetland coverage. This dock concentration is understandable when considering the cost and environmental and permitting obstacles involved in constructing a docking facility across large expanses of coastal wetlands in an attempt to reach water depths adequate for boat use.

It is likely that additional, future dock construction will mirror existing dock location trends. Supporting this anticipated trend, of the 432 undeveloped but potentially developable waterfront (non-oceanfront) parcels within the Road Accessible and Non-Road Accessible Outer Banks PDAs, 390 of these parcels exist within the artificial canal system in the Non-Road Accessible Outer Banks PDA. It should be noted that the canal system appears to be largely devoid of substantial areas of coastal wetlands. Of the remaining 42 currently undeveloped but potentially developable waterfront parcels in the Road Accessible and Non-Road Accessible Outer Banks PDAs, 15 are within the 3.4-mile area from the Whalehead Club Marina to the Corolla Raceway.

In the waterfront areas (outside of the canal system) in the Non-Road Accessible Outer Banks PDA, 19 undeveloped but potentially developable waterfront parcels exist, including several large parcels that could potentially support multiple units. The remaining eight undeveloped but potentially developable waterfront parcels are dispersed throughout the Road Accessible Outer Banks PDA.

For new docks or piers constructed over coastal wetlands, there should be minimal direct impacts to coastal wetlands associated with piling placement. These impacts have typically been considered acceptable in past CAMA permit decisions. Shading impacts are another potential impact to coastal wetlands associated with dock construction. However, shading impacts have also generally been considered acceptable in past CAMA permit decisions, provided that the NCCRC rules on dock and pier width and elevation over coastal wetlands (15A NCAC 07H.0208(b)(6)(C)) are adhered to. These same rules would apply to the proposed permitting and construction of any new marinas. Additionally, 15A NCAC 07H.0208(b)(5)(P) requires that cumulative impacts of a new marina be considered during the CAMA permit application review process. Therefore, taking these rules into consideration, and given the number of existing waterfront docking facilities (approximately 70) and the relatively small number (42) of undeveloped but potentially developable waterfront parcels, it is anticipated that cumulative effects from these development types to coastal wetlands will be minimal.

There is a similar geographic concentration of shoreline stabilization structures. This is likely at least in part because high ground properties adjacent to substantial areas of coastal wetlands are much less likely to have eroding shorelines in need of stabilization. An analysis of available aerial photography suggests that much of the shoreline within the canal system in the Non-Road Accessible Outer Banks PDA is currently stabilized with existing bulkheads. For parcels immediately adjacent to Currituck Sound, an approximately 0.3-mile long area adjacent to the artificial canal system appears to be mostly stabilized. There are also heavy concentrations of stabilized shorelines along the 3.4 mile stretch of shoreline south of the Whalehead Club. Based on an analysis of the 42 undeveloped but potentially developable waterfront parcels, there appear to be 20 such parcels that exist within the two refenced areas of heavier shoreline stabilization. An additional 14 undeveloped but potentially developable waterfront parcels exist within the Non-Road Accessible Outer Banks PDA, but outside the 0.3-mile area near the canal system. Many of these parcels appear not to require shoreline stabilization due to a sufficient amount of coastal wetlands fronting the properties. The remaining eight undeveloped but potentially developable waterfront parcels are located throughout the Road Accessible Outer Banks PDA.

For property owners adjacent to coastal wetland areas who wish to stabilize their waterfront property, NCCRC rules provide for coastal wetland protection by requiring that bulkheads be constructed landward of coastal wetlands in order to avoid significant adverse impacts to the wetlands (15A NCAC 07H.0208(b)(7)(B)). It is also anticipated that as alternatives to vertical stabilization structures become more common (e.g., living shorelines, sloping riprap, marsh-toe revetments, vegetative stabilization), future impacts to coastal wetlands as a result of shoreline stabilization measures will likely be minimized.

As was the case with docks and piers, when taking the rules of the NCCRC into consideration, and when looking at the subset of the 42 undeveloped but potentially developable waterfront parcels that may pursue shoreline stabilization, it is anticipated that cumulative effects to coastal wetlands from shoreline stabilization should be minimal.

In addition to the potential for new docking facilities or shoreline stabilization structures on undeveloped but potentially developable waterfront parcels, it is also possible that existing parcel owners with existing docks or stabilized shorelines may want or need to expand (mainly in the case of docking facilities) or replace their structures due to either structural deterioration or storm-related damage. In such cases, it is anticipated that damage to coastal wetlands should be minimal based on the locations of such structures (many in areas devoid of coastal wetlands) and because impacts to coastal wetlands from original project construction have already occurred. Additionally, NCCRC provides for significant protection to coastal wetlands during dock and pier construction.

The loss of existing riparian and shoreline buffers can lead to adverse impacts on coastal wetlands. However, since the early 2000's, NCCRC rules have provided protection of shoreline buffers by limiting development activities within the first 30 feet landward of the normal high water line or normal water line, whichever is applicable (15A NCAC 07H.0209(d)(10)). Future development of the undeveloped but potentially developable waterfront parcels will be required to comply with this riparian and shoreline buffer requirement. Therefore, provided the NCCRC buffer rules remain in effect and are enforced, it is anticipated that buffers adequate to provide protection for coastal wetlands would remain.

Dredging and/or excavation of channels, canals, and boat basins also represent the potential for impact to coastal wetlands. It is possible over the next 20 years that some of the 42 undeveloped parcels located on the shorelines of Currituck Sound will desire new access channels for new docking facilities. However, NCCRC rules provide for significant protections for coastal wetlands as they relate to dredging projects. Specifically, 15A NCAC 07H.0208(b)(1) requires that navigational channels and boat basins be aligned so as to avoid all but narrow fringes of coastal wetlands. Additionally, an analysis of existing docking facilities shows that the majority of these docking facilities are located along shorelines of Currituck Sound that have minimal to no adjacent coastal wetlands. It also appears that in these areas, docks have been able to gain access to deeper waters without the need for dredging. It must be noted, however, that the Whalehead Club Marina has unsuccessfully pursued dredging of an access channel to their upland basin for many years. It is possible that there may be additional efforts over the next 20 years to obtain authorization for dredging in this area, although it appears that coastal wetland impacts from any such project would likely be minimal. Future trends with regard to docking facility locations will likely be of a similar nature, with most future proposed projects similarly located in areas largely devoid of coastal wetlands and where docks can access adequate water depths without dredging. It is therefore not expected that dredging projects will represent a threat to coastal wetlands over the next 20 years.

It also should be pointed out that an effort is currently underway by Audubon North Carolina to implement a comprehensive marsh restoration and planning effort in Currituck Sound (Audubon

North Carolina, 2020b). The successful implementation of this project should increase or enhance coastal wetland habitat acreages and values within Currituck Sound.

3.2.5 Summary

Provided that the recommendations of the water quality-focused cumulative impact analysis are addressed, and that the NCCRC's riparian buffer rules remain in effect, it is anticipated that cumulative effects to coastal wetlands relating to water quality should be minimal. With regard to potential impacts from shoreline stabilization of undeveloped parcels, the location of many of these parcels in areas largely devoid of coastal wetlands, as well as the coastal wetland protections contained in NCCRC rules, will ensure cumulative effects to coastal wetlands resulting from shoreline stabilization project will also be minimal. It is not expected that new docking facilities will represent a substantial cumulative threat to coastal wetlands over the next 20 years due to the relatively small number (42) of undeveloped but potentially developable waterfront parcels that may wish to construct docks in accordance with the NCCRC's rules. Dredging impacts on coastal wetlands should also not be considered a major threat to coastal wetlands, again due to the coastal wetland protection measures of NCCRC rules.

3.2.6 Rules That Protect Coastal Wetlands

- 15A NCAC 07H.0205(d) (Use Standards), which sets forth acceptable and non-acceptable land uses with areas of coastal wetland.
- 15A NCAC 07H.0205(e), which provides rules governing the alteration of coastal wetlands by mowing, cutting, or burning.
- 15A NCAC 07H.0208(a)(1), which prohibits development activities within coastal wetlands that are not water dependent.
- 15A NCAC 07H.0208(a)(2)(A), which requires that before issuing a CAMA permit, a decision must first be made that the proposed development is sited and designed in a way that avoids significant adverse impacts on the productivity and biological integrity of coastal wetlands.
- 15A NCAC 07H.0208(b)(1), which requires that navigation channels, canals and boat basins be aligned so as to avoid most areas of coastal wetlands.
- 15A NCAC 07H.0208(b)(1)(B), which requires dredge spoil materials be placed landward of coastal wetlands and be stabilized in a manner that prevents entry of sediments into adjacent coastal wetlands.
- 15A NCAC 07H.0208(b)(2)(A), which requires that before a CAMA permit is issued, a determination must be made that the project is sited and designed to avoid significant adverse impacts upon the productivity and biological integrity of coastal wetlands (among other resources).
- 15A NCAC 07H.0208(b)(2)(C), which requires that materials resulting from hydraulic dredging be placed landward of coastal wetlands and stabilized in a manner that prevents entry of sediments into adjacent coastal wetlands.

- 15A NCAC 07H.0208(b)(6)(C), which requires that piers and docks located over coastal wetlands be no wider than six feet and be elevated above the coastal wetland substrate a minimum of three feet.
- 15A NCAC 07H.0208(b)(7)(B), which requires that bulkheads be constructed landward of coastal wetlands.
- 15A NCAC 07H.0208(b)(11)(C), which requires that the filling of canals, basins, and ditches not have a significant adverse impact on coastal wetlands, among other resources.
- 15A NCAC 07H.1105(b), which requires that General Permits for bulkheads not be issued if the bulkhead will impact any coastal wetland.
- 15A NCAC 07H.1105(j), which requires that for bulkheads authorized by General Permit, appropriate sedimentation and erosion control devices, measures or structures be implemented to ensure that eroded materials do not enter adjacent wetlands.
- 15A NCAC 07H.1205(d), which requires that for docks and piers authorized by General Permits, piers be elevated a minimum of three feet above the wetland substrate.
- 15A NCAC 07H.1205(j), which requires that for docks and piers authorized by General Permits, the width of the structure will be no more than six feet, and the structure must be elevated above the coastal wetland substrate a minimum of three feet.
- 15A NCAC 07H.1305(5), which requires that for boat ramps being authorized under a General Permit, no coastal wetlands shall be excavated or filled.
- 15A NCAC 07H.1505(5), which requires that for maintenance dredging authorized under a General Permit, no excavated material may be placed within any wetland.
- 15A NCAC 07H.1505(6), which requires that for maintenance dredging projects authorized under a General Permit, all excavated materials must be stabilized in a manner that prevents entry of sediments into adjacent coastal wetlands.
- 15A NCAC 07H.1505(7), which requires that for maintenance dredging projects authorized under a General Permit, no coastal wetland be excavated.
- 15A NCAC 07H.1605(2), which requires that for aerial or subaqueous utility lines authorized under a General Permit, any dredge spoil must not be placed in coastal wetlands and stabilized in a way that prevents entry of the spoils into adjacent coastal wetlands.
- 15A NCAC 07H.1905(3), which requires that for temporary structures authorized under a General Permit, no coastal wetlands may be disturbed.
- 15A NCAC 07H.2105(i), which requires that for sheetpile sills authorized under a General Permit, no coastal wetlands may be backfilled.
- 15A NCAC 07H.2105(j), which requires that for sheetpile sills authorized under a General Permit, no coastal wetlands may be excavated.

3.2.7 Additional Resource Protection Suggestions

- It is strongly suggested that existing NCCRC rules relating to the protection of coastal wetlands be maintained and not weakened.

- NCDCM should continue its promotion of alternatives to vertical shoreline stabilization measures.
- When undertaking future resiliency efforts, NCDCM is encouraged to ensure that coastal wetlands are treated as a high priority.

3.3 Cultural and Historic Resources

3.3.1 Importance

CAMA refers to the importance of historic and cultural resources in several places. These include § 113A.102(b)(4)(b), which establishes as a goal of CAMA the development of policies, guidelines, and standards for the preservation and enhancement of historic and cultural aspects of the coastal area, and § 113A-113(b)(4), which allows for the consideration of historic and cultural values when establishing AECs. NCCRC rules (15A NCAC 07H.0208(a)(2)(C)) further acknowledge the importance of cultural and historic resources by requiring that, before issuing a CAMA permit, a determination shall be made that a proposed project will not cause irreversible damage to documented archaeological or historic resources as identified by the NCDNCR. To facilitate this determination, the NCDNCR is provided copies of all CAMA Major Permit application packages for their review and comment.

3.3.2 Distribution

A review of data available from the North Carolina Historic Preservation Office (NCDNCR, 2020) and Section 3.2 of the 2012 FEIS (USDOT, FHWA, and NCTA, 2012) indicates few National Register listed or eligible properties within the three PDAs. The listed or eligible properties in the Corolla area include the Corolla Historic District, the Currituck Beach Lighthouse Complex, and the Whalehead Club, all within the Road Accessible Outer Banks PDA (Figure 2). The Currituck Shooting Club is also located within the Road Accessible Outer Banks PDA, but its listing is indicated as “National Register Listing – Gone” (Figure 3). There do not appear to be any National Register listed or eligible properties within the U.S. 158 Interchange PDA or Non-Road Accessible Outer Banks PDA.

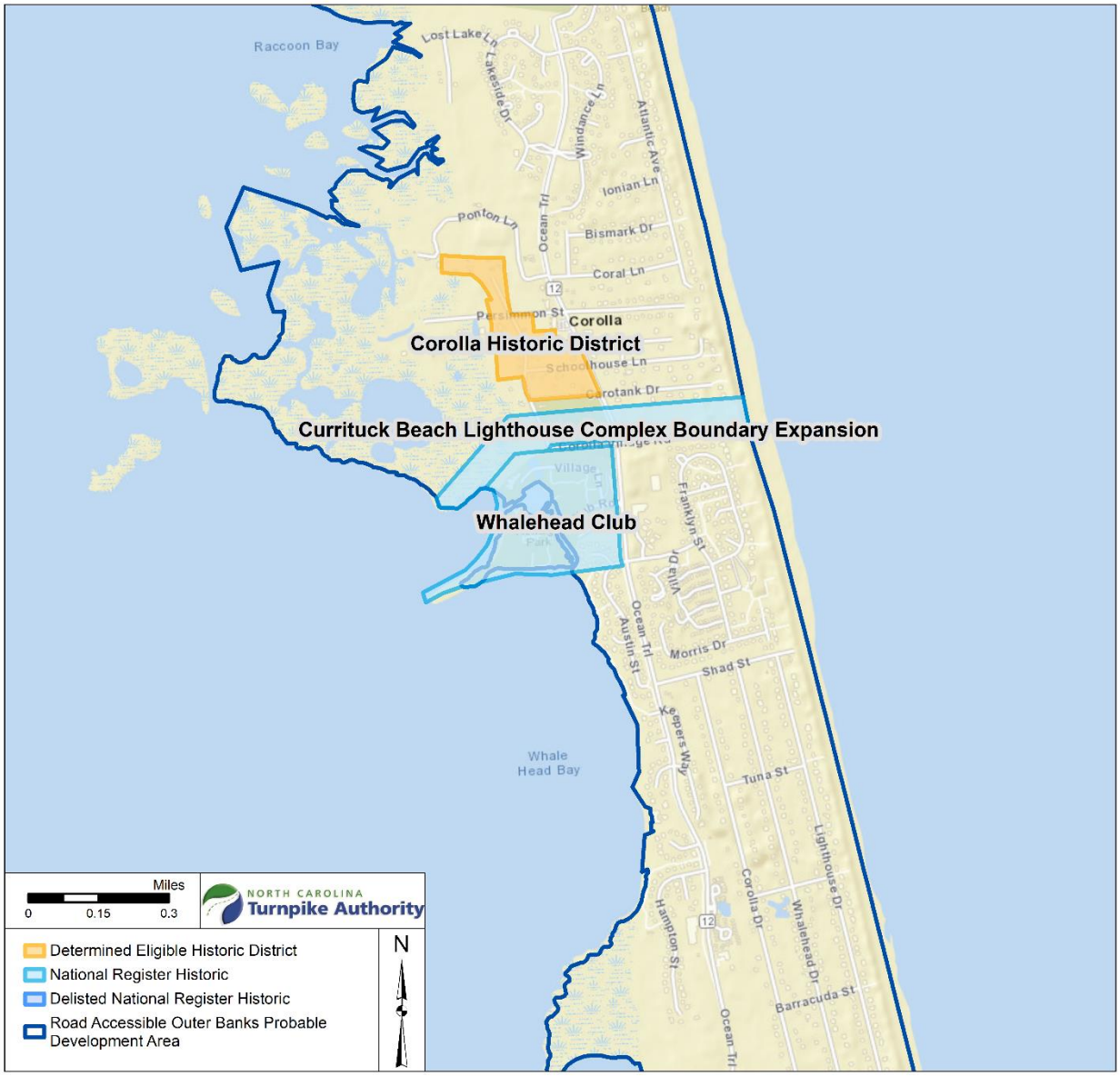

Figure 2: Historic Sites

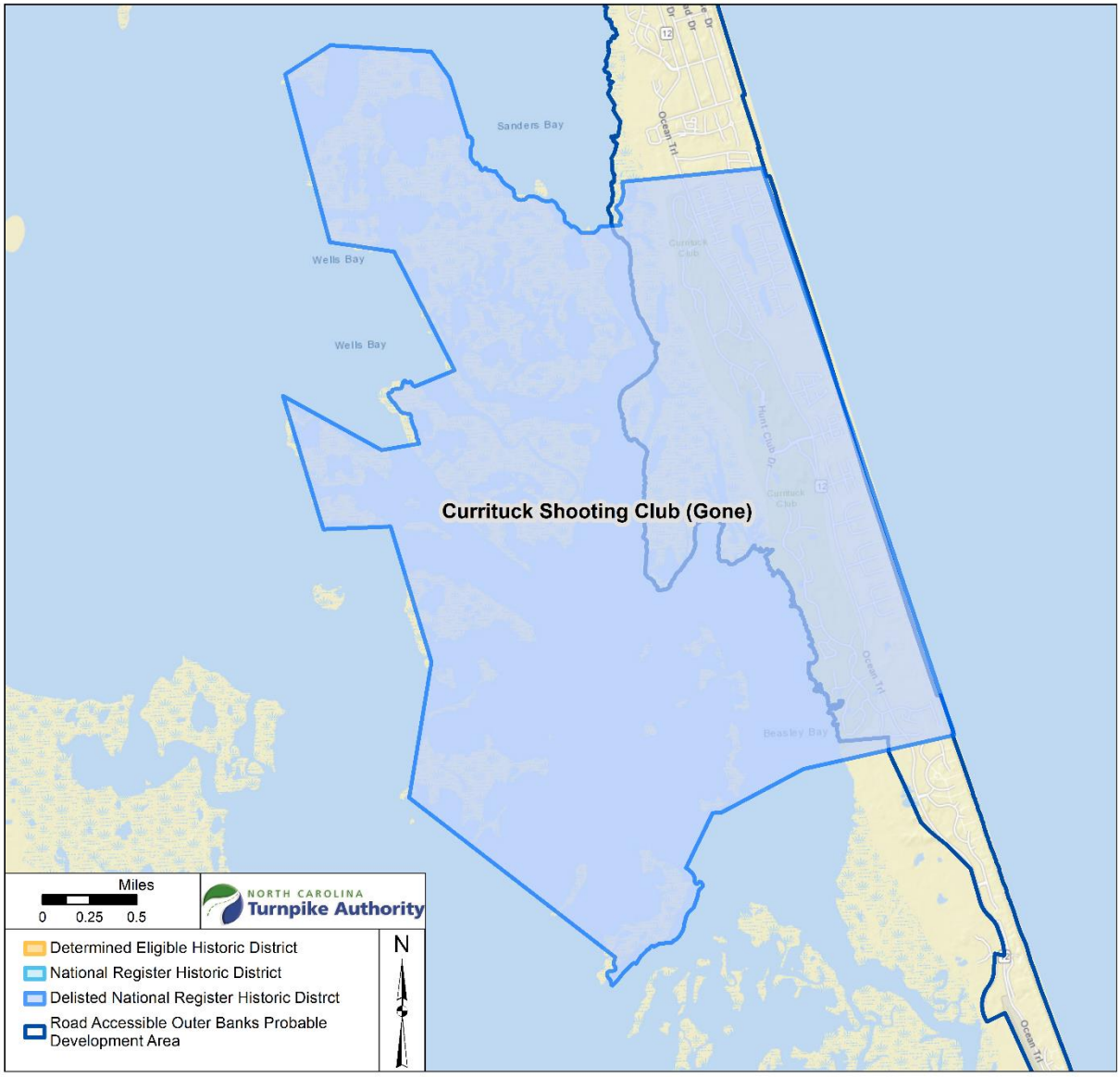

Figure 3: Currituck Shooting Club (Listed as "Gone")

According to Section 3.2.2 of the 2012 FEIS (USDOT, FHWA, and NCTA, 2012):

> *"Numerous terrestrial archaeological surveys have been conducted in or adjacent to the Area of Potential Effects (APE) Surveys of the APE found eight recorded archaeological sites (five prehistoric, two historic, and one multi-component) and 36 old cemeteries. A single reported site and two "old missile test sites" also were noted within the APE. While only a few submerged cultural resources surveys have been conducted within or adjacent to the project area, no underwater sites are listed within the APE. However, there are several notable shipwreck sites adjacent to the APE, and the Currituck Sound portion of the project area has a long maritime history suggesting the possibility of additional sites."*

3.3.3 Potential Threats

Potential threats to cultural and historic resources include visual impacts of new developments on historic sites or districts, pressures to redevelop historic sites or properties, potential impacts to older structures due to storms or erosion, and impacts to previously undiscovered buried archaeological resources from dredging projects and development activities.

3.3.4 Cumulative Effects Analysis

With regard to direct impacts from the Mid-Currituck Bridge, numerous archaeological and cultural resource surveys have been carried out in association with this project. Section 1.3.3 of the 2019 Record of the Decision (USDOT, FHWA, and NCTA, 2019b) indicated that:

> *"The Preferred Alternative with reversing the center turn lane on US 158 to improve hurricane evacuation clearance times would have No Effect or No Adverse Effect on properties listed on or eligible for inclusion in the National Register of Historic Places (NRHP). These findings are unchanged because historic and archaeological resource findings from cultural resource surveys in 2007, 2008, and 2009, as well as additional archaeological studies conducted in 2011 for the Preferred Alternative, have neither changed nor has the impact area of the Preferred Alternative expanded beyond the cultural resource survey area since the preparation of the FEIS. This conclusion was affirmed by the State Historic Preservation Office (SHPO) in a July 20, 2015 letter (Appendix A). In a letter dated April 7, 2017, the SHPO affirmed the same conclusion for ER2."*

In regard to cumulative effects to this coastal resource within the three PDAs, cultural and historic resources should be provided substantial protections from potential development projects taking place within a CAMA AEC. These protections may be by way of the various CAMA permit review processes as well NCCRC rules that address protection of cultural and historic resources. Such projects could include upland development projects and dredging projects. It can also reasonably be assumed that, as has been the case for existing developments falling outside of CAMA permit jurisdiction, there does exist a slight possibility that future planned and expected development could impact currently unknown archaeological resources. To ensure proper identification and protection of any such resources on a project-by-project basis during

the issuance of local building permits, NCDCM, through its Local Permit Officer training program, is encouraged to suggest additional coordination between County Permit and Inspections Division staff, the SHPO and the North Carolina Office of State Archaeology.

The Currituck County Land Use Plan contains numerous policy statements that address protection of cultural and historic resources (Currituck County, 2006). These land use plan policies should provide additional resource protections for projects that may fall outside of the scope of a CAMA permit review.

Public ownership also provides protections for historic resources. Both the Whalehead Club property, which is owned by Currituck County, and the Corolla Lighthouse complex, portions of which are owned by the State of North Carolina, will further benefit from the protections offered by public ownership.

3.3.5 Summary

It is anticipated that protections provided by the CAMA permit process and the various land use plan policies of Currituck County should provide adequate protections to ensure that significant cumulative effects to cultural and historic resources do not occur with the Mid-Currituck Bridge Project.

3.3.6 Rules That Protect Cultural and Historic Resources

- 15A NCAC 07H.0208(a)(2)(C), which states that permitted development shall not cause irreversible damage to documented archaeological or historic sites.
- 15A NCAC 07H.0209(d)(7), which states that permitted development shall not cause irreversible damage to documented archaeological or historic sites.
- 15A NCAC 07H.0208(b)(12)(A)(iii), which states that mining activities shall avoid significant impacts to archaeological resources and shipwrecks.
- 15A NCAC 07H.0208(b)(13)(B)(iii), which states that wind energy facilities shall not cause significant impacts to archaeological resources and shipwrecks.

3.3.7 Additional Resource Protection Suggestions

- NCDCM should continue to ensure that Local Permit Officer training stresses the importance of knowing the location(s) of all known historic and cultural sites. This training should also indicate the proper contacts at the NCDNCR should questions arise concerning protection measures for cultural or historic sites.

3.4 Fisheries and Shellfish Resources

3.4.1 Importance

The North Carolina Coastal Habitat Protection Plan (NCCHPP) (NCDEQ, 2016) indicates that North Carolina's billion dollar commercial and recreational fishing industries rank among the nation's largest. The NCCHPP goes on to state that in 2013, the economic impact of North Carolina's fisheries was $305 million due to commercial fisheries and $1.7 billion due to recreational fisheries. Recognizing the critical importance of these fisheries resources, the NC General Assembly passed the Fisheries Reform Act (GS.143B-279.8), which requires three of the State's regulatory commissions - the North Carolina Marine Fisheries Commission (NCMFC), the NCEMC, and the NCCRC - to adopt a plan to protect and restore resources critical to North Carolina's fisheries.

CAMA addresses the importance of fisheries and shellfish resources in several places. For example, § 113A-102(b)(4)(a) states that one goal of CAMA is to establish policies, guidelines, and standards for the protection, preservation, and conservation of natural resources including fish and wildlife. The rules of the NCCRC go on to include recreational and sport fisheries, including shellfishing, as important components of estuarine waters (15A NCAC 07H.0206(b)) and public trust areas (15A NCAC 07H.0207(b)). The importance of these resources is further addressed by 15A NCAC 07H.0208(a)(2)(A), which requires that no CAMA permit be issued for a project that is determined to have a significant adverse impact to shellfish beds, spawning areas, or nursery areas. Additionally, 15A NCAC 07H.0208(b) includes numerous fish and shellfish protection measures as part of specific use standards of various development types. It should also be noted that other NCCRC rules that address protection of resources such as water quality, coastal wetlands, and submerged aquatic vegetation, were established at least partially due to the importance of these resources in maintaining healthy shellfish and fisheries populations.

3.4.2 Distribution

Fisheries and shellfish resources exist within open water areas of Currituck Sound as well as the waters of the Atlantic Ocean adjacent to the beaches in the Road Accessible and Non-Road Accessible Outer Banks PDAs. It should be noted that, according to 2011 Mid-Currituck Bridge Study – Essential Fish Habitat Technical Report (CZR Inc., 2011):

> "*Living oyster reefs are not known to occur in the sound because of low salinity levels*".

With regard to fish species, the Essential Fish Habitat Technical Report identified the following fish species as occurring within the waters of Currituck Sound:

- American Eel (*Anguilla rostrata*)
- Atlantic Croaker (*Micropogonias undulatus*)
- Atlantic Menhaden (*Brevoortia tyrannus*)
- Atlantic Spadefish (*Chaetodipterus faber*)
- Black Sea Bass (*Centropristis striata*)

- Blue Crabs (*Callinectes sapidus*)
- Bluefish (*Pomatomus saltatrix*)
- Blueback Herring (*Alosa aestivalis*)
- Butterfish (*Peprilus triacanthus*)
- Catfish (A*meiurus spp. and Ictalurus spp.*)
- Penaeid and Rock Shrimp (*Penaeus sp. and Sicyonia sp.*)
- Red Grouper and Gray Snapper (*Epinephelus morio and Lutjanus griseus*)
- Spanish Mackerel (*Scomberomorus maculatus*)
- Spot (*Leiostomus xanthurus*)
- Spotted Sea Trout (*Cynoscion nebulosus*)
- Striped Bass (*Morone saxatilis*)
- Summer Flounder (*Paralichthys dentatus*)
- White Perch (*Morone americana*)
- Yellow Perch (*Perca flavescens*)
- Weakfish (*Cynoscion regalis*)

The following fish species are also known to exist within the surf zone and near shore waters of the Atlantic Ocean adjacent to Currituck County beaches (OuterBanks.com, 2020):

- Black Drum (*Pogonias cromis*)
- Bluefish (*Pomatomus saltatrix*)
- Croaker (*Micropogonias undulates*)
- Cobia (*Rachycentron canadum*)
- Gulf Flounder (*Paralichthys albigutta*)
- Pompano (*Trachinotus carolinus*)
- Summer Flounder (*Paralichthys dentatus*)
- King Mackerel (*Scomberomorus cavalla*)
- Red Drum (*Sciaenops ocellatus*)
- Sea Mullet (*Menticirrhus americanus*)
- Sheepshead (*Archosargus probatocephalus*)
- Spot (*Leiostomus xanthurus*)
- Striped Bass (*Morone saxatilis*)
- Weakfish (*Cynoscion regalis*)

The waters of Currituck Sound are classified as SC waters, which identifies that the best uses for these waters is for aquatic life propagation/protection and secondary recreation (salt water). All waters of Currituck Sound are closed to the taking of shellfish. The waters of the Atlantic Ocean adjacent to the Road Accessible and Non-Road Accessible Outer Banks PDAs are classified as SB, meaning that best uses for these waters are primary and secondary recreation, and aquatic life propagation/protection (salt water).

No waterfront properties, and therefore no potential for fish or shellfish habitats, are located adjacent to the U.S. 158 Interchange PDA.

3.4.3 Threats

The NCCHPP (NCDEQ, 2016) identifies threats to North Carolina's coastal fisheries habitats, including shellfish habitats, as follows:

> *"While poor water quality puts the habitats' ability to function and support fish populations at risk, physical damage caused by humans is also a serious threat. Conversion of wetlands by draining, filling, and water control projects are the major sources of wetland loss in eastern North Carolina. Shell bottom habitat along our coast has been decimated by a century of excessive mechanical harvests and diseases. More recently, dredging for navigation channels and marinas, as well as damage from bottom-disturbing fishing gear, threatens remaining shell bottom and submerged aquatic vegetation habitat and impedes establishment of those habitats."*

3.4.4 Cumulative Effects Analysis

In regards to direct impacts from the construction of the Mid-Currituck Bridge, the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) indicated that the Preferred Alternative would impact 12.6 acres of Essential Fish Habitat (0.1 acres due to pile placement, 7.8 acres of shading of areas with water depths less than or equal to six feet, and 4.7 acres of shading of SAV habitat).

With regard to cumulative effects to fish and shellfish habitats and resources from planned and expected development, impacts due to degradation of water quality is a prime concern. The water quality-focused cumulative impact analysis identified potential water quality impacts from reuse/reclaimed water facilities (Chapter 9), wastewater from on-site septic tanks and drain fields (Chapter 10), groundwater lowering measures, (Chapter 11), sea level rise (Chapter 12), flooding (Chapter 13), stormwater management (Chapter 14), and spills and emergencies (Chapter 15). Section 18.5.5 of the water quality-focused cumulative impact analysis came to the following conclusions:

> *"Based on the analyses presented in Chapters 6 through 16, the planned and expected development with the construction of the Mid-Currituck Bridge Project within the next 20 years are expected to have only a minimal and localized impact on downstream water quality, mainly in man-made tributaries of Currituck Sound. Indirect and cumulative impacts on the overall water quality in the Atlantic Ocean and Currituck Sound are not expected to cause violations of state standards or a loss of existing and anticipated uses. Though some sensitive areas near water are present in localized parts of Currituck Sound such as the finger canal area, the extent of expected development which can be attributed to the Project is small and may at most cause minimal and localized impacts on water quality. Existing local and State water quality-related regulations (such as CAMA setback limits) and utilization of existing water treatment facilities will likely control certain sources of pollution (especially coliform bacteria). However, to address any potential concerns, NCDWR and*

Currituck County could review and consider implementation of practical regulatory and non-regulatory changes as outlined in Chapter 20, should these agencies determine that such action is warranted."

Dredging and/or excavation of channels, canals, and boat basins represent a potential for impact to shellfish and fisheries habitats. It is possible that over the next 20 years, some of the 42 undeveloped but potentially developable waterfront parcels located along the shorelines of Currituck Sound will desire new access channels for new docking facilities. However, NCCRC rules provide for substantial protections for these coastal resources for dredging projects. Specifically, 15A NCAC 07H.0208(b)(1) requires navigational channels and boat basins to be aligned to avoid shellfish beds, beds of SAV, and all but narrow fringes of coastal wetlands. Additionally, 15A NCAC 07H.0208(a)(2)(B) requires that projects be sited and designed to avoid significant adverse impacts upon the productivity and biological integrity of coastal wetlands, shellfish beds, SAV beds, and spawning and nursery areas. As detailed in Section 3.2.4 of this analysis, an assessment of existing docking facilities shows that the majority of these docking facilities located along shorelines of Currituck Sound appear to have been able to gain access to deeper waters without dredging. It is expected that the relatively low number of anticipated new docking facility locations will be of a similar nature, with most future proposed projects similarly located in areas where docks can access adequate water depths without dredging. It is therefore expected that there will be minimal requests for new dredging projects over the next 20 years.

With regard to damage to shellfish and fisheries resources resulting from bottom-disturbing fishing gear, the salinity of Currituck Sound generally precludes the existence of live oyster reefs (NCDEQ, 2016). Additionally, according to the NCDMF Shellfish Leasing Application (NCDMF, 2020), the waters of Currituck Sound within Currituck County are permanently closed to the taking of shellfish, meaning that no shellfish leases or other harvesting of shellfish is allowed in this area. These two factors should eliminate the potential for bottom impacts from the use of shellfish harvesting gear. Various types of commercial fisheries gear not used for shellfish harvesting may cause bottom impacts. For example, towed trawling gear and fixed fishing gear, if set in the same place for a long period of time, could cause bottom impacts (ASMFC, 2020). However, it is not anticipated that construction of the Mid-Currituck Bridge will cause an increase in commercial fishing operations from the shorelines of the Road Accessible and Non-Road Accessible Outer Banks PDAs. National Oceanic and Atmospheric Administration (NOAA) depth charts (NOAA, 2020) generally show one to three feet of water depth adjacent to the shorelines of the Road Accessible and Non-Road Accessible Outer Banks PDAs. These shallow waters would likely preclude access to new docks or fish houses by larger commercial fishing vessels without dredging, which would likely not be permitted in areas with coastal wetlands and/or SAV habitat. It should also be noted that analyses of cumulative effects of the Mid-Currituck Bridge on both coastal wetlands and SAV habitat, which are described elsewhere in this document, have determined that the project should result in minimal cumulative effects to coastal wetlands and SAV.

NCCRC rules preclude almost all development activities along the oceanfront beaches. Potential water quality impacts to the Atlantic Ocean are addressed in the water quality-focused cumulative impact analysis. Therefore, the development activities addressed in this section would not be expected to have the potential to impact fisheries or shellfish resources in the waters adjacent to the Atlantic Ocean beaches.

3.4.5 Summary

It is not anticipated that the construction of the Mid-Currituck Bridge will result in significant adverse effects to fisheries and shellfish resources within Currituck Sound and the waters of the Atlantic Ocean adjacent to the Road Accessible and Non-Road Accessible Outer Banks PDAs. This conclusion is based on the analysis of potential impacts to fisheries and shellfish resources from bottom disturbing fishing activities, dredging-related impacts, and water quality impacts.

3.4.6 Rules That Protect Fisheries and Shellfish Resources

- 15A NCAC 07H.0207(b), which identifies development activities that cause degradation of shellfish waters as being incompatible with the management policies of public trust areas.
- 15A NCAC 07H.0208(b)(2)(A), which requires that before a CAMA permit is issued, a determination must be made that the project sited and designed to avoid significant adverse impacts upon the productivity and biological integrity of shellfish beds, spawning and nursery areas (among other resources).
- 15A NCAC 07H.0208(b)(1), which requires that navigation channels, canals and boat basins be aligned so as to avoid shellfish beds.
- 15A NCAC 07H.0208(b)(1)(A), which states that navigation channels, canals and boat basins be allowed through coastal wetland fringes provided there will be no significant adverse impact to fisheries resources.
- 15A NCAC 07H.0208(b)(2)(H), which requires that hydraulic dredged material from closed shellfish waters and effluent from diked disposal areas used when dredging in closed shellfish waters be returned to the closed shellfish waters.
- 15A NCAC 07H.0208(b)(3)(D), which requires that drainage ditches not have a significant adverse impact on primary nursery areas or productive shellfish beds.
- 15A NCAC 07H.0208(b)(5)(A), which requires that marinas not be sited in a manner that disturbs shellfish resources.
- 15A NCAC 07H.0208(b)(5)(I), which requires that marinas not be located within areas where shellfish harvesting for human consumption is a significant existing use, or adjacent to such areas, if shellfish harvest closure is anticipated to result from the location of the marina.
- 15A NCAC 07H.0208(b)(10)(D), which requires that mooring fields not be located within areas where shellfish harvesting for human consumption is a significant existing use, or adjacent to such areas, if shellfish harvest closure is anticipated to result from the location of the marina.

- 15A NCAC 07H.0208(b)(11)(C), which requires that the filling of canals, basins, and ditches not have an adverse impact on shellfish beds.
- 15A NCAC 07H.0602, which requires that no development shall be allowed within areas where shellfish harvesting for human consumption is a significant existing use, or adjacent to such areas, if shellfish harvest closure is anticipated to result from the development.
- 15A NCAC 07H.12025(h), which requires that, for pier and dock projects seeking authorization under a General Permit, coordination be first initiated with NCDMF or NCWRC if the proposed structure will be located over shellfish beds, and the water depths are less than two feet.
- 15A NCAC 07H.1205(i), which requires that for pier and dock projects seeking authorization under a General Permit, any proposed floating structure(s) located over shellfish beds must have a minimum elevation over the bottom substrate of at least 18 inches.
- 15A NCAC 07H.1605(6), which requires that for aerial or subaqueous utility lines authorized under a General Permit, there can be no work within any productive shellfish bed.
- 15A NCAC 07H.1905(2), which requires that for temporary structures authorized under a General Permit, no work with any productive shellfish bed may be allowed without prior authorization from the NCDMF.

Healthy coastal wetland and SAV habitats play important roles in the protection of fisheries and shellfish resources. See Sections 3.2.6 and 3.12.6 of this study for NCCRC rules that provide protections for these resources.

3.4.7 Additional Resource Protection Suggestions

- Encourage the NCDWR and Currituck County to begin to address measures suggested in Chapter 20 of the water quality-focused cumulative impact analysis.

3.5 Mitigation Sites

3.5.1 Importance

Mitigation sites are important in offsetting environmental impacts, such as wetland impacts, resulting from development projects. Neither CAMA nor the North Carolina Dredge and Fill Law specifically references or mentions mitigation sites. However, NCCRC rules do acknowledge the importance of these sites through the development of a General Permit for mitigation sites, allowing for rapid regulatory approvals of such sites within the coastal zone.

3.5.2 Distribution

From data obtained from the North Carolina Division of Mitigation Services (NCDMS, 2017), there do not appear to be any mitigation sites within the three PDAs. Additionally, based on personal contact with the NCDOT, as well as a review of the NCDOT Mitigation Site Map (NCDOT, 2020) and the USACE Regulatory In-Lieu Fee and Bank Information Tracking System (USACE, 2021), there do not appear to be any mitigation sites within the three PDAs.

3.5.3 Cumulative Effects Analysis

A cumulative effect analysis is not needed due to lack of this resource within or adjacent to the three PDAs.

3.6 Outstanding Resource Waters

3.6.1 Importance

The rules of the NCCRC (15A NCAC 07H.0208(a)(5)) identify Outstanding Resource Waters (ORW) as:

> "*those estuarine waters and public trust areas classified by the N.C. Environmental Management Commission (NCEMC). In those estuarine waters and public trust areas classified as ORW by the NCEMC no permit required by the Coastal Area Management Act shall be approved for any project which would be inconsistent with applicable use standards adopted by the CRC, NCEMC, or NCMFC for estuarine waters, public trust areas, or coastal wetlands. For development activities not covered by specific use standards, no permit shall be issued if the activity would, based on site specific information, degrade the water quality or outstanding resource values…."*

3.6.2 Distribution

Based upon a review of the NCDCM Interactive Map Viewer (NCDCM, 2020a), there are no ORW areas in or adjacent to the three PDAs. Therefore, there should not be any impacts, either directly or cumulatively, to this coastal resource with the Mid-Currituck Bridge Project.

3.6.3 Cumulative Effects Analysis

A cumulative effect analysis is not needed due to lack of this resource within or adjacent to the three PDAs.

3.7 Parklands

3.7.1 Importance

Parklands can represent major economic and environmental components in an area. In communities where tourism is a major economic factor, such parklands may enhance the draw of tourists to an area. Parklands may also provide for environmental, conservation, management, and educational opportunities. This may especially be true in coastal settings, which possess very diverse wildlife species and habitat types, from oceanfront beach environments to upland wildlife habitats to fisheries and shellfish habitats.

CAMA identifies the importance of parklands in § 113A-102(b)(4)(c), which states that one of the goals of CAMA is to establish policies, guidelines, and standards for parklands.

3.7.2 Distribution

According to the Currituck County Land Use Plan (Currituck County, 2006), Currituck County operates five public parks, none of which are located within the three PDAs. However, several other parklands or recognized protected areas are located within the Road Accessible and Non-Road Accessible Outer Banks PDAs (Figure 4). The Currituck National Wildlife Refuge (NWR) is located within portions of the Non-Road Accessible Outer Banks PDA. Primary purposes of the Currituck NWR are to preserve, protect, and maintain healthy and viable populations of migratory birds, wildlife, fish, and plants, including federal and state endangered species and trust species. The refuge restores, enhances, and maintains the natural processes and diversity of beach, dune, interdunal, maritime forest, and marsh habitats to ensure optimum ecological productivity as well as to protect the water quality of Currituck Sound. The Refuge also provides opportunities for wildlife-oriented interpretation, outdoor recreation and environmental education focusing on the wildlife and habitats of the refuge (USFWS, 2017). The Refuge partners with the NCWRC, Partners in Flight, and the South Atlantic Bird Initiative to ensure optimum avian resources. Refuge visitors have the option to park along the oceanfront or seek out the small, sandy parking areas that are located approximately one mile off the main paved road on Currituck Sound side. Three additional parking areas are located in Swan Beach and North Swan Beach, behind the residential communities.

The Currituck Banks National Estuarine Research Reserve (NERR) is also located within the Non-Road Accessible Outer Banks PDA, as well as a portion of the Road Accessible Outer Banks PDA. The Currituck Banks NERR encompasses 965 acres of ocean beach, sand dunes, grasslands, shrub thicket, maritime forest, brackish and freshwater marshes, tidal flats, and subtidal soft bottoms. Currituck Banks Reserve is bordered by Currituck Sound on the west and the Atlantic Ocean on the east (NCDCM, 2020b). The site aims to preserve coastal ecosystems representative of the various biogeographic regions and typologies in the area and to make them available for continuous future study of the processes, functions, and influences which shape and sustain these coastal ecosystems (15A NCAC 07O.0101(1)). Twelve parking spaces are provided north of Corolla just before the end of the paved section of NC 12. Communication with NERR

staff indicates that the Reserve currently faces challenges with these parking spaces being misused by people who are heading north or out to the beach.

The North Carolina Center for Wildlife Education, managed by the NCWRC, is located near the Corolla Lighthouse, and provides opportunities for the public to explore coastal North Carolina's wildlife, natural history, and cultural heritage (NCWRC, 2020). The center provides guest parking just north of the Whalehead Club Marina basin.

The Audubon Society maintains the Donal C. O'Brien Sanctuary and Audubon Center at Pine Island, within the Road-Accessible Outer Banks PDA, approximately 2.25 miles north of the Dare County line. The purpose of the Sanctuary (Audubon North Carolina, 2020a) is to:

- Protect, restore, and adaptively manage Currituck Sound marshes and managed wetlands in the greater Currituck Sounds region to provide high quality habitats for diverse populations of birds and other wildlife,
- Maintain high quality water that supports healthy submerged aquatic vegetation, fisheries, birds, other wildlife, and people in the greater Currituck Sound region,
- Engage a coalition of diverse stakeholders that work toward sustaining a healthy Currituck Sound ecosystem,
- Protect important bird areas in northeastern North Carolina, and
- Develop a plan to sustain habitats for birds and other wildlife in the greater Currituck Sound region given the projected sea level rise.

The Audubon NC Sanctuary has initiated a fundraising effort to support expansion of the facility. Once realized, this expansion should provide for better access to the Sanctuary's resources and educational programs (Audubon North Carolina, 2020c).

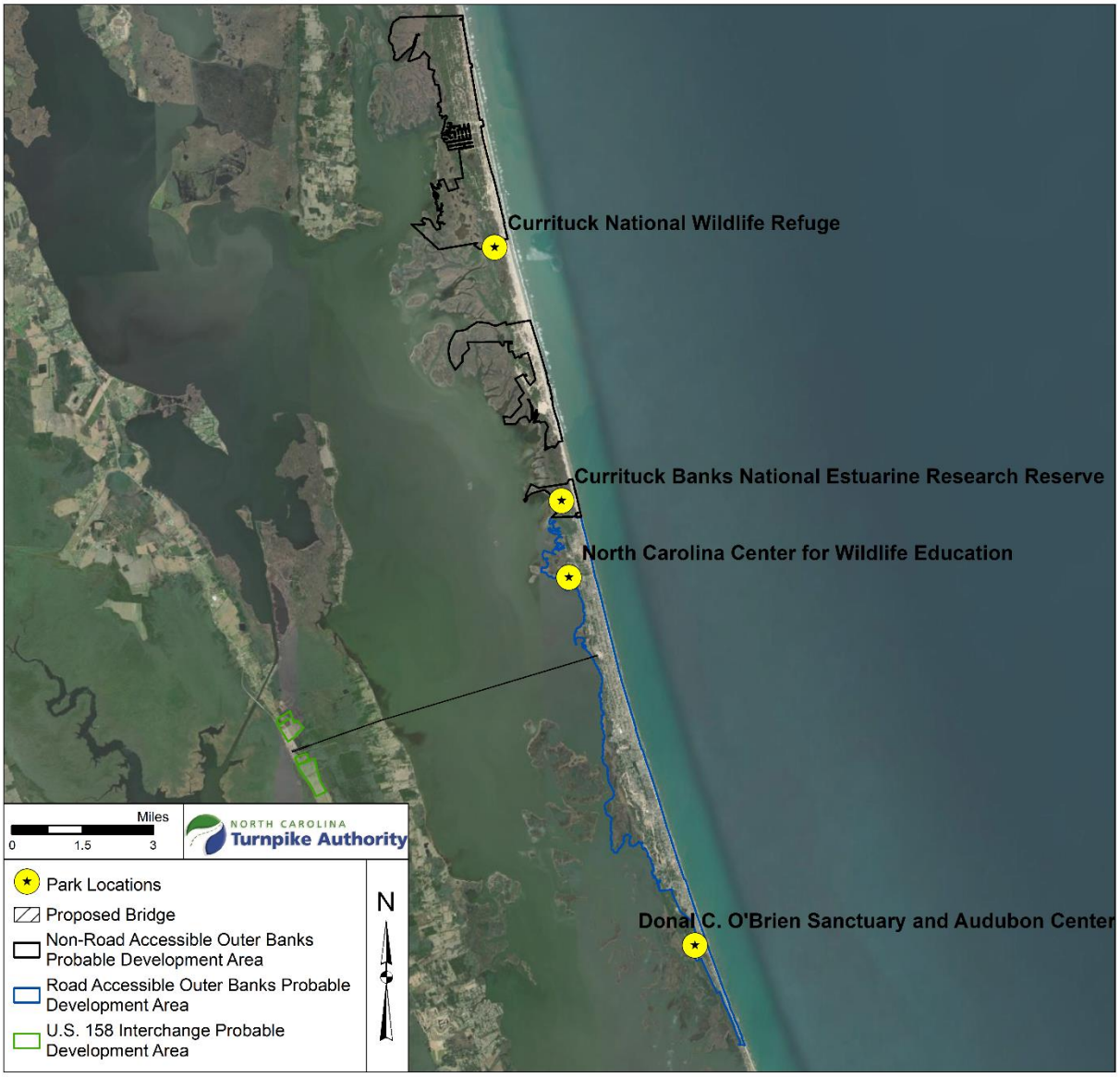

Figure 4: Parklands Located Within the Two Outer Banks PDAs

3.7.3 Threats

Threats to the continued use and enjoyment of parklands include encroachment of development close to park boundaries, lack of public access components such as parking areas for the parks, which is especially limiting as park access demands grow, and lack of available land for the expansion of existing parks or the development of new parks.

3.7.4 Cumulative Effects Analysis

With regard to direct impacts resulting from the construction of the Mid-Currituck Bridge, per Section 4.1.9.1 of the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a), the 2012 FEIS (USDOT, FHWA, and NCTA, 2012) concluded that parks would not be affected by the Preferred Alternative, a finding confirmed by the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a).

Each of the listed parks currently provides varying levels of public parking/access to allow users to access trails, facilities, educational programs, and other services provided by the parks. These access facilities may currently be a limiting factor with regard to park use, although the parks may intentionally limit parking availability to ensure that their individual visitor capacities are not exceeded or overwhelmed. Additional demand for access to these parks from planned and expected development is likely to occur over the next 20 years, especially in the Road Accessible Outer Banks PDA. This increase in demand may be beneficial to each park's educational and informational goals and programs, provided each park is not overwhelmed by the number of new users/visitors. If park staff believe that their facilities and programs can accommodate additional visitors, it is assumed that the parks will explore new ways to allow additional access. This could include providing new or expanded parking, longer hours, more frequent formal educational programs, and similar measures.

As was stated above, the NERR facility currently faces challenges with parking spaces being misused by people who are heading north or to the beach. Planned and expected development resulting from the construction of the Mid-Currituck Bridge has the potential to exacerbate this situation unless specific solutions to this issue are implemented.

3.7.5 Summary

Because the listed parks manage access to their facilities and programs, planned and expected development would not be expected to lead to significant cumulative effects on park resources. Increased demands resulting from planned and expected development could enhance some of the parks' educational programs, assuming that there are feasible mechanisms to accommodate more visitors.

3.7.6 Rules That Protect Parklands

- 15A NCAC 07O.0101, which states that the purpose of North Carolina Coastal Reserve system components, including NERRs sites, is to provide a focal point for educational activities that increase the public awareness and understanding of coastal ecosystems, effects of man on them, and the importance of the coastal systems to the state and the

Nation, and to accommodate traditional recreational activities, commercial fishing, and other uses of the Reserve as long as they do not disturb the Reserve environment and are compatible with the research and educational activities taking place there.

- 15A NCAC 07O.0103, which states that the Coastal Reserve program of the NCDCM shall be responsible for managing and protecting each Coastal Reserve site. This includes promoting and coordinating research and educational programs while allowing for compatible traditional uses, maintaining a management plan for the site, maintaining cooperative agreements with scientific, educational, and resource management agencies and private citizens that will assist in the management of the Reserve, and providing new information on coastal processes to coastal management decisionmakers.

3.7.7 Additional Resource Protection Suggestions

- The County may wish to explore the development of a County park within either one or both of the Road Accessible or Non-Road Accessible Outer Banks PDAs. It may be beneficial for the County to begin planning for parks or similar natural recreational areas before planned and expected development occurs related to the construction of the Mid-Currituck Bridge.

3.8 Primary Nursery Areas

3.8.1 Importance

The importance of PNAs is acknowledged by CAMA in § 113A-113(b)(9), which allows for consideration of the value of PNAs when developing AECs. The rules of the NCCRC (15A NCAC 07H.0208(a)(5)) further state the importance of PNAs as:

> *"those areas in the estuarine and ocean system where initial post larval development of finfish and crustaceans takes place. They are usually located in the uppermost sections of a system where populations are uniformly early juvenile stages. They are designated and described by the N.C. Marine Fisheries Commission (NCMFC) and by the N.C. Wildlife Resources Commission (NCWRC)".*

3.8.2 Distribution

Based on a review of the NCDCM Interactive Map Viewer (NCDCM, 2020a), no PNAs are within or adjacent to the three PDAs. Therefore, no impacts are expected, either directly or cumulatively, to this coastal resource with the Mid-Currituck Bridge Project.

3.8.3 Cumulative Effects Analysis

A cumulative effect analysis is not needed due to lack of this resource within or adjacent to the three PDAs.

3.9 Public Water Supplies

3.9.1 Importance

CAMA in § 113A-113(b)(3.a) identifies areas providing for public water supplies as a coastal resource to be managed and protected. In order to protect this valuable coastal resource, 15A NCAC 07H.0400 of the rules of the NCCRC has designated two Small Surface Water Supply Watershed AECs and one Public Water Supply Well Field AEC. Chapter 17 of the water quality-focused cumulative impact analysis addresses the potable water situation in the three PDAs.

3.9.2 Distribution

Neither of the two NCCRC-designated Small Surface Water Supply Watershed AECs (the Fresh Pond AEC in Dare County and the Toomers Creek Watershed AEC in New Hanover County), nor the one NCCRC-designated Public Water Supply Well Field AEC (the Cape Hatteras Well Field in Dare County) are located within or serve any of the three PDAs.

Additionally, the Currituck County Land Use Plan (Currituck County, 2006) states that:

> *"All potable water supplies in Currituck County are derived from ground water sources. Therefore, there are no surface water supply watersheds in the county*[7]*."*

3.9.3 Threats

According to 15A NCAC 07H.0402(b) of the rules of the NCCRC, uncontrolled development within the designated boundaries of a watershed or well field site could cause significant changes in runoff patterns or water withdrawal rates that may adversely affect the quantity and quality of the raw water supply. Additionally, incompatible development could adversely affect water quality by introducing a variety of pollutants from homes, businesses, or industries, either through subsurface discharge, surface runoff, or seepage into the vulnerable water supply.

3.9.4 Cumulative Effects Analysis

A cumulative effect analysis is not needed due to the lack of identified resources within or adjacent to the three PDAs.

3.10 Recreational Access and Use of Public Trust Waters (Non-Oceanfront)

3.10.1 Importance

CAMA places a high importance on public access to public trust resources, as is evidenced by § 113A-134.1(b), which states:

> *"The public has traditionally fully enjoyed the State's beaches and coastal waters and public access to and use of the beaches and coastal waters. The beaches provide a recreational resource of great importance to North Carolina and its citizens and this makes a significant contribution to the economic well-being of the State. The General Assembly finds that the beaches and coastal waters are resources of statewide significance and have been customarily freely used and enjoyed by people throughout the State. Public access to beaches and coastal waters in North Carolina is, however, becoming severely limited in some areas. Also, the lack of public parking is increasingly making the use of existing public access difficult or impractical in some areas. The public interest would best be served by providing increased access to beaches and coastal waters and by making available additional public parking facilities. There is therefore, a pressing need in North Carolina to establish a comprehensive program for the identification, acquisition, improvement, and maintenance of public accessways to the beaches and coastal waters."*

This acknowledgement of legislative support for providing public access to public trust waters is found in a portion of CAMA that sets out parameters for the establishment of a Public Beach and Coastal Waterfront Access Program.

The rules of the NCCRC also acknowledge the importance of public access in the management objectives for the Estuarine and Ocean System (15A NCAC 07H.0203), which states:

> *"Furthermore, it is the objective of the Coastal Resources Commission to protect present common-law and statutory public rights of access to the lands and waters of the coastal area."*

The rules of the NCCRC go on to state in 15A NCAC 07H.0207(b) that the significance of access to public trust waters as:

> *"The public has rights in these areas, including navigation and recreation. In addition, these areas support commercial and sports fisheries, have aesthetic value, and are important resources for economic development."*

While 15A NCAC 07H.0207(c), which lists the management object for public trust areas as:

> *"To protect public rights for navigation and recreation and to conserve and manage the public trust areas so as to safeguard and perpetuate their biological, economic and aesthetic value."*

3.10.2 Distribution

The waterfront shorelines of Currituck Sound provide opportunities for access to and use of public trust waters. Waterfront parcels along these shorelines have riparian rights to access the

adjacent public trust waters. This may include access to the waters adjacent to the shoreline for swimming or similar use, or vessel access and use, which may be facilitated by the construction of docking facilities.

A review of the existing aerial photography revealed few large-scale water access facilities along Currituck Sound shorelines within the Road Accessible Outer Banks PDA, and no large-scale water access facilities along the shorelines within the Non-Road Accessible Outer Banks PDA. Facilities present include the marina at the Whalehead Club, the access piers associated with the Corolla Lighthouse, the NCWRC's Outer Banks Center for Wildlife Education, and the Corolla Watersports pier at the Timbuck II Shopping Village in Corolla, which all provide public access.

There are no waterfront properties, and therefore no recreational water access facilities, adjacent to the U.S. 158 Interchange PDA.

3.10.3 Potential Threats

Threats to recreational access and use of public trust waters include the lack of publicly available water access facilities, conversion of existing public access facilities into private facilities, increased pressures on existing access facilities resulting from increased demand, and increased use of already crowded water bodies.

3.10.4 Cumulative Effects Analysis

Direct impacts to recreational access and use of Currituck Sound resulting from the construction of the Mid-Currituck Bridge should be minimal. Pre-construction coordination between the NCTA and the U.S. Coast Guard (USCG), as well as the USCG bridge permitting process for the Mid-Currituck Bridge, will ensure that the bridge, once constructed, will allow for unimpeded marine vessel use traveling underneath or adjacent to the bridge. There will likely be localized impacts to use of small portions of Currituck Sound during construction, due to the establishment of temporary boating exclusion areas that are put in place for safety purposes. However, impacts which occur during the construction of most major bridge projects over navigable waters should be short-term and temporary.

As stated above, there appear to be few large-scale water access facilities along Currituck Sound shorelines within the Road Accessible Outer Banks PDA, and no large-scale water access facilities along the shorelines within the Non-Road Accessible Outer Banks PDA. The marina at the Whalehead Club, the access piers associated with the Corolla Lighthouse and the NCWRC's Outer Banks Center for Wildlife Education, and the Corolla Watersports pier at the Timbuck II Shopping Village in Corolla are exceptions and these sites do provide public access.

It is likely that this lack of existing large-scale access facilities (i.e., marinas, commercial piers, upland basins, access channels) is due to several factors, including the lack of concentrated population centers, shallow waters adjacent to much of the shoreline, and the inability to obtain permits to dredge access channels throughout much of the area due to the presence of substantial areas of coastal wetlands and/or SAV. It is likely that of the 432 undeveloped but potentially developable waterfront parcels (390 in the canal system and 42 adjacent to Currituck Sound), the majority of these, especially in the canal system, will follow similar development patterns (i.e.,

single-family residential development with small docking facilities, where permittable). Therefore, recreational access to public trust waters for these waterfront property owners should be available, provided environmental concerns (i.e., coastal wetlands, SAV habitat) do not inhibit the ability of individual parcel owners to obtain dock permits. In cases where docks may not be allowable due to environmental constraints, observation piers that provide opportunities for fishing, swimming, and enjoyment of the aesthetics of Currituck Sound may still be permittable.

Within the Road Accessible and Non-Road Accessible Outer Banks PDAs, it can be expected that over the next 20 years developers of undeveloped properties and visitors to the area with the Mid-Currituck Bridge may still enjoy non-boating access to the public trust waters through existing access facilities. Such access facilities include the access piers at the Corolla Lighthouse and the NCWRC Outer Banks Center for Wildlife Education, and at the Corolla Watersports pier. As is currently the case with existing developed properties, boating access to public trust waters for any new non-waterfront property owners is likely to be more limited. Boating access for existing non-waterfront residents is already limited due to the lack of existing public access piers or boat ramps. Planned and expected development will likely bring new property owners to the Road Accessible and Non-Road Accessible Outer Banks PDAs over the next 20 years, which could amplify the current inadequacies in existing boating access for non-waterfront property owners. However, lack of water access for non-waterfront property owners is not unique to Currituck County, as many coastal communities within North Carolina share similar deficiencies in the availability of public water access facilities.

In regards to recreational use of Currituck Sound, based on an analysis of existing aerial photography, there appear to be approximately 300 docking facilities along a 22.75-mile long segment of the Sound side of the Road Accessible and Non-Road Accessible Outer Banks PDAs. Most of these existing docks (approximately 230) exist within one large artificial canal system at the northern end of the Non-Road Accessible Outer Banks PDA. Another major concentration (approximately 56 dock structures plus the Whalehead Club Marina) of docks exists along an approximate 3.4 mile stretch of shoreline from the Whalehead Club Marina south to the location of the Corolla Raceway (Sunset Boulevard in Corolla).

There are an estimated 432 undeveloped but potentially developable waterfront parcels within the Road Accessible and Non-Road Accessible Outer Banks PDAs, 390 of these parcels exist within the artificial canal system in the Non-Road Accessible Outer Banks PDA. Of the remaining 42 undeveloped but potentially developable waterfront parcels in the Road Accessible and Non-Road Accessible Outer Banks PDAs, 15 occur within the 3.4-mile area from the Whalehead Club Marina to the Corolla Raceway. In the waterfront areas (outside of the canal system) in the Non-Road Accessible Outer Banks PDA, there are 19 undeveloped but potentially developable waterfront parcels, including several large parcels. The remaining eight undeveloped but potentially developable waterfront parcels are spread throughout the Road Accessible Outer Banks PDA. Given the relatively low boat use of Currituck Sound by existing waterfront parcel owners within the Road Accessible and Non-Road Accessible Outer Banks PDAs, it is not anticipated that the future addition of boating access to Currituck Sound from these 432 parcels

(the vast majority of which are along the artificial canal system within the Non-Road Accessible Outer Banks PDA) will cause a significant adverse impact on recreational use of Currituck Sound.

3.10.5 Summary

There should be no permanent direct impact to recreational access and use of Currituck Sound resulting from the construction of the Mid-Currituck Bridge, with the possible exception of short-term, localized impacts at and near construction zones during the building of the bridge.

Recreational access to public trust waters for undeveloped but potentially developable waterfront parcels should continue to be available, provided environmental concerns (i.e., coastal wetlands, SAV habitat) do not inhibit the ability of individual parcel owners to obtain dock or pier permits.

Water access for non-waterfront parcel owners is currently limited and the possible addition of new property owners within the Road Accessible and Non-Road Accessible Outer Banks PDAs over the next 20 years does have the potential to amplify the current inadequacies in existing boating access for these non-waterfront property owners, a situation in North Carolina that is not unique to Currituck Sound. This situation could be partially alleviated if additional lands and funds can be allocated for the construction of new public access facilities.

3.10.6 Rules That Protect Recreational Access and Use of Public Trust Waters (Non-Oceanfront)

- 15A NCAC 07H.0203, which states that it is the objective of the NCCRC to protect existing common-law and statutory public rights of access to the lands and waters of the coastal area.
- 15A NCAC 07H.0207(b), which provides a statement on the significance of access to public trust waters.
- 15A NCAC 07H.0207(c), which states that the management object for public trust areas is to protect public rights for navigation and recreation, and to conserve and manage these public trust areas so as to safeguard and perpetuate their biological, economic, and aesthetic values.
- 15A NCAC 07H.0208(a)(2)(G), which requires that no permit may be issued if the proposed development will jeopardize the use of the waters for navigation or for other public trust rights in public trust areas.
- 15A NCAC 07H.0208(b)(5)(D), which limits the size of marina facilities within public trust waters.
- 15A NCAC 07H.0208(b)(5)(H), which requires that marinas be designed so that the capability of the adjacent waters to be used for navigation or for other public trust rights in estuarine or public trust waters are not jeopardized while allowing the applicant access to deep waters.
- 15A NCAC 07H.0208(b)(5)(I), which requires that marinas be located and constructed so as to avoid adverse impacts on navigation throughout all federally maintained channels.

- 15A NCAC 07H.0208(b)(6)(A), 15A NCAC 07H.0208(b)(6)(B), 15A NCAC 07H.0208(b)(6)(C), 15A NCAC 07H.0208(b)(6)(D), and 15A NCAC 07H.0208(b)(6)(E), all of which, in an attempt to reduce potential navigational impacts, sets maximum size limits for docks and piers.
- 15A NCAC 07H.0208(b)(6)(G) and 15A NCAC 07H.0208(b)(6)(H), both of which, in an attempt to reduce potential navigational impacts, sets maximum distances offshore a docking facility may extend.
- 15A NCAC 07H.0208(b)(6)(I), which requires that piers and docking facilities be set back a minimum of 15' from each adjacent riparian corridor line, unless a waiver is first obtained from the adjacent property owner.
- 15A NCAC 07H.0208(b)(10)(F), which requires that freestanding moorings be located and constructed so as to avoid adverse impacts on navigation throughout all federally maintained channels.
- 15A NCAC 07H.1204(c), which requires that General Permits for piers and docking facilities not be issued if the proposed project interferes with navigation or use of the waters by the public.
- 15A NCAC 07H.1205(a), 15A NCAC 07H.1205(b), 15A NCAC 07H.1205(c), 15A NCAC 07H.1205(o), and 15A NCAC 07H.1205(p), all of which, in an attempt to reduce potential navigational impacts, sets maximum distances offshore a docking facility may extend if authorized by a General Permit.
- 15A NCAC 07H.1205(d), 15A NCAC 07H.1205(e), 15A NCAC 07H.1205(f), 15A NCAC 07H.1205(l), and 15A NCAC 07H.1205(m), all of which, in an attempt to reduce potential incorporation of public trust waters trust, sets maximum size limits for docks and piers authorized by a General Permit.
- 15A NCAC 07H.1205(q), which requires that piers and docking facilities seeking authorization under a General Permit be set back a minimum of 15' from each adjacent riparian corridor line, unless a waiver is first obtained from the adjacent property.
- 15A NCAC 07H.1905(4), which requires that temporary structures seeking authorization under a General Permit not disrupt navigation and transportation channels.
- 15A NCAC 07H.1905(5), which requires that temporary structures seeking authorization under a General Permit not impede public access or other public trust uses.

3.10.7 Additional Resource Protection Suggestions

- Explore opportunities to increase public access funding for underserved areas such as the Currituck Banks area.
- Encourage Currituck County to update its Land Use Plan with new policies addressing the desire to add new public access facilities along the waters of Currituck Sound.

3.11 Recreational Access and Use of Oceanfront Beaches

3.11.1 Importance

In North Carolina, it is generally understood that the dry sand beach, or the area between the mean high water line and the first line of vegetation, is open to public use. This portion of beach is typically referred to as the public trust beach (Kalo, 2012). The concept of the public trust beach in North Carolina was recently upheld in the *Neis v. Town of Emerald Isle* decision in the North Carolina Court of Appeals (*Nies v. Town of Emerald Isle*, 2015).

As was the case with recreational access to public trust waters, CAMA places a high importance on recreational access and use of oceanfront beaches, as is evidenced in § 113A-134.1(b), which states:

> *"The public has traditionally fully enjoyed the State's beaches and coastal waters and public access to and use of the beaches and coastal waters. The beaches provide a recreational resource of great importance to North Carolina and its citizens and this makes a significant contribution to the economic well-being of the State. The General Assembly finds that the beaches and coastal waters are resources of statewide significance and have been customarily freely used and enjoyed by people throughout the State. Public access to beaches and coastal waters in North Carolina is, however, becoming severely limited in some areas. Also, the lack of public parking is increasingly making the use of existing public access difficult or impractical in some areas. The public interest would best be served by providing increased access to beaches and coastal waters and by making available additional public parking facilities. There is therefore, a pressing need in North Carolina to establish a comprehensive program for the identification, acquisition, improvement, and maintenance of public accessways to the beaches and coastal waters. "*

This acknowledgement of legislative support for providing public access to public trust waters is found in a portion of CAMA that sets out parameters for establishing a Public Beach and Coastal Waterfront Access Program.

NCCRC rules also acknowledge the importance of public access in the management objectives for the Estuarine and Ocean System (15A NCAC 07H.0203), which states:

> *"Furthermore, it is the objective of the Coastal Resources Commission to protect present common-law and statutory public rights of access to the lands and waters of the coastal area."*

Page 2-17 of the Currituck County Land Use Plan (Currituck County, 2006) states that tourism is the economic engine for the Outer Banks. The recreational opportunities provided by the public trust beaches are a major driver of this tourism sector.

3.11.2 Distribution

Oceanfront shorelines within the Road Accessible and Non-Road Accessible Outer Banks PDAs are considered public trust beaches (Kalo, 2012). These oceanfront shorelines also provide opportunities for access to and use of the public beach. According to the NCDCM Interactive Map Viewer (NCDCM, 2020a), 17 beach access facilities exist within the Road Accessible and

Non-Road Accessible Outer Banks PDAs (Figure 5), with most of these located within the Corolla area. The majority of these sites are described as providing local access, with two sites providing a total of 41 on-site parking spaces and another seven sites providing 268 parking spaces near the access facilities. Most of the sites, including those without any associated parking, provide a beach access point for local citizens who wish to walk to the beach (see Table 1). It also should be noted that off-road vehicle beach parking is allowed for much of the beach area north of the end of paved NC 12.

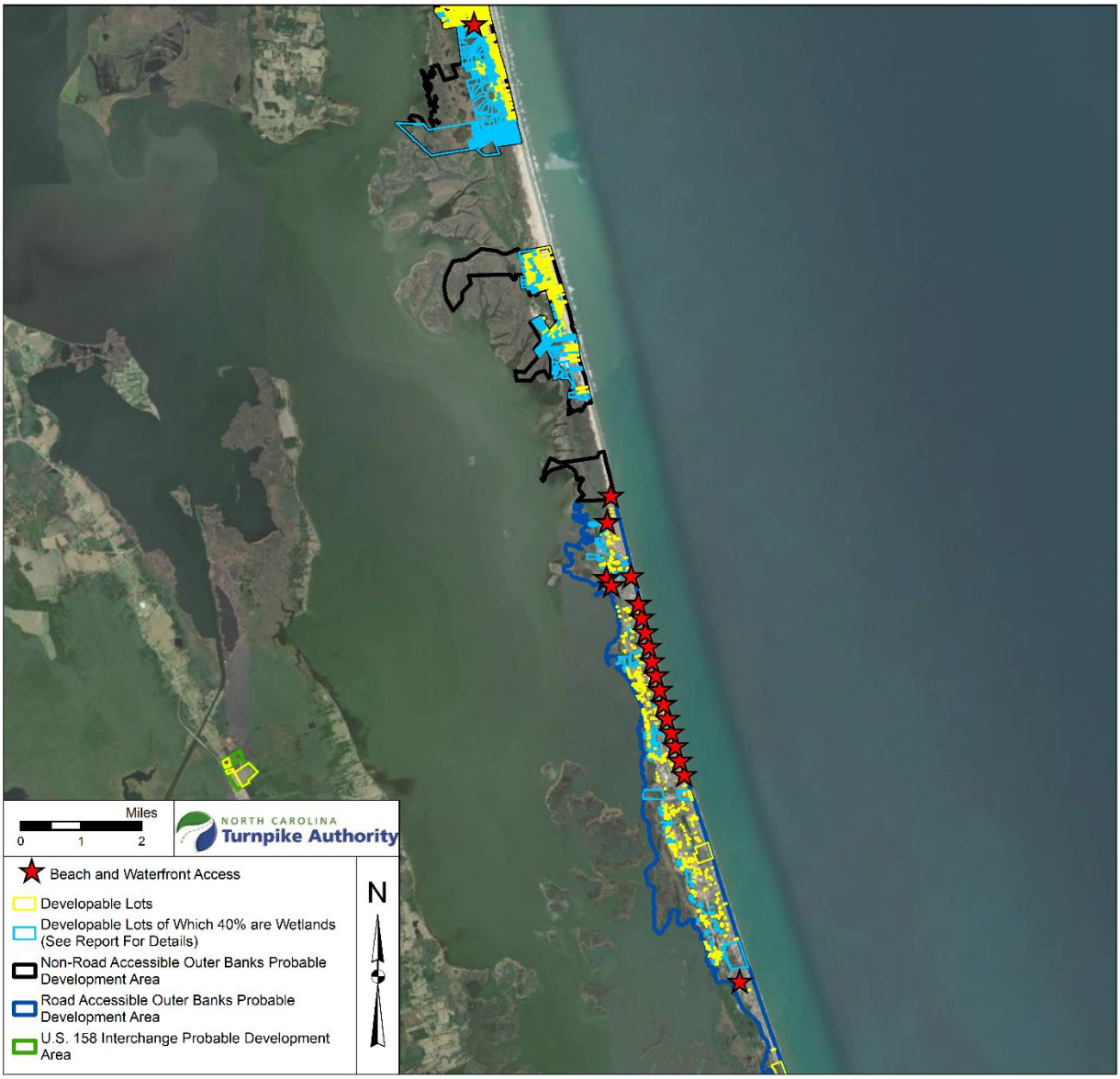

Figure 5: Beach and Waterfront Access Points

Table 1: Mid-Currituck Bridge Beach and Waterfront Access Points

Address	Parking	Dune Walkover	Notes	Access Type
471 Ocean Trail/NC 12	30	Yes	restroom, shower, bike rack	Beach
Albacore Street and Lighthouse Drive	0	Yes		Beach
Dolphin Street and Lighthouse Drive	0	Yes		Beach
Marlin Street and Lighthouse Drive	0	Yes		Beach
Sailfish Street and Lighthouse Drive	0	Yes	40 unmarked parking spaces located 1 block west	Beach
Coral Street and Lighthouse Drive	0	Yes		Beach
Bonito Street and Lighthouse Drive	0	Yes	40 unmarked parking spaces located 1 block west	Beach
Mackerel Street and Lighthouse Drive	0	Yes		Beach
Perch Street and Lighthouse Drive	0	Yes	15 unmarked parking spaces located 1 block west	Beach
Herring Street and Lighthouse Drive	0	Yes	27 street parking and 14 paved parking spaces located 2 blocks west	Beach
Barracuda Street and Lighthouse Drive	0	Yes		Beach
Sturgeon Street and Lighthouse Drive	0	Yes	46 gravel parking spaces located 1 block west	Beach
Tuna Street and Lighthouse Drive	0	Yes		Beach
Shad Street and Lighthouse Drive	0	Yes	40 unmarked gravel parking spaces located 1 block west	Beach
NC 12 and east side of Corolla Village Road	0	No	26 gravel and 20 unimproved parking spaces, picnic pavilion, open and enclosed showers, benches	Beach
North end of NC 12 paved road	0	No	off-road vehicle access only, parking allowed on the beach, NC 12 continues northward for 12 miles along the beach	Beach
NC 12 and west side of Corolla Village Road	0	No	boardwalk and pier with benches, small watercraft tie-ups	Shoreline
1160 Village Lane west of the NC12 and Club Road intersection	25	No	boardwalk and pier, watercraft tie-ups, boat ramp	Shoreline
2100 Ocean Pearl Road	13	No	boardwalk, boat ramp, picnic shelters, pavilion and grills, horseshoe pit	Shoreline
NC 12 Terminus at North Beach Access Road	11	No	boardwalk and hiking trail to sound	Beach

3.11.3 Threats

Threats to this resource include lack of public beach access facilities, a loss of existing public beach access facilities, overcrowding, loss of public trust beach due to shoreline erosion, and encroachment of structures, including sandbags, onto the public trust beach.

3.11.4 Cumulative Effects Analysis

The construction of the Mid-Currituck Bridge should not cause any direct impact on recreational access and use of public trust ocean beaches. From a cumulative effects perspective, planned and expected development will increase the number of users wishing to access and enjoy the public trust beach and the waters of the Atlantic Ocean.

With regards to property owners within the Road Accessible and Non-Road Accessible Outer Banks PDAs, it is assumed that for any of the approximately 210 parcels that may be developed over the next 20 years, property owners will have direct access to the beach from their oceanfront properties. For properties not located on the beachfront, it can reasonably be expected that individuals living within one-third of a mile of a beach access point or crossover have easy pedestrian access to the beach. Of the undeveloped but potentially developable parcels within the Road Accessible and Non-Road Accessible Outer Banks PDAs, approximately 330 are estimated to be located within one-third of a mile of an existing access. Residents of the undeveloped but potentially developable parcels that fall more than one-third of a mile away from still may choose to walk longer distances to nearby beach access sites, or they may choose to utilize some of the roughly 300 public currently existing beach access parking spaces. Alternatively, off-road vehicle owners may choose to utilize beach access opportunities along the beach area north of the end of the paved section of NC 12.

Section 7.4 of the Mid-Currituck Bridge Study - Indirect and Cumulative Effects Technical Report (East Carolina University and Parsons Brinckerhoff Inc., 2011) addressed potential impacts of increased day visitors resulting from the construction of the Mid-Currituck Bridge. This Technical Report indicated that for communities accessible from NC 12, impacts from increased day visitors on the beach could be in the form of increased traffic and increased demands for parking and restroom facilities. For the non-road accessible portions of the Outer Banks, the effects of increased day visitors could be in the form of potential impacts to dune areas in conservation, as well as bird and turtle nesting sites. There could also be increased demands for parking and restroom facilities.

With regard to beach erosion, according to the NCDCM Interactive Map Viewer (NCDCM, 2020a), long-term, annual erosion rates, which are established by the NCDCM and adopted by the NCCRC, are 2 feet per year for the roughly 9-mile section of the oceanfront from the Dare County/Currituck County line to Corolla (in the vicinity of the Corolla Lighthouse). Erosion rates then increase to 3 feet per year in the area near the lighthouse to the end of the paved section of NC 12. Erosion rates vary from 4 to 8 feet per year north of the end of the paved section of NC 12, with rates dropping back to 2 to 3 feet per year along the more developed areas closer to the canal zone and the Virginia state line.

For the oceanfront beaches of Currituck County, all development (with certain exceptions set out in 15A NCAC 07H.0309) must be set back from the first line of stable natural vegetation (FLSNV), a distance that is determined by multiplying the long-term average annual erosion rate by a graduated setback factor that is based on the size of a structure. For example, a structure with less than 5,000 square feet of total floor area must be set back from the FLSNV a distance equal to 30 times the erosion rate, with a minimum setback of 60 feet. A structure with a total floor area of between 5,000 square feet and 10,000 square feet must be set back from the FLSNV a distance of 60 times the erosion rate, with a minimum setback of 120 feet. These graduated setback factors keep increasing with building size, with a maximum setback factor of 90 times the erosion rate for structures with greater than 100,000 square feet total floor area.

Provided that these existing oceanfront setback rules are maintained, any of the 210 parcels that may be developed over the next 20 years will be required to adhere to the oceanfront setback requirements found at 15A NCAC 07H.0306. This should ensure that these new structures should not encroach upon the public trust beach during the time frame of this study.

As oceanfront beaches and vegetation lines erode, encroachment of existing structures on to the public trust beach are an issue that could have an impact on the public's ability to use the beach. Based on a review of existing aerial photography, there currently appear to be 3 to 5 structures (not counting dune crossovers) located on the public trust beach. Additionally, according to the NCDCM Interactive Map Viewer (NCDCM, 2020a), three properties, all located in the Non-Road Accessible Outer Banks PDA near Sandpiper Road, have been stabilized with sandbag structures. With regard to new oceanfront development, it can reasonably be expected that any new oceanfront structure will not encroach on the public trust beach or need sandbag protections over the next 20 years, provided that the NCCRC's current setback rules, which require a minimum setback of 30 times the long-term annual erosion rate, remain in force.

With regard to the need for beach nourishment, the County has already initiated an analysis to determine whether existing oceanfront development, including infrastructure, warrants nourishment (Hampton, 2020). Given that the County already believes that beach nourishment may be necessary to protect existing development and infrastructure, construction of new homes on undeveloped but potentially developable oceanfront parcels over the next 20 years is not likely to contribute to this need. This determination assumes that NCCRC's oceanfront setback rules for new development remain in force over that time period.

3.11.5 Summary

Construction of the Mid-Currituck Bridge should not result in any direct impact to the access and utilization of the public trust beaches along the oceanfront side of the Road Accessible and Non-Road Accessible Outer Banks PDAs. Any newly developed oceanfront properties over the next 20 years should have direct beach access from their properties. For potentially developable non-oceanfront properties that may be developed over the next 20 years, approximately 330 are located within reasonable walking distance of an existing beach access facility. Residents of the undeveloped but potentially developable parcels that fall more than one-third of a mile away from existing beach access still may choose to walk longer distances to nearby beach access

sites, or they may choose to utilize some of the roughly 300 existing public beach access parking spaces. Alternatively, off-road vehicle owners may choose to utilize beach access opportunities along the beach area north of the end of the paved section of NC 12. Oceanfront access could be enhanced by enlarging existing facilities and through funding and construction of new beach access facilities.

Despite potential shoreline erosion, existing NCCRC oceanfront setback requirements will likely prevent oceanfront structures constructed over the next 20 years from encroaching on the public trust beach. Planned and expected development are not likely to increase the perceived need for beach nourishment, given that County staff already believe that nourishment may be necessary to protect existing development and infrastructure.

3.11.6 Rules That Protect Recreational Access and Use of Oceanfront Beaches

- 15A NCAC 07H.0303(b), which states that it is the objective of the NCCRC to protect present common-law and statutory public rights of access to and use of the lands and waters of the coastal area, including public trust beaches and the waters of the Atlantic Ocean.
- 15A NCAC 07H.0306(a)(5), which requires that, with certain exceptions, no development, including any portion of a building or structure, shall extend seaward of the ocean hazard setback. This rule also establishes a graduated oceanfront setback for structures depending on the size of the structure, with greater setback requirements applied to larger structures.
- 15A NCAC 07H.0306(a)(10), which requires that established common law and statutory public rights of access to and use of public trust lands and waters in ocean hazard areas not be eliminated or restricted. This rule also requires that development shall not encroach upon public accessways, nor shall it limit the intended use of such accessways.
- 15A NCAC 07H.0306(a)(g), which requires that development not interfere with legal access to, or use of, public resources along ocean beaches, nor shall such development increase the risk of damage to public trust areas.
- 15A NCAC 07H.0308(c)(5), which requires that structural accessways not interfere with trust rights and emergency access along ocean beach.

3.11.7 Additional Resource Protection Suggestions

- Explore opportunities to increase public access funding for underserved areas such as the Currituck Banks area.
- Encourage Currituck County to update its Land Use Plan with new policies addressing the desire to add new public access facilities allowing access to public trust beaches and the adjoining waters of the Atlantic Ocean.
- The NCDCM Public Beach and Waterfront Access Program is encouraged to work with Currituck County to identify narrow vacant parcels within the Non-Road Accessible Outer Banks PDA that could serve as beach access sites.

3.12 Submerged Aquatic Vegetation

3.12.1 Importance

While CAMA does not specifically mention SAV or SAV habitat as an identified coastal resource, NCCRC rules specifically reference SAV beds in their General Use Standards for estuarine waters and public trust areas (15A NCAC 07H.0208). Beds of SAV are defined in 15A NCAC 07H.0208(a)(6) as:

> *"those habitats in public trust and estuarine waters vegetated with one or more species of submergent vegetation. These vegetation beds occur in both subtidal and intertidal zones and may occur in isolated patches or cover extensive areas. In either case, the bed is defined by the Marine Fisheries Commission."*

NCCRC rules (15A NCAC 07H.0208(d)(4)) further state that development shall not have a significant adverse impact on estuarine resources, including SAV beds.

The importance of SAV habitat is further supported by the NCCHPP (NCDEQ, 2016), which states:

> *"Submerged aquatic vegetation is recognized as essential fish habitat because of five interrelated features – primary production, structural complexity, modification of energy regimes, sediment and shoreline stabilization, and nutrient cycling. Water quality enhancement and fish utilization are especially important ecosystem functions of SAV relevant to the enhancement of coastal fisheries. Seagrasses produce large quantities of organic matter. Many fish species occupy SAV at some point in their life for refuge, spawning, nursery, foraging, and corridors. SAV is considered essential fish habitat for red drum, shrimp, and species in the snapper-grouper complex. Spotted seatrout are also highly dependent on SAV, and bay scallops occur almost exclusively in SAV beds."*

3.12.2 Distribution

It is well established that the shallow waters of eastern Currituck Sound are densely covered with SAV (See Chapter 7 of the water quality-focused cumulative impact analysis). The NCDCM Interactive Map Viewer (NCDCM, 2020a) shows mapped SAV areas adjacent to the vast majority of the Road Accessible and Non-Road Accessible Outer Banks PDAs (Figure 6 and Figure 7). There are no waterfront properties, and therefore no potential for the presence of SAV, immediately adjacent to the U.S. 158 Interchange PDA.

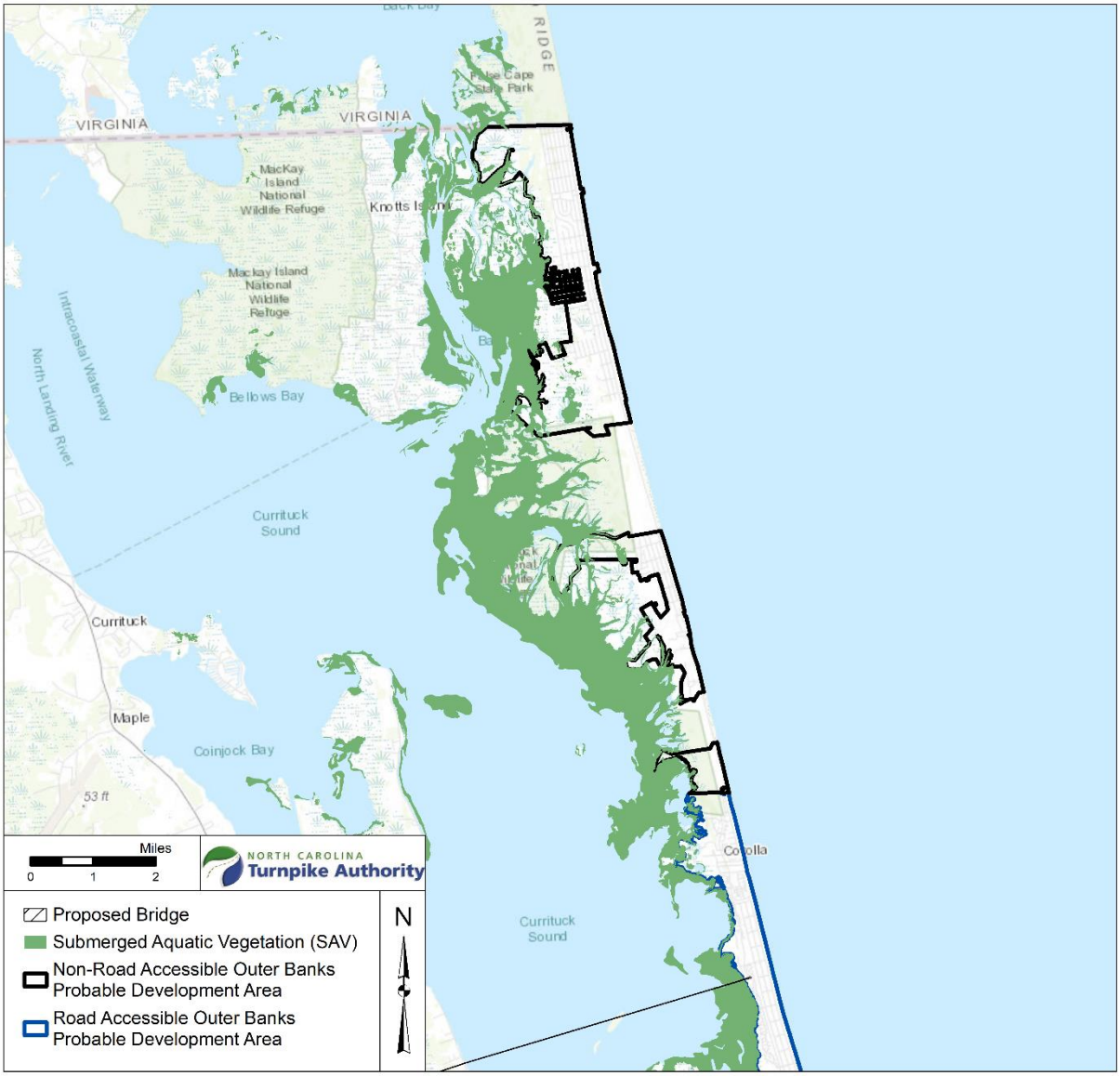

Figure 6: Submerged Aquatic Vegetation Distribution within Currituck Sound

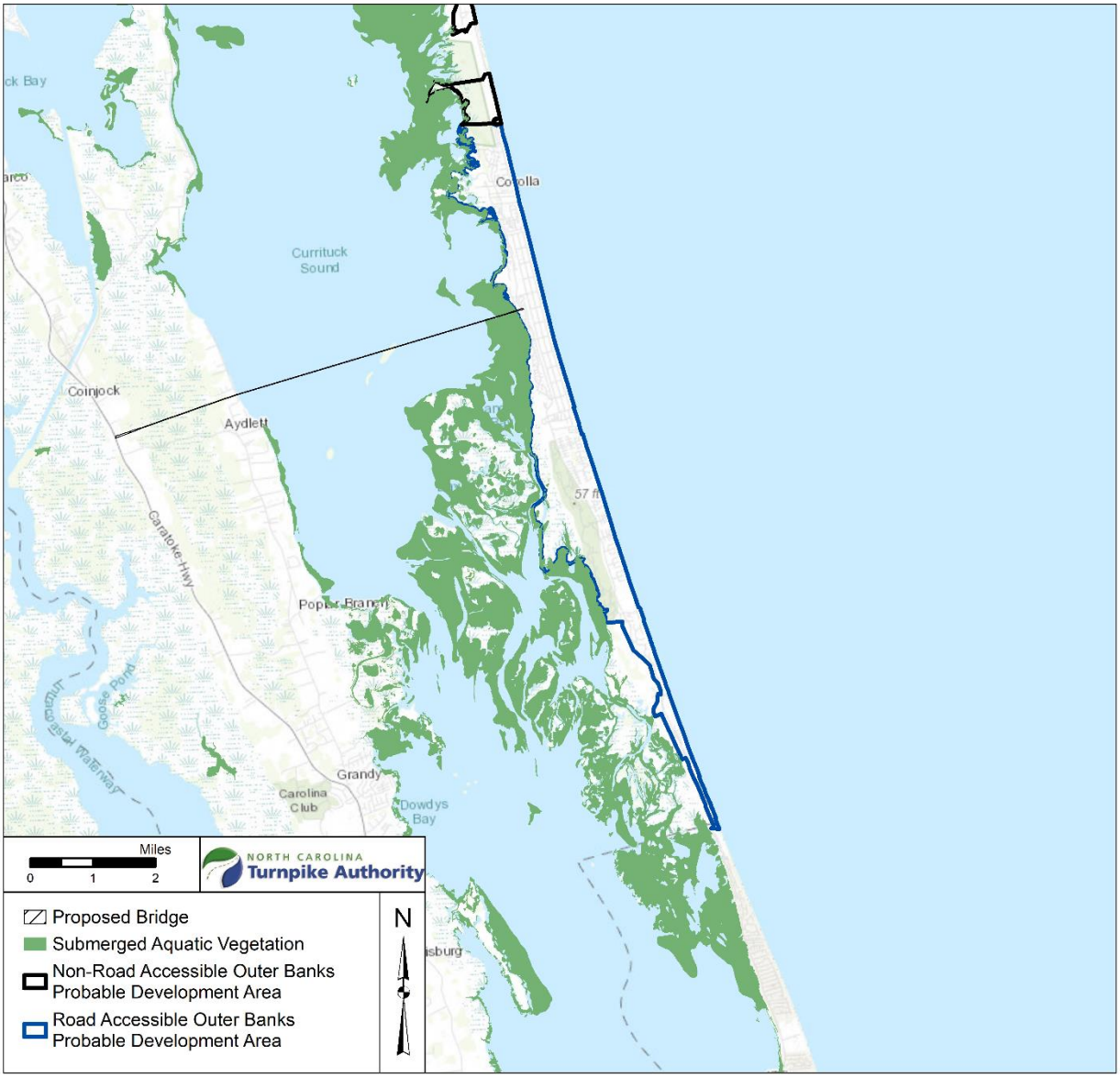

Figure 7: Submerged Aquatic Vegetation Distribution within Currituck Sound

3.12.3 Potential Threats

According to the NCCHPP (NCDEQ, 2020a), threats to SAV habitat are listed as:

> *"Major threats to SAV habitat are channel dredging and water quality degradation from excessive nutrient and sediment loading. Natural events, human activities, and an everchanging climate influence the distribution and quality of SAV habitat. Natural events include shifts in salinity due to drought and excessive rainfall, animal foraging, storm events, temperature, and disease. Submerged vegetation is vulnerable to water quality degradation, in particular, suspended sediment and pollutant runoff. Large amounts of algae and sediment make the water cloudy such that sufficient light cannot reach the plants, reducing their growth, survival, and productivity. Dredges and boat propellers can also have a direct effect on SAV habitat by uprooting and destroying the plants."*

3.12.4 Cumulative Effects Analysis

The 2019 Reevaluation of the FEIS (USDOT, FHWA, NCTA, 2019a) for the project shows a direct impact resulting from bridge construction of 3.5 acres (existing SAV beds shaded), with an additional 5.2 acres of potential SAV habitat shaded. A SAV mitigation plan, which is included in the CAMA Major Permit application package, has been prepared to offset these impacts.

With regard to cumulative effects based on planned and expected development, SAV habitat may be impacted by several development activities that fall under the regulatory authorities of the NCDCM.

With regard to cumulative effects to SAV habitat habitats and resources from planned and expected development, impacts due to degradation of water quality is a prime concern. The water quality-focused cumulative impact analysis identified potential water quality impacts from reuse/reclaimed water facilities (Chapter 9), wastewater from on-site septic tanks and drain fields (Chapter 10), groundwater lowering measures, (Chapter 11), sea level rise (Chapter 12), flooding (Chapter 13), stormwater management (Chapter 14), and spills and emergencies (Chapter 15). Section 18.5.5 of the water quality-focused cumulative impact analysis came to the following conclusions:

> *"Based on the analyses presented in Chapters 6 through 16, the planned and expected development with the construction of the Mid-Currituck Bridge Project within the next 20 years are expected to have only a minimal and localized impact on downstream water quality, mainly in man-made tributaries of Currituck Sound. Indirect and cumulative impacts on the overall water quality in the Atlantic Ocean and Currituck Sound are not expected to cause violations of state standards or a loss of existing and anticipated uses. Though some sensitive areas near water are present in localized parts of Currituck Sound such as the finger canal area, the extent of expected development which can be attributed to the Project is small and may at most cause minimal and localized impacts on water quality. Existing local and State water quality-related regulations (such as CAMA setback limits) and utilization of existing water treatment facilities will likely control certain sources of pollution*

(especially coliform bacteria). However, to address any potential concerns, NCDWR and Currituck County could review and consider implementation of practical regulatory and non-regulatory changes as outlined in Chapter 20, should these agencies determine that such action is warranted."

Piers, docking facilities, and open-water marinas may shade areas of SAV. Improper boat and marine vessel use may scar SAV beds, although such scarring may not always be permanent. Taken to an extreme, improper use of boats and marine vessels during periods of lower water may lead to "kicking" of the bottom or substrate, which represents a more permanent impact to SAV beds. When examining the potential for cumulative effects to SAV habitat from docks, piers, marinas and related boat and marine vessel use resulting from the Mid-Currituck Bridge project along the Road Accessible and Non-Road Accessible Outer Banks PDAs, an analysis of the number of existing and new docking facilities within the project area should be considered. Existing aerial photography shows approximately 300 docking facilities on the Sound side of the Road Accessible and Non-Road Accessible Outer Banks PDAs. Most of these existing docks (approximately 230) exist within one large artificial canal system at the northern end of the Non-Road Accessible Outer Banks PDA. Another major concentration (approximately 56 dock structures plus the Whalehead Club Marina) of docks exists along an approximate 3.4 mile stretch of shoreline from the Whalehead Club Marina south to the location of the Corolla Raceway (Sunset Boulevard in Corolla). Based on an examination of SAV data from the NCDCM Interactive Map Viewer (NCDCM, 2020a), with the exception of the canal system in the Non-Road Accessible Outer Banks PDA, there appears to be SAV habitat near or adjacent to the shorelines in these areas.

It is likely that any future dock construction will mirror the existing dock location trends. Supporting this anticipated trend, of the 432 undeveloped but potentially developable waterfront parcels within the Road Accessible and Non-Road Accessible Outer Banks PDAs, 390 of these parcels exist within the artificial canal system in the Non-Road Accessible Outer Banks PDA. Of the remaining 42 undeveloped but potentially developable waterfront parcels, 15 are found within the 3.4-mile area from the Whalehead Club Marina south to the Corolla Raceway. In the waterfront areas (outside of the canal system) in the Non-Road Accessible Outer Banks PDA, there are 19 undeveloped but potentially developable waterfront parcels, including several large parcels. The remaining eight undeveloped but potentially developable waterfront parcels are spread throughout the Road Accessible Outer Banks PDA.

For new docks or piers constructed over SAV habitat, there should be minimal direct impacts associated with piling placement and these impacts have typically been considered acceptable in past CAMA permit decisions. Shading impacts are another potential impact to SAV habitat associated with dock construction. However, shading impacts have also generally been considered acceptable in past CAMA permit decisions, provided that the NCCRC's rules on dock and pier width (15A NCAC 07H.0208(b)(6)(A)), and square footage limitations (15A NCAC 07H.0208(b)(6)(B) are adhered to. These same rules would apply to the proposed permitting and construction of new marinas. Additionally, 15A NCAC 07H.0208(b)(5)(P)

requires that cumulative impacts of a proposed marina be considered during the CAMA permit application review process.

Another SAV habitat protection measure is provided by 15A NCAC 07H.1205(h) of the rules of the NCCRC, which requires that before a General Permit is issued for dock and pier construction, NCDCM is required to coordinate with the NCDMF and/or the NCWRC for docks located over SAV habitat and the water depth is less than two feet normal low water or normal water level (whichever is applicable). Additionally, General Permits for docks and piers are not available if a dock is proposed with a floating component over SAV habitat unless the bottom of the proposed floating structure is at least 18 inches above the bottom substrate (15A NCAC 07H.1205(h)).

Considering these rules along with the number of existing waterfront docking facilities (approximately 70) and the relatively small number (42) of undeveloped but potentially developable waterfront parcels, cumulative effects from dock and pier construction to SAV habitat should be minimal. The proper siting and design of these structures should also aid in limiting kicking and scarring impacts resulting from marine vessel use. Additional impact minimization could be achieved through increasing educational efforts aimed at ensuring that boat users understand the importance of SAV and what measures they can take to minimize habitat impacts.

Shoreline stabilization structures such as bulkheads and riprap, which can divert wave energy back towards the shallow bottom areas immediately in front of the stabilization structure, may cause damage to immediately adjacent SAV beds. Shoreline stabilization structures are distributed in a geographic pattern similar to docks and piers. This is likely because those high ground properties adjacent to substantial areas of coastal wetlands, which are less likely to have docks, are also much less likely to have eroding shorelines. An analysis of available aerial photography appears to indicate that much of the shoreline within the canal system in the Non-Road Accessible Outer Banks PDA is currently stabilized. For parcels immediately adjacent to Currituck Sound, an area approximately 0.3 miles long adjacent to the artificial canal system, is currently mostly stabilized. There are also heavy concentrations of stabilized shorelines along the 3.4 mile stretch of shoreline south of the Whalehead Club. Approximately 20 of the 42 undeveloped but potentially developable waterfront parcels appear to exist within the two refenced areas of heavier shoreline stabilization. An additional 14 undeveloped but potentially developable waterfront parcels are within the Non-Road Accessible Outer Banks PDA, but outside the 0.3-mile area near the canal system. Many of these parcels should not need shoreline stabilization because they have sufficient amounts of coastal wetlands fronting the properties. The remaining eight undeveloped but potentially developable waterfront parcels are located throughout the Road Accessible Outer Banks PDA.

For parcel owners adjacent to an area of SAV habitat who wish to stabilize their waterfront properties, NCCRC rules provide for SAV protection by requiring that bulkheads be constructed at or above the normal high water line or the normal water line (15A NCAC 07H.0208(b)(7)(A)) unless certain circumstances exist, such as aligning with adjacent bulkheads or recovering lands lost to erosion within the preceding 12 months (15A NCAC 07H.0208(b)(7)(D)). It is also

anticipated that as alternatives to vertical stabilization structures become more common (e.g., living shorelines, sloping riprap, marsh-toe revetments, or vegetative stabilization), future impacts to SAV habit as a result of shoreline stabilization measures will likely be minimized.

As for docks and piers, NCCRC rules and the characteristics of developable waterfront parcels that could pursue shoreline stabilization suggest that cumulative effects to SAV habitat from shoreline stabilization structures should be minimal.

Dredging and/or excavation of channels, canals, and boat basins, including dredging associated with boat ramp construction, represent the potential for impact to submerged aquatic vegetation habitat. It is possible that over the next 20 years, owners of some of the 42 undeveloped parcels located on the shorelines of Currituck Sound could desire new access channels to access new docking facilities. However, NCCRC rules include protections for SAV habitat as it relates to dredging projects. Specifically, 15A NCAC 07H.0208(b)(1) requires navigational channels and boat basins be aligned so as to avoid beds of submerged aquatic vegetation. Additionally, available aerial photography shows that the majority of existing docking facilities allow access to deeper waters without the need for dredging. It must be noted, however, that the Whalehead Club Marina has unsuccessfully pursued dredging of an access channel to its upland basin for many years. It is expected that there may be additional efforts over the next 20 years to obtain authorization for dredging in this area. It is anticipated that future docking facility location trends will be similar, with most new projects located in areas where dredging should not be necessary to gain access to deeper waters. It is therefore not expected that dredging projects will represent a threat to SAV habitat over the next 20 years.

3.12.5 Summary

The 2019 Reevaluation of the FEIS (USDOT, FHWA, NCTA, 2019a) for the project shows a direct impact resulting from bridge construction of 3.5 acres (existing SAV beds shaded), with an additional 5.2 acres of potential SAV habitat shaded. A SAV mitigation plan, which is included in the CAMA Major Permit application package, has been prepared to offset these impacts.

Provided that the NCDWR determines that State water quality standards are not violated, as evidenced by issuance of a 401 Water Quality Certification, there are not expected to be cumulative effects on SAV habitat from water quality degradation over the next 20 years. With regard to docking facilities and marine vessel use, NCCRC rules and the characteristics of the undeveloped but potentially developable waterfront parcels suggest that cumulative effects from dock construction to SAV habitat should be minimal. A similar finding can be made for shoreline stabilization projects.

With regard to potential cumulative effects to SAV habitat from dredging projects, predicted future docking facility location trends will be similar, with most future proposed projects located in areas where dredging should not be necessary to gain access to deeper waters. Additionally, proposed dredging projects are subject to substantial SAV protections under NCCRC rules. Therefore, dredging projects associated with the Road Accessible and Non-Road Accessible Outer Banks PDAs will not likely represent a cumulative threat to SAV habitat over the next 20 years.

3.12.6 Rules That Protect Submerged Aquatic Vegetation

- 15A NCAC 07H.0208(a)(2)(A), which requires that before issuing a CAMA permit, a decision must first be made that the proposed development is sited and designed in a way that avoids significant adverse impacts on the productivity and biological integrity of submerged aquatic vegetation.
- 15A NCAC 07H.0208(b)(1), which requires that navigation channels, canals and boat basins be aligned so as to avoid most areas of submerged aquatic vegetation.
- 15A NCAC 07H.0208(b)(1)(I), which requires that maintenance excavation of navigation channels, canals and boat basins be aligned so as to avoid most areas of submerged aquatic vegetation.
- 15A NCAC 07H.0208(b)(3)(D), which requires that drainage ditches be aligned so as to avoid having a significant adverse impact of submerged aquatic vegetation.
- 15A NCAC 07H.0208(b)(5)(A), which requires that marinas be sited in a way that does not disturb submerged aquatic vegetation.
- 15A NCAC 07H.0208(b)(11)(C), which requires that the filling of canals, basins, and ditches not have a significant adverse impact on submerged aquatic vegetation.
- 15A NCAC 07H.12025(h), which requires that, for pier and dock projects seeking authorization under a General Permit, coordination be first initiated with the NCDMF or the NCWRC if the proposed structure will be located over areas of submerged aquatic vegetation, and the water depths are less than two feet.
- 15A NCAC 07H.1205(i), which requires that for pier and dock projects seeking authorization under a General Permit, any proposed floating structure(s) located over submerged aquatic vegetation must have a minimum elevation over the bottom substrate of at least 18 inches.
- 15A NCAC 07H.1505(7), which requires that for excavation projects seeking authorization under a General Permit, the proposed project shall not involve the excavation of any area of submerged aquatic vegetation.
- 15A NCAC 07H.1905(3), which requires that for temporary structures authorized under a General Permit, no area of submerged aquatic vegetation may be disturbed.

3.12.7 Additional Resource Protection Suggestions

- Ensure that existing NCCRC rules prohibiting dredging of SAV habitat remain in effect.
- Ensure that existing NCCRC rules limiting issuance of General Permits for docks located in shallow SAV habitat remain in effect.
- Encourage Currituck County, NCDMF, NCWRC, the NWR and the NERR to develop and distribute educational materials aimed at educating boat users on the importance of SAV and what measures they can take to minimize habitat impacts.
- Encourage the NCDWR and Currituck County to begin consideration of measures suggested in Chapter 20 of the water quality-focused cumulative impact analysis.

3.13 Transportation Systems

3.13.1 Importance

CAMA mandates the consideration of transportation and circulation patterns for the coastal area, including major thoroughfares and transportation routes, when establishing policies, guidelines and standards (§ 113A-102(b)(4)(a)). The transportation system in coastal North Carolina is an important component of public access to all coastal resources, including historic, cultural, and public trust resources.

3.13.2 Distribution

Components of the state's transportation system are located throughout all three PDAs.

3.13.3 Cumulative Effects Analysis

The Mid-Currituck Bridge Study Administrative Action Record of Decision (USDOT, FHWA, and NCTA, 2019b) states the following:

> *"The Selected Alternative will: substantially improve traffic flow on the project area's thoroughfares (US 158 and NC 12); substantially reduce travel time for persons traveling between the Currituck County mainland and the Currituck County Outer Banks; and reduce substantially evacuation times from the Outer Banks for residents and visitors who use US 158 and NC 168 as an evacuation route."*

Given that this finding is made by the NCTA, which is a component of the NCDOT, it is expected that the selected Mid-Currituck Bridge alternative will have positive impacts on the transportation system within the three PDAs. Additional cumulative effects analysis on this coastal resource is therefore not deemed necessary.

3.14 Urban Waterfronts

3.14.1 Importance

Urban waterfronts are defined by the rules of the NCCRC (15A NCAC 07H.0209(g)) as waterfront areas, not adjacent to an ORW, that lie within the corporate limits of any municipality duly chartered within the 20 coastal counties of the state. In determining whether an area is an urban waterfront, the NCCRC rules mandate that the following criteria must be met:

- The area lies wholly within the corporate limits of a municipality, and
- The area has a central business district or similar commercial zoning classification where there are mixed land uses, and urban level services, such as water, sewer, streets, solid waste management, roads, police and fire protection, or in an area with an industrial or similar zoning classification adjacent to a central business district.

Urban waterfronts are considered important because of their cultural, historical, and economic significance for many coastal municipalities. Maritime traditions and longstanding development patterns make these areas suitable for maintaining or promoting dense development along the shore. Proper planning and stormwater management are necessary to ensure that these areas continue to preserve local historical and aesthetic values while enhancing the economy.

3.14.2 Distribution

Based on coordination with the NCDCM, it has been confirmed that Currituck County has no municipalities. Therefore, because an area must be in a municipality to be an urban waterfront, there can be no designated urban waterfronts within any of the three PDAs. The lack of existing municipalities also makes it unlikely that any urban waterfronts will be designated in the future.

3.14.3 Cumulative Effects Analysis

A cumulative effect analysis is not needed due to lack of this resource within or adjacent to the three PDAs.

3.15 Water Quality

3.15.1 Importance

Maintenance and protection of water quality are critical components for ensuring the health of many other coastal resources. Water quality is generally tied to the presence of healthy wetland ecosystems that act as filters and buffers contributing to good water quality. CAMA addresses the importance of wetlands as water resources and of associated water quality in its legislative findings and goals (§ 113A-102(a)), which include the following statement:

> *"In the implementation of the coastal area management plan, the public's opportunity to enjoy the physical, esthetic, cultural, and recreational qualities of the natural shorelines of the State shall be preserved to the greatest extent feasible; water resources shall be managed in order to preserve and enhance water quality and to provide optimum utilization of water resources;"*

NCCRC rules address the importance of water quality in various places. For example, 15A NCAC 07H.0208(a)(2)(B) requires that no CAMA permit may be issued for any project that violates state or federal water quality standards. Other examples where NCCRC rules address the protection of water quality appear in the specific use standards for excavation of navigation channels, canals and basins (15A NCAC 07H.0208(b)(1)(A)), marina development (15A NCAC 07H.0208(b)(5)(E)), mooring facilities ((15A NCAC 07H.0208(b)(10)(D)), and coastal shoreline development (15A NCAC 07H.0209(d)(4)).

The NCCHHP (NCDEQ, 2016) lists reducing water quality impacts from point and nonpoint sources as one of its overarching implementation goals. Enhancing and protecting water quality is also listed as one of the Goals and Recommendations of the NCCHPP.

3.15.2 Distribution

Water quality is defined by the water quality standards approved by the NCEMC and administered by the NCDWR. Those narrative and numeric water quality standards are applicable to estuarine and freshwater wetlands and waters within and adjacent to the three PDAs. The waters of Currituck Sound are classified by the NCEMC as "Class SC" waters and are not open to the taking of shellfish.

3.15.3 Potential Threats

The 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) states that

> *"...water quality of the Albemarle-Pamlico estuarine system is undergoing substantial degradation because of the area's increasing population, changes in agricultural practices, and urbanization and industrialization of the region" and "Historic and present stressors to Currituck Sound include natural and anthropogenic fluctuations in nutrient loading, turbidity, and salinity."*

In addition, the water quality-focused cumulative impact analysis addresses water quality in and adjacent to the PDAs in more detail.

3.15.4 Cumulative Effects Analysis

This study on cumulative effects of the Mid-Currituck Bridge on coastal resources defers to the water quality-focused cumulative impact analysis, which contains a detailed analysis on the cumulative effects of the Mid-Currituck Bridge on water quality within the three PDAs.

3.16 Wetlands (Non-Coastal)

3.16.1 Importance

NCCRC rules address the importance of non-coastal wetlands in numerous places. 15A NCAC 07H.0202 (Significance of Systems Approach in Estuaries) states:

> *"For example, destruction of wetlands may have harmful effects on estuarine waters which are also areas within the public trust. As a unified system, changes in one AEC category may affect the function and use within another category."*

15A NCAC 07H.0209(b) goes on to state:

> *"The coastal shorelines and wetlands contained within them serve as barriers against flood damage and control erosion between the estuary and the uplands. Coastal shorelines are the intersection of the upland and aquatic elements of the estuarine and ocean system, often integrating influences from both the land and the sea in wetland areas. Some of these wetlands are among the most productive natural environments of North Carolina and they support the functions of and habitat for many valuable commercial and sport fisheries of the coastal area. Many land-based activities influence the quality and productivity of estuarine waters. Some important features of the coastal shoreline include wetlands, flood plains, bluff shorelines, mud and sand flats, forested shorelines and other important habitat areas for fish and wildlife."*

Further, NCCRC rules prohibit the placement of dredge spoils within wetlands (15A NCAC 07H.0208(b)(1)(C)), prohibit the placement of marinas in wetland areas (15A NCAC 07H.0208(b)(5)(A)), and require that urban waterfront development not have significant adverse impacts on adjacent wetlands (15A NCAC 07H.0209(g)(4)(B)(iii)(IX)).

3.16.2 Distribution

Section 7.9 of the water quality-focused cumulative impact analysis provides an in-depth analysis of the measures taken to assess the location of freshwater wetlands within the three PDAs and how they might affect the developable parcels in the PDAs. This effort utilized the North Carolina Coastal Region Evaluation of Wetland Significance data and field accuracy assessments to analyze freshwater wetland locations.

3.16.3 Threats

According to NCCHPP (NCDEQ, 2016), threats to wetlands within North Carolina's coastal zone are stated as follows:

> *"In the late 1800s and early 1900s, large amounts of wetland loss resulted from ditching and draining for agriculture and forestry. Over the years, wetland loss has occurred from dredging conversion to deepwater habitat for boat basins and navigation channels, followed by upland development, erosion, and shoreline hardening."*

3.16.4 Cumulative Effects Analysis

According to the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a), direct impacts from the project to wetlands include 4.2 acres of non-coastal wetland fill, with another 32.9 acres of non-coastal wetlands impacted by clearing activities.

With regard to indirect impacts, GIS analysis and accompanying field work suggested that 618 of the 2,283 parcels within the three PDAs that have potential for planned and expected development contain non-coastal wetlands. Therefore, potential impacts to non-coastal wetlands due to filling and other development activities exist on a parcel-by-parcel basis. However, projects that would require filling non-coastal wetlands would be subject to regulatory oversight of the NCDWR for Section 401 Water Quality Certifications, the USACE for Section 404 permits, and to a lesser degree NCDCM for any projects falling within an AEC. Providing that these regulatory programs and their associated wetlands regulations remain in place over the next 20 years, this regulatory involvement is expected to minimize cumulative effects to wetlands associated with individual parcel development. Additionally, wetland mitigation is often required for projects involving greater wetland fill acreages, helping to offset wetland impacts associated with development activities. Conservation measures such as wetland restoration projects on conservation lands and constructing living shorelines further help to offset potential wetland impacts (NCDEQ, 2016).

It should also be noted that the Currituck National NWR and the Corolla Banks NERR both appear to contain areas of non-coastal wetlands. Given the operational mandates of both sites, it would be expected that wetlands occurring within the boundaries of the sites would be protected between now and 2040.

Shoreline erosion and shoreline hardening also represent potential threats to non-coastal wetlands. However, shorelines adjacent to the Road Accessible and Non-Road Accessible Outer Banks PDAs are largely bordered by coastal wetlands, as opposed to non-coastal wetlands. Of the estimated 42 undeveloped but potentially developable waterfront parcels, it appears that most of the parcels are either not bordered by waters of the U.S., including wetlands, or are bordered by coastal (as opposed to non-coastal) wetlands. Therefore, shoreline hardening is not anticipated to represent a major source of potential impact for non-coastal wetlands. Additionally, shoreline erosion along the Road Accessible and Non-Road Accessible Outer Banks PDAs should also mainly impact coastal wetlands, as opposed to non-coastal wetlands. It is therefore expected that cumulative effects on non-coastal wetlands due to shoreline erosion and hardening within the three PDAs will be minimal.

Along the shorelines of the Road Accessible and Non-Road Accessible Outer Banks PDAs, it is expected that there will be minimal requests for permits to dredge through non-coastal wetlands to construct boat basins and navigation channels over the next 20 years. The combination of shallow water depths adjacent to the shoreline and the presence of areas of coastal wetlands and SAV habitat adjacent to the shoreline make it unlikely that there will be many requests for this type of dredging project. If a navigation or access channel is requested, it would be much more likely that coastal wetlands, as opposed to non-coastal wetlands, would be affected. Regulatory

oversight by USACE, NCDWR, and possibly NCDCM would also be required for any such project.

3.16.5 Summary

Provided that the wetland protection measures afforded by USACE, NCDWR, and NCDCM remain in effect, the anticipated future development that may occur with the construction of the Mid-Currituck Bridge is not anticipated to result in major impacts to non-coastal wetlands.

3.16.6 Rules That Protect Non-Coastal Wetlands

- 15A NCAC 07H.0208(a)(2)(B), which requires that no CAMA permit be issued for a project that violates State water quality rules, statutes, or regulations.
- 15A NCAC 07H.0208(b)(1)(C), which requires that dredge material from dredging projects be placed in non-wetland areas or disposed of by a method having no significant long-term impact to wetlands. This rule goes on to state that under no circumstances shall dredge material be placed on regularly flooded wetlands.
- 15A NCAC 07H.0208(b)(5)(A), which requires that marinas be sited in non-wetland areas, except for dredging necessary to gain access to high ground sites.
- 15A NCAC 07H.0601, which requires that no development be authorized for any project that violates any rule, regulation, or law of the State of North Carolina, which includes wetland protection rules established by the NCEMC.
- 15A NCAC 07H.1105, which requires that General Permits for bulkheads and riprap revetments be not be issued unless the bulkhead or revetment is landward of any wetland.
- 15A NCAC 07H.1505(5), which requires that General Permits for maintenance dredging activities not be issued if spoil material from the dredging will be placed on any wetland.
- 15A NCAC 07H.1505(6), which requires that for General Permits for maintenance dredging activities, all spoil materials will be stabilized in a manner that prevents excavated material from entering adjacent wetlands.
- 15A NCAC 07H.1505(7), which requires that General Permits for maintenance dredging activities not be issued if the dredging will involve any wetland area.
- 15A NCAC 07H.1605(2), which requires that for General Permits for utility line installation activities, all spoil materials will be placed in a non-wetland area and be stabilized in a manner that prevents excavated material from entering adjacent wetlands.
- 15A NCAC 07H.1605(4), which requires that for General Permits for utility line installation activities any cuts through wetlands must be minimized.
- 15A NCAC 07H.1605(5), which requires that General Permits for utility line installation activities, finished grades of wetland crossings must be returned pre-project contours.
- 15A NCAC 07H.1905(3), which requires that General Permits for temporary structures not be issued if the project involves disturbance, including excavation or filling, or any wetlands.

3.16.7 Additional Resource Protection Suggestions

- Continue to work with appropriate regulatory agencies to ensure the continued existence of adequate wetland protection standards.
- Continue to urge wetland restoration projects in the area, both coastal and non-coastal, similar to the effort currently underway by Audubon North Carolina to implement a comprehensive marsh restoration and planning effort in Currituck Sound.

3.17 Wildlife and Wildlife Habitat

It should be noted that for the purposes of this study, the term "wildlife and wildlife habitat" does not include fisheries resources and shellfish resources, since these resources are addressed elsewhere in this report.

3.17.1 Importance

Wildlife have an important role in helping to maintain proper ecological balances within different ecological settings. Wildlife may also provide important economic benefits to an area or region. The importance of wildlife within the three PDAs is illustrated by the presence of the Audubon Society's Donal C. O'Brien Sanctuary and Audubon Center at Pine Island, the Currituck NWR, the North Carolina Center for Wildlife Education, and the Corolla Banks NERR facility.

CAMA acknowledged the importance of wildlife in the coastal zone in § 113A-102(b)(4)(a), which states that one of the goals of the Act is to establish policies, guidelines, and standards for the protection, preservation, and conservation of wildlife.

Additionally, NCCRC rule 15A NCAC 07H.0209(b) identifies wildlife habitat as one of the important functions of the Coastal Shoreline AEC.

3.17.2 Distribution

Using information available from the USFWS (USFWS, 2014b), and NCDCM (NCDCM, 2020c), several different wildlife habitat types can be identified within the PDAs:

- Beaches – These areas can be important nesting areas for colonial nesting birds and sea turtles.
- Dune Grasses – These areas provide floral diversity within the area and may provide cover for many wildlife species as well as dune stability.
- Maritime Grasslands – These areas provide vegetative cover for many wildlife species.
- Maritime Shrub – These areas are preferred by numerous wildlife species.
- Brackish Marsh – Important nesting and migrating grounds for many animal species. Also provides refuge for juvenile fish.
- Maritime Forest – Utilized by numerous wildlife species.
- Maritime Evergreen/Deciduous Forest Habitat – Utilized by numerous wildlife species.
- Freshwater Wetlands – Utilized by numerous wildlife species.
- Managed Wetlands – Maintained in a manner that provides high food values, primarily to waterfowl.
- Tidal Flats – These flats are home to many worms, snails, clams, and crabs.

Different habitats support different suites of wildlife species. For example, some species, such as white-tailed deer, range over many habitats. Other species, such as marsh birds, are very particular about residing exclusively in brackish marshes (USFWS, 2014b, NCDCM, 2020c). Most waterfowl species reside in the marshes and moist soil vegetation units during migration.

Colonial nesting birds nest on exposed soil close to the water. Shorebirds reside on beaches and drained moist soil units. Songbirds and rabbits occupy maritime scrub shrub communities. Ospreys and bald eagles nest in the tops of trees that have been killed by lightning and are located near open water so they can catch fish close to their nests (USFWS, 2014a). Sea turtles rely on ocean beaches for nesting and hatching activities. Beach infauna, such as coquina clams (*Donax* sp.) amphipods and mole crabs (*Emerita talpoida*) provide an important link in the marine food web (ASBPA, 2016)

One important and highly visible wildlife component of the Non-Road Accessible Outer Banks PDA is the Corolla wild horse population. This population of horses exist within a 7,544 acre "sanctuary", which is comprised of a mix of approximately one third public lands and two thirds private lands. The horse population is kept in place by a fence at the Virginia state line, and a sea-to-Sound fence approximately 11 miles to the south (Corolla Wild Horse Fund, 2020).

The majority of the U.S. 158 Interchange PDA exists as open agricultural space as well as forested, freshwater non-coastal wetlands. These types of areas provide food and shelter for migratory and resident wildlife.

In the more heavily developed areas within the three PDAs, many of these wildlife habitats have already been heavily impacted or eliminated.

According to information available from the USFWS, the following Table (Table 2) lists the Threatened and Endangered Species that are known to exist within Currituck County (USFWS, 2020):

Table 2: Threatened and Endangered Species Listing for Currituck County

Common Name	Scientific name	Federal Status	Record Status
Vertebrate			
American alligator	*Alligator mississippiensis*	Threatened due to similarity of appearance	Current
Black rail	*Laterallus jamaicensis*	Threatened	Current
Green sea turtle	*Chelonia mydas*	Threatened	Current
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Historical
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered	Current
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Current
Loggerhead sea turtle	*Caretta caretta*	Threatened	Current
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Current
Piping plover	*Charadrius melodus*	Threatened	Current
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Current
Red knot	*Calidris canutus rufa*	Threatened	Current
West Indian manatee	*Trichechus manatus*	Endangered	Current
Vascular Plant			
Seabeach amaranth	*Amaranthus pumilus*	Threatened	Current

Many of these species, such as the sea turtles, red knot, piping plover, and seabeach amaranth exist within or in close proximity to oceanfront beaches and dune systems. Most of the other species range throughout Currituck County and may be expected to potentially occur within or immediately adjacent to the three PDAs.

3.17.3 Threats

Threats to wildlife and wildlife habitat include habitat loss, conversion, or fragmentation due to development and habitat conversion due to climate change, invasive species, poor water quality, beach bulldozing, and beach driving.

3.17.4 Cumulative Effects Analysis

With regard to direct impacts, Table 1 of the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a) indicates that impacts to wildlife from the construction of the Mid-Currituck Bridge will involve the removal and alteration of wildlife habitat (both by habitat use and bridging) and habitat edge effects. Direct impacts to terrestrial wildlife and wildlife habitat are discussed in more detail in Section 3.3.3.2 of the 2012 FEIS (USDOT, FHWA, and NCTA, 2012), while impacts to protected species are discussed in Section 6.2.2.14 and Section 6.3.2.14 of the Mid-Currituck Bridge Study - Indirect and Cumulative Effects Technical Report (East Carolina University and Parsons Brinckerhoff Inc., 2011).

With regard to cumulative effects to wildlife, it must be noted that in more heavily developed areas within the PDAs, many of these wildlife habitats have already been impacted, fragmented, or eliminated due to construction and land clearing. Many of the remaining vacant parcels in the Road Accessible Outer Banks PDA occur as individual lots within established neighborhoods. While much of the Non-Road Accessible PDA is projected to remain undeveloped in 2040, it can still be anticipated that with planned and expected development over the next 20 years, additional habitat loss and/or fragmentation will occur. However, the Donal C. O'Brien Sanctuary and Audubon Center at Pine Island, the North Carolina Center for Wildlife Education, the Currituck Banks NERR and the Currituck NWR all maintain relatively undisturbed habitats for many of the important wildlife species along the Currituck Banks area. These undisturbed areas can serve as "habitat islands" to allow for wildlife species to exist and flourish in natural habitats. Additionally, riparian buffers, such as the NCCRC's coastal shoreline buffer found at 15A NCAC 07H.0209(d)(10), can provide for relatively undisturbed or undeveloped areas adjacent to open water areas that can serve as wildlife corridors for wildlife travels from one area to another. Similar protections are provided by NCCRC coastal wetland rules (Section 3.2.6). Additionally, NCCRC oceanfront setback rule 15A NCAC 07H.0306 provides for the maintenance of a relatively undeveloped area between the dry sand beach and the developed uplands that also can serve as wildlife corridors. Development of the dunes and dry-sand beach areas are generally prohibited by the same NCCRC rules.

Development projects that would involve the filling of non-coastal wetlands would be subject to regulatory oversight of NCDWR (Section 401 Water Quality Certifications), the USACE (Section 404 permits), and to a lesser degree NCDCM (CAMA permits) for any projects falling within an AEC. As long as these regulatory programs and their associated wetland protections

remain in place over the next 20 years, these programs will help to minimize wildlife habitat impacts within wetland areas.

With regard to cumulative effects to wildlife and wildlife habitat, impacts due to degradation of water quality are a concern. The separate water quality-focused cumulative impact analysis identified potential water quality impacts from reuse/reclaimed water facilities (Chapter 9), wastewater from on-site septic tanks and drain fields (Chapter 10), groundwater lowering measures, (Chapter 11), sea level rise (Chapter 12), flooding (Chapter 13), stormwater management (Chapter 14), and spills and emergencies (Chapter 15). Section 18.5.5 of the water quality-focused cumulative impact analysis came to the following conclusions:

> *"Based on the analyses presented in Chapters 6 through 16, the planned and expected development with the construction of the Mid-Currituck Bridge Project within the next 20 years are expected to have only a minimal and localized impact on downstream water quality, mainly in man-made tributaries of Currituck Sound. Indirect and cumulative impacts on the overall water quality in the Atlantic Ocean and Currituck Sound are not expected to cause violations of state standards or a loss of existing and anticipated uses. Though some sensitive areas near water are present in localized parts of Currituck Sound such as the finger canal area, the extent of expected development which can be attributed to the Project is small and may at most cause minimal and localized impacts on water quality. Existing local and State water quality-related regulations (such as CAMA setback limits) and utilization of existing water treatment facilities will likely control certain sources of pollution (especially coliform bacteria). However, to address any potential concerns, NCDWR and Currituck County could review and consider implementation of practical regulatory and non-regulatory changes as outlined in Chapter 20, should these agencies determine that such action is warranted."*

It is expected that increased beach traffic in the Non-Road Accessible Outer Banks PDA resulting from planned and expected development will take place over the next 20 years. The main impacts associated with beach driving would include impacts to nesting sea turtles, sea turtle nests, and the Corolla wild horse herd (East Carolina University and Parsons Brinckerhoff Inc., 2011). With regard to sea turtles and sea turtle nests, according to the Network for Endangered Sea Turtles (N.E.S.T.), 14 sea turtle nests have been located and monitored on the beaches of Currituck County during the 2020 nesting season (Network for Endangered Sea Turtles, 2020). As the volume of beach driving increases between the present and 2040, the work of N.E.S.T. and other similar volunteer programs will become even more critical for the continued protection of nesting sea turtles and sea turtle nests. The provisions of the Endangered Species Act also provide substantial protections for sea turtles.

Beach driving also represents potential threats to the Corolla wild horse herd (East Carolina University and Parsons Brinckerhoff Inc., 2011). As the volume of beach driving increases between the present and 2040, the work of the Corolla Wild Horse Fund (CWHF) and other similar volunteer programs will need to be maintained to continue protection of the herd. Additionally, there are also several local (Currituck County, 2009), state (NC General Assembly,

2010) and federal (Corolla Wild Horse Fund, 2018) legal protections currently in place for the herd.

With regard to the U.S. 158 Interchange PDA, most of this PDA is already developed or is currently in agricultural production, which have already greatly impacted the wildlife value of this area. Therefore, the anticipated commercial development of this PDA should have limited impacts to wildlife. Additionally, the existence of large areas of undisturbed habitat to the east and west of this PDA should further mitigate the anticipated minimal impacts to wildlife.

3.17.5 Summary

It can be expected that over the next 20 years, planned and expected development resulting from the construction of the Mid-Currituck Bridge will result in additional habitat fragmentation within the three PDAs, but primarily in the Non-Road Accessible Outer Banks PDA, as the Road Accessible Outer Banks and U.S. 158 Interchange PDAs are already heavily fragmented. Additionally, the Donal C. O'Brien Sanctuary and Audubon Center at Pine Island, the North Carolina Center for Wildlife Education, the Currituck Banks NERR and the Currituck NWR all provide for relatively undisturbed "habitat islands" to allow for wildlife species to exist and flourish in natural habitats. The NCCRC's riparian buffer and coastal wetland rules can also provide for relatively undisturbed or undeveloped areas adjacent to open water areas that can serve as wildlife corridors.

With regard to the beaches existing along the Road Accessible and Non-Road Accessible Outer Banks PDAs, NCCRC rules that prohibit most development activities on the beaches should provide for adequate wildlife protections in these areas. Additionally, the continued work of N.E.S.T. and CWHF will be critical for maintaining nesting sea turtles and the Corolla wild horse herd, respectively.

3.17.6 Rules That Protect Wildlife and Wildlife Habitat

- 15A NCAC 07H.0205(a)(e)(2), which requires that alteration of coastal wetlands through mowing or cutting not be allowed if the project is determined to have a significant adverse impact on habitat resources, especially.
- 15A NCAC 07H.0308(a)(1)(D), which requires that for oceanfront erosion control activities, shoreline erosion response projects shall not be constructed in areas that sustain substantial habitat for fish and wildlife species, as identified by natural resource agencies during project review, unless mitigation measures are incorporated into project design.
- 15A NCAC 07H.0312(4)(b), which allows for timing restrictions to be placed on beach nourishment projects to protect wildlife resources.
- 15A NCAC 07H.1805(f), which requires that, in order to ensure that work can be accomplished without significant adverse impact to sea turtle nests or suitable nesting habitat, no beach bulldozing projects authorized under a General Permit shall occur within the period of April 1 through November 15 of any year without the prior approval of NCDCM, in coordination with the NCWRC, the USFWS, and the USACE.

3.17.7 Additional Resource Protection Suggestions

- The NWR, NERR, Audubon sanctuary and the Center for Wildlife Education should all be encouraged to continue exploring means to enhance or expand their various conservation efforts in Currituck County.
- The NWR and the NERR should both be encouraged to work with the CWHF to maintain and expand protection and conservation efforts for the Corolla wild horse herd.
- It is strongly suggested that existing NCCRC rules relating to riparian buffers, coastal wetlands and oceanfront setbacks be maintained and not weakened.

4 Summary

4.1 Purpose

This study presents a qualitative analysis of potential cumulative effects to coastal resources related to the construction of the Mid-Currituck Bridge in Currituck County. The study, which utilized GIS information and other readily available public information, was done primarily in the context of CAMA (§ 113A) and NCCRC rules, primarily 15A NCAC 07H.

4.2 Study Methodology

This study utilized readily available public data and information to provide a qualitative, as opposed to quantitative, cumulative effects study. This report relied heavily on existing GIS analysis data, current aerial photography, and easily accessible documentation and data sources. Field verifications were not conducted as a part of this study.

Based on guidance available from NCDWR (NCDWQ, 2004), this study utilized a 20-year time frame (i.e., beginning in 2020 and extending through 2040). This time period also corresponds to the design year for the project (USDOT, FHWA, and NCTA, 2012).

Three distinct areas were chosen for detailed study. These areas, or PDAs, were chosen based upon an examination of the cumulative impact results from the 2019 Reevaluation of the FEIS (USDOT, FHWA, and NCTA, 2019a). The three PDAs were also chosen to be consistent with the study areas in the water quality-focused cumulative impact analysis. The three PDAs are listed as follows:

- Road Accessible Outer Banks PDA,
- Non-Road Accessible Outer Banks PDA, and
- U.S. 158 Interchange PDA.

Based upon an examination of CAMA, the State Dredge and Fill Law (§ 113-229), and the rules of the NCCRC, the following coastal resources were identified for inclusion in this study:

- air quality,
- coastal wetlands,
- cultural and historic resources,
- fisheries and shellfish resources,
- mitigation sites,
- outstanding resource waters,
- parklands,
- primary nursery areas,
- public water supplies,
- recreational access and use of public trust waters,
- recreational and use of oceanfront beaches,

- submerged aquatic vegetation,
- transportation systems,
- urban waterfronts,
- water quality,
- wetlands (non-coastal), and
- wildlife and wildlife habitat.

A GIS spatial analysis was utilized to determine the development potential of the three PDAs for the 20-year time frame of this analysis. Details of this analysis are explained in detail in Chapter 8 of the separate water quality-focused cumulative impact analysis.

Using the time frame and PDAs identified above, as well as information from the GIS spatial analysis and other readily available information, a cumulative effects analysis was conducted for each coastal resource included in this study. This study also documents NCCRC rules that provide a level of protection from future cumulative effects, and also offers additional suggestions or ideas on ways to further reduce or mitigate potential cumulative effects.

4.3 Cumulative Effects Analysis

Several coastal resources (ORWs, PNAs, mitigation sites, public water supplies, and urban waterfronts) were dismissed from further analysis because they are not present within or adjacent to the three PDAs. Given that the construction of the Mid-Currituck Bridge will have positive impacts on the transportation system within the three PDAs, an additional cumulative effects analysis on this coastal resource was not deemed necessary. Similarly, the expected enhanced and improved traffic flows within the three PDAs resulting from the construction of the Mid-Currituck Bridge suggests that there will not be adverse impacts to air quality. With regard to water quality resources, this study defers to the separate water quality-focused cumulative impact analysis, which contains a detailed analysis of the cumulative effects of the Mid-Currituck Bridge on water quality within the three PDAs.

With regard to coastal resources examined in greater detail, the cumulative effects analysis for each coastal resource, as well as a listing of NCCRC rules and additional resource protection suggestions that provide protection for the resource, are found in Section 3 of this study.

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