RED-COCKADED WOODPECKER AND BALD EAGLE BIOLOGICAL ASSESSMENT FOR THE U.S. HIGHWAY 64 ALLIGATOR RIVER BRIDGE REPLACEMENT, TYRRELL AND DARE COUNTIES, NORTH CAROLINA

TIP #HB-0001, WBS #49475.1.1

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1. INTRODUCTION

The North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration propose to replace the U.S. Highway (Hwy.) 64 bridge over the Alligator River (Tyrrell County Bridge Number 7 or the Lindsay C. Warren bridge), Tyrrell and Dare Counties, North Carolina (NC) (Transportation Improvement Program (TIP) HB-0001) (Figure 1).

One active and 2 abandoned red-cockaded woodpecker (*Dryobates borealis*) (RCW) clusters are known to occur within a 0.5 mile (mi.) radius of the proposed project, and bald eagle (*Haliaeetus leucocephalus*) nests have been documented in the area (Figure 2). In March and April 2021, aerial surveys were conducted for RCW cavity trees and bald eagle nests; these surveys were followed up with RCW cavity tree surveys via an unmanned aerial system (UAS) and ground surveys. A foraging habitat analysis (FHA) conducted in 2013 (NCDOT 2014) was updated and other impact analyses were conducted.

This report evaluates impacts of the proposed project on the federally endangered RCW pursuant to Sections 7 and 9 of the Endangered Species Act, as amended, and the bald eagle pursuant to the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) and the Migratory Bird Treaty Act (16 U.S.C. 703-712).

2. PROJECT HISTORY

In January 1999, NCDOT initiated a feasibility study to address widening U.S. Hwy. 64 between Columbia and Mann's Harbor and replacing the Lindsay C. Warren Bridge over the Alligator River (NCDOT 2012a). At that time, the project was TIP R-2544/2545. In 2002, a

Figure 1. Location of the proposed US Highway (Hwy.) 64 Alligator River Bridge Replacement project (HB-0001) in Tyrrell and Dare Counties, North Carolina.

Figure 2. Action Area for the proposed replacement of the U.S. Highway 64 Lindsay C. Warren bridge over the Alligator River (HB-0001), Tyrrell and Dare Counties, North Carolina. The Action Area includes the red-cockaded woodpecker (*Dryobates borealis*) (RCW) "neighborhood," defined as the population's average dispersal distance (2.55 miles). Study areas used for surveys ("preliminary") and impact analyses ("project impact area") are also shown. RCW partitions with red labels were active when last updated and those with yellow labels were inactive or abandoned.

Draft Feasibility Study was prepared and public meetings were held. In August 2002, further work was postponed.

In 2007, NCDOT reinitiated the project and project alternatives were evaluated in 2008. A Draft Environmental Impact Statement was signed by the United States Army Corps of Engineers (USACE) on 11 January 2012 (NCDOT 2012a).

In 2008, the Reeves-Jackson Tract, owned by The Conservation Fund (TCF), was surveyed by Dr. J.H. Carter III & Associates, Inc. (JCA) and the U.S. Hwy. 64 project area was surveyed by EcoScience Corporation. JCA conducted aerial and ground RCW cavity tree surveys of the R-2544/2545 project area and select areas in 2012 (NCDOT 2012b, 2013a).

During ground surveys in 2012 for R-2544/2545, RCWs were observed within the 0.5 mi. foraging partitions for Tyrrell (TYR) Clusters 52, 54 and 55, over 0.5 mi. from any known active cavity trees. Attempts were made each time to follow the birds and to find new cavity trees, however, no active cavity trees were found in these partitions. Given the difficult habitat and survey conditions and the activity history of these sites, there was a chance that active cavity trees could be present in TYR Clusters 52, 54 or 55. Even if there were no active cavity trees in these sites, clusters could be re-occupied by the time of construction. NCDOT therefore chose to have FHAs conducted for potentially active TYR Clusters 52, 54 and 55 in September 2012 (NCDOT 2013b). No active cavity trees were found in TYR Clusters 52, 54 or 55 during extensive surveying in 2012 and 2013 (NCDOT 2013c).

The highway widening for TIP R-2544/2545 would affect RCW groups at the Palmetto-Peartree Preserve (P3), a conservation bank then owned and managed by the NCDOT (see Section 8 for more information about P3). Demographic monitoring of all RCW clusters on P3 had been ongoing for many years and was budgeted to continue. During the 2013 RCW nesting season, JCA personnel added the remaining RCW clusters that would be directly and indirectly impacted by the R-2544/2545 project on private properties, including the Reeves-Jackson Tract.

In November 2013, JCA found a new active RCW cluster (TYR 63) within the 0.5 mi. radius of the U.S. Hwy. 64 project while updating the activity status of outlier cavity trees. JCA determined that TYR Clusters 52, 54 and 55 were inactive. A final RCW Biological Assessment for R-2544/R-2545 was submitted 6 June 2014, which included foraging habitat impact analyses for all active impacted RCW clusters, including the new cluster (TYR 63) (NCDOT 2014).

In a Biological Opinion dated 10 September 2014, the USFWS concurred with the findings in the NCDOT's Biological Assessment (NCDOT 2014) that 11 RCW groups would require Incidental Take for effects from project R-2544/2545 (5 direct, 6 indirect). These losses would be compensated by debiting NCDOT's mitigation credits on P3 by 21 conservation credits and 6 creation credits, so that 2 conservation and 4 creation credits would remain (USFWS 2014).

From 2013-2017, all nestlings and most adults were color-banded in clusters potentially affected by R-2544/2545, including 5 clusters on the southern portion of the P3 (TYR Clusters 09, 15, 16, 19 and 61); 4 clusters on, or partially on, the Reeves-Jackson Tract (owned by TCF) (TYR 47, 48, 53 and 63); and 2 clusters on adjacent private lands (TYR 50 and 51). One new cluster (TYR 64) was found during the 2014 nesting season after the RCW Biological Assessment had been written, and consequentially, the USFWS Biological Opinion (2014) did not address it. Another new cluster (TYR 68) was found on the Reeves-Jackson Tract in 2018. Due to the proximity of Clusters 64 and 68 to the Hwy. 64 project, the new clusters were expected to potentially be affected by the R-2544/2545 action and were therefore included in annual demographic monitoring.

The R-2544/2545 project was ultimately put on indefinite hold. P3 was transferred from the NCDOT to the NC Wildlife Resources Commission (NCWRC) in 2018 and is now considered to be the Palmetto-Peartree Tract of the larger Alligator River Game Land (ARGL) (Figure 2) (NCWRC 2020).

Because the R-2544/2545 project was no longer in NCDOT's 10-year schedule, as well as RCW leg injuries being observed in Tyrrell County and range-wide associated with changes in color band manufacturers, demographic monitoring efforts required in the Biological Opinion were reduced in 2018 and discontinued in 2019. Since 2019, efforts have been made on P3 and at the U.S. Hwy. 64 clusters to capture banded RCWs and remove color bands in order to prevent future leg injuries, but no systematic annual monitoring or cavity tree surveys have been conducted.

Foraging Guidelines. Due to the variety of habitats utilized by the RCW for nesting and foraging in northeastern (NE) NC and the lack of naturally occurring vegetative communities in the area that meet the foraging standards described in the 2003 RCW Recovery Plan (USFWS 2003), Dr. J.H. Carter III proposed new Standard for Managed Stability (SMS) guidelines strictly

for this region (Regional SMS Guidelines) (Carter 2012). The proposed regional guidelines were approved by USFWS personnel on 10 July 2013 and only the proposed guidelines were used for the final Biological Assessment (NCDOT 2014) and USFWS Biological Opinion (2014) for R-2544/2545. Minor edits were made to the proposed guidelines in 2014 (Carter 2014), which were an attachment to the R-2544/2545 Biological Assessment (NCDOT 2014).

3. PROJECT DESCRIPTION/ PROPOSED ACTION

The NCDOT proposes to construct a new 2-lane, fixed-span high rise bridge to replace the Lindsay C. Warren Bridge. The section of the Least Environmentally Damaging Practicable Alternative (LEDPA) for R-2544/2545 project containing the Alligator River Bridge has been separated out as a new project, HB-0001. The National Environmental Policy Act (NEPA)/404 Merger Team concurred with only bringing the HB-0001 alignment forward at a Concurrence Point 2 meeting on 21 April 2021. The alignment analyzed herein was considered to be similar enough to the R-2544/2545 LEDPA that additional alternatives do not need to be considered (NCDOT 2021a, b).

The proposed project begins approximately 0.65 mi. west of the Lindsay C. Warren Bridge and 0.88 mi. east of an unpaved road to Southshore Landing in Tyrrell County, and terminates approximately 480 ft. southeast of the current intersection of U.S. Hwy 64 and Old Ferry Landing Rd. (State Road (SR) 1153) in Dare County, a total distance of approximately 4.4 mi. (Figure 1). Bridge approaches will have two lanes 12 feet (ft.) wide with 8 ft. shoulders, and 5 ft. of the shoulders will be paved. Road shoulders on the approaches were reduced from the standard 10 ft. width in order to minimize the project footprint and environmental impacts. The new bridge will have two lanes 12 ft. wide and 8 ft. paved shoulders (NCDOT 2021b). The bridge will be constructed on the north side of the Lindsay C. Warren Bridge; the centerline will be approximately 1,380 ft. north of the current centerline at its farthest point (Figure 2).

A larger preliminary study area used for the rare species surveys was defined as a 250 ft. buffer on all sides of the proposed HB-0001 centerline and a 50 feet buffer around the existing bridge centerline (NCDOT 2021a) (Figure 2). The footprint used for analyses in this document was developed using slope stakes plus a 25 ft. buffer (project impact area). This area is approximately 115 ft. wide at the western terminus and 166 ft. at its widest point (Figure 2).

4. ACTION AREA

Guidance set forth by the USFWS (USFWS and NMFS 1998) states that "when determining an action area, it must include the project site and all the areas surrounding the activity up to where the effects will no longer be felt by the listed species." The Action Area for this project was defined as a 2.55 mi. buffer around the preliminary U.S. Hwy. 64 study area in order to include the entire RCW "neighborhood." See Section 6.7 for an explanation of this distance.

West of the Alligator River, with the exception of a few houses and a gas station concentrated around a marina northwest of the existing bridge, the Action Area is uninhabited by humans and is mostly forested or in timber production. The Action Area includes the entire Reeves-Jackson Tract and portions of the ARGL (including P3) (NCWRC), Texas Plantation (NCWRC) and privately-owned forested properties. Uplands east of the river have been subject to more disturbance including residences, businesses and extensive impoundments and fields maintained by the Alligator River National Wildlife Refuge (ARNWR).

Much of the habitat within the Action Area has been altered in the past by logging and/or ditching, and many of the remaining unaltered areas were in a state of transition due to combined effects of saltwater intrusion, sea level rise and/or southern pine beetle (*Dendroctonus frontalis*) and other bark beetle infestations. Natural communities seldom matched those described in the *Guide to Natural Communities of North Carolina: Fourth Approximation* (Schafale 2012, Schafale, in prep;) exactly, but were categorized as accurately as possible based on species composition, location and site history. The most well-drained forests have been subject to past disturbance and did not match a natural community type. These areas have been classified in past analyses as Wet Successional Loblolly Pine Forest (WSLPF) or Wet Successional Pine-Hardwood Forest (WSPHF). Palustrine communities included Nonriverine Swamp Forest (Mixed Subtype) (NrSF), Pond Pine Woodland (Typic Subtype), Peatland Atlantic White Cedar, Estuarine Fringe Pine Forest (Loblolly Pine Subtype), Tidal Swamp (Cypress-Gum Subtype) and Tidal Freshwater Marsh (Shrub Subtype).

Formerly pine-dominated forests in the survey area, and especially within the TYR 54, 55 and 63 foraging habitat partitions, have experienced significant mortality in the past few decades and since the TIP R-2544/2545 assessments. In general, stands formerly classified as WSLPF, WSPHF, or NrSF are in the process of transitioning to Tidal Swamp (Cypress-Gum Subtype) or

Tidal Freshwater Marsh (Shrub Subtype), with the most extreme changes apparent west of the river and north of the highway, south of the highway adjacent to the roadside ditch, and in all areas along the Alligator River. Throughout the TYR 54, 55 and 63 foraging habitat partitions, few overstory pines remain and most live, mature pines observed had water approaching or at their root collars and very low crown density and vigor. Appendix A shows comparisons of aerial photography provided by the NCDOT from 1998, 2010 and 2021. South of the highway, a large roadside ditch connected to the Alligator River has likely contributed to pine loss along the highway; roadside ditches have flooded for long periods after hurricanes, resulting in flooding and likely saltwater intrusion into previously pine-dominated habitat.

WSLPF and WSPHF occurred primarily on wet mineral and shallow organic soils. These forests are believed to have been Nonriverine Swamp Forest or Nonriverine Wet Hardwood Forests modified by prior anthropogenic disturbance, primarily ditching and farming and/or management for loblolly pine (*Pinus taeda*) production. Because of past disturbances, hydrology and understory species composition were highly variable, even within stands. Because WSLPF and WSPHF are structurally similar and can be expected to produce similar pine basal area (BA), they were not separated for the FHA. The dominant overstory species in these stands was loblolly pine, sometimes mixed with mesic hardwoods such as sweet gum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), red maple (*Acer rubrum*), water oak (*Quercus nigra*), and occasional swamp chestnut oak (*Q. michauxii*), cherrybark oak (*Q. pagoda*) or white oak (*Q. alba*). The midstory was highly variable and was usually tall and dense with saplings of the overstory species, American holly (*Ilex opaca*), sweetbay (*Magnolia virginiana*), swamp red bay (*Persea palustris*) and occasional hickory (*Carya* sp.), tulip poplar (*Liriodendron tulipifera*) and ironwood (*Carpinus caroliniana*). Understory species composition was equally variable and contained sparse to moderately dense fetterbush (*Lyonia lucida*), inkberry (*Ilex glabra*), waxmyrtle (*Morella cerifera*), blueberries (*Vaccinium* spp.), coastal fetterbush (*Eubotrys racemosa*), maleberry (*Lyonia ligustrina*) and/or switch cane (*Arundinaria tecta*). Herbaceous groundcover typically consisted of sparse Virginia chain-fern (*Anchistea virginica*), royal fern (*Osmunda spectabilis*) and vines such as poison ivy (*Toxicodendron radicans*), greenbriers (*Smilax* spp.), muscadine grape (*Muscadinia rotundifolia*) and Virginia creeper (*Parthenocissus quinquefolia*). Southern twayblade (*Neottia bifolia*), a Watch Category 1 species in NC, has been observed at several locations within the project area in this type of habitat.

Many RCW clusters and their associated foraging partitions in Tyrrell County are located in these successional habitat types.

Acreage considered to be WSLPF or WSPHF has been greatly reduced since the R-2544/2545 Biological Assessment (NCDOT 2014). Much of this habitat has been saturated or inundated for longer periods of time in recent years, causing pine mortality and a shift to palustrine vegetative communities. The highest ground observed during ground surveys in the TYR 63 partition in 2021 had saturated soils with sedges (*Carex* spp.), switch cane, and bluestems (*Andropogon* spp.).

Nonriverine Swamp Forests (Mixed Subtype) (NrSF) occurred on mucky mineral and organic soils in the project area. The overstory was typically moderately dense swamp blackgum (*Nyssa biflora*), loblolly pine, red maple and/or sweet gum, with occasional bald cypress (*Taxodium distichum*). The midstory varied from somewhat open to dense and was comprised of saplings of the overstory species, swamp redbay and sweetbay. The understory was generally dense with shrubs such as waxmyrtle, fetterbush, inkberry, blueberries, maleberry and coastal fetterbush. Standing water was often widespread. Hummocks were vegetated with Virginia chain-fern, royal fern and switch cane, and areas with water at the surface were dominated by arrow arum (*Peltandra virginica*), with frequent water-willow (*Decodon verticillatus*) and lizard's tail (*Saururus cernuus*). Frog's bit (*Limnobium spongia*) was common in flooded areas. Bald cypress, and possibly Atlantic white cedar (*Chamaecyparis thyoides*), are thought to have been a significant overstory components in the past. There was evidence of past logging in areas.

The communities sampled most closely fit the Mixed Subtype of Nonriverine Swamp Forest (Schafale 2012), although there were species composition differences. Many stands contained a mixture of typical Nonriverine Swamp Forest species (intolerant of infrequent saltwater intrusion) and species associated with estuarine communities. It is believed that many of these areas are in a state of transition to estuarine and/or tidal communities due to rising sea levels. Stands with a pine overstory and a higher proportion of salt-tolerant species than intolerant species were categorized as Estuarine Fringe Pine Forest (see below).

RCW use of swamp habitat is atypical for the species since pines rarely compose more than 20-30% of the canopy, often much less. However, many cavity trees and some entire clusters have been found in Tyrrell County in this community type. Additionally, significant

portions of the foraging partitions analyzed for R-2544/2545 and HB-0001 were comprised of this community type.

Within the project area, Pond Pine Woodland (Typic Subtype) habitat occurs on shallow Histosols or wet mineral soils south of U.S. Hwy. 64. The overstory is dominated by varying densities of pond pine (*Pinus serotina*) and loblolly bay (*Gordonia lasianthus*). The midstory can contain sweetbay, redbay or red maple, and the understory contains typical pocosin species such as fetterbush, sweet gallberry (*Ilex coriacea*), inkberry, and titi (*Cyrilla racemiflora*). The understory is often tall and very dense, especially in the absence of fire. When burned regularly the understory can become dominated by switch cane, which may be 10-15 ft. tall. In the prolonged absence of fire, pocosin shrubs and swamp hardwoods dominate the understory/midstory and may reach the subcanopy in height. This community type is subject to catastrophic fires which can temporarily suppress the understory and severely thin or eliminate the pine overstory. Peat soils can be consumed in such fires and depending on the depth of consumption, a different community type may become established (Schafale, in prep).

RCWs use Pond Pine Woodland habitat for nesting and foraging habitat, especially on Dare County Range (DCR) and ARNWR, but have only been observed foraging in this habitat within the project area. Where clusters are present in this community in other areas, habitat is utilized irrespective of understory or midstory height. Notably, RCW clusters in unnaturally open conditions where the understory has been mechanically cleared have been abandoned, never occupied or occupied for only short durations. Many cavities in trees in cleared areas have been destroyed or adversely modified by pileated woodpeckers (*Dryocopus pileatus*). RCWs were observed foraging numerous times 2012-2017 south of Hwy. 64, sometimes seemingly going to or coming from Pond Pine Woodland habitat.

Peatland Atlantic White Cedar Forest (PAWC) occurred on shallow to deep organic soils, flats or in shallow depressions fed by sheet flow and rain water. The overstory was typically dense and dominated by Atlantic White Cedar with smaller amounts of pond pine, loblolly pine, swamp blackgum and pond cypress (*Taxodium ascendens*). The midstory varied from somewhat open to dense and was comprised of loblolly bay, sweet bay, swamp red bay, fetterbush, titi, inkberry, dangleberry (*Gaylussacia frondosa*) and sweet gallberry. The herbaceous layer was generally sparse and vegetated with partridge berry (*Mitchella repens*), netted chain-fern (*Lorinseria areolata*) and sphagnum mosses (*Sphagnum* spp.). Peatland Atlantic White Cedar

Forest often occurred as patches in a mosaic with Nonriverine Swamp Forest, Bay Forest and Pond Pine Woodland, shifting overtime depending on fire history (Schafale 2012). This was the case in the project area, with small stands of Atlantic white cedar surrounded by other peatland communities.

Estuarine Fringe Pine Forest (Loblolly Pine Subtype) (EFPF) is characterized by an overstory of loblolly pine that can range from very sparse to dense, with swamp tupelo, red maple or sweetgum. The midstory typically contained overstory species, red bay, sweet bay and/or American holly. The understory varied with canopy density, extent of standing water and and proximity to brackish water, but was dominated by waxmyrtle; other species included switch cane, hairy highbush blueberry (*Vaccinium fuscatum*), inkberry, fetterbush, silverling (*Baccharis halimifolia*) and water-willow. Vine coverage could be substantial, particularly poison ivy and greenbrier (Schafale, in prep). Herbaceous species in the project area were sparse to dense and typically included sedges, arrow arum, Virginia chain-fern, and aquatics such as frog's bit and submerged sphagnum moss. Sawgrass (*Cladium jamaicense*) was present and could be dense on the edges of stands transitioning to marsh communities. The invasive common reed (*Phragmites communis*) was common in some areas. This community type is subject to a variety of environmental stresses including high winds, periodic flooding, salt spray and saltwater intrusion, together with sea level rise. Severely stressed stands are subject to stand-replacing bark beetle attacks.

Despite the often low pine BA in many of these habitats, RCW cavity trees occur in this natural community in the project area.

Tidal Cypress-Gum Swamp (Cypress-Gum Subtype) communities occur along the margins of freshwater sounds and the mouths of blackwater or brownwater rivers and creeks. These areas are subject to regular or irregular tidal freshwater flooding, which can be from lunar or wind tides (Schafale, in prep). Within the action area, stands with a canopy dominated by bald cypress and swamp black gum most closely matched this community type, although many were in a transitional state and contained midstory and understory components of other communities. Loblolly pines in the canopy were typically dead or unhealthy, but pine regeneration could be dense in the understory. Red maple, redbay and sweetbay were common

in the midstory and waxmyrtle dominated the understory. Stands typically had standing water and little emergent aquatic vegetation. Frog's bit and duckweed were common floating plants, and common reed and sawgrass could be dominant in patches.

Tidal Swamp habitats did not contain a significant pine component and would not be expected to be relied upon by RCWs as foraging or nesting habitat. However, they do contain sufficient hardwoods, cypress and/or dead pines to serve as travel or dispersal corridors. Large pines remaining in these habitats also provide potential bald eagle nest sites.

Marsh communities in the project area most closely matched Tidal Freshwater Marsh (Shrub Subtype). Like Tidal Swamps, marsh communities would not be expected to be used for foraging by RCWs. However, they do contain sufficient scattered live and dead trees to serve as travel or dispersal corridors.

Most eagle nests documented during the 2021 survey were found in large, isolated loblolly pines in Tidal Freshwater Marsh (Shrub Subtype).

5. PROJECT SITE

West of Alligator River, north of Hwy. 64: This section of the study area is comprised of the Reeves-Jackson Tract and private property, and includes the majority of the projected RCW impacts from HB-0001 (Figure 3). Mature pines suitable for RCW nesting are sparse in most areas due to mortality of overstory pines, but one stand of suitable WSLPF habitat remains that will be partially cleared for the proposed action. Stands of NrSF habitat within the study area are seemingly even-aged, with dense medium-sized pines and hardwoods and very little herbaceous cover.

West of Alligator River, south of Hwy. 64: Disturbance south of the existing paved highway will be restricted to the existing right-of-way, which is periodically mowed (Figure 3).

East of Alligator River, north of Hwy. 64: Areas to be impacted were under private ownership and have a mature overstory of loblolly pine (Figure 4).

East of Alligator River, south of Hwy. 64: Disturbance south of the existing paved highway will be restricted to the existing right-of-way, which is periodically mowed (Figure 4).

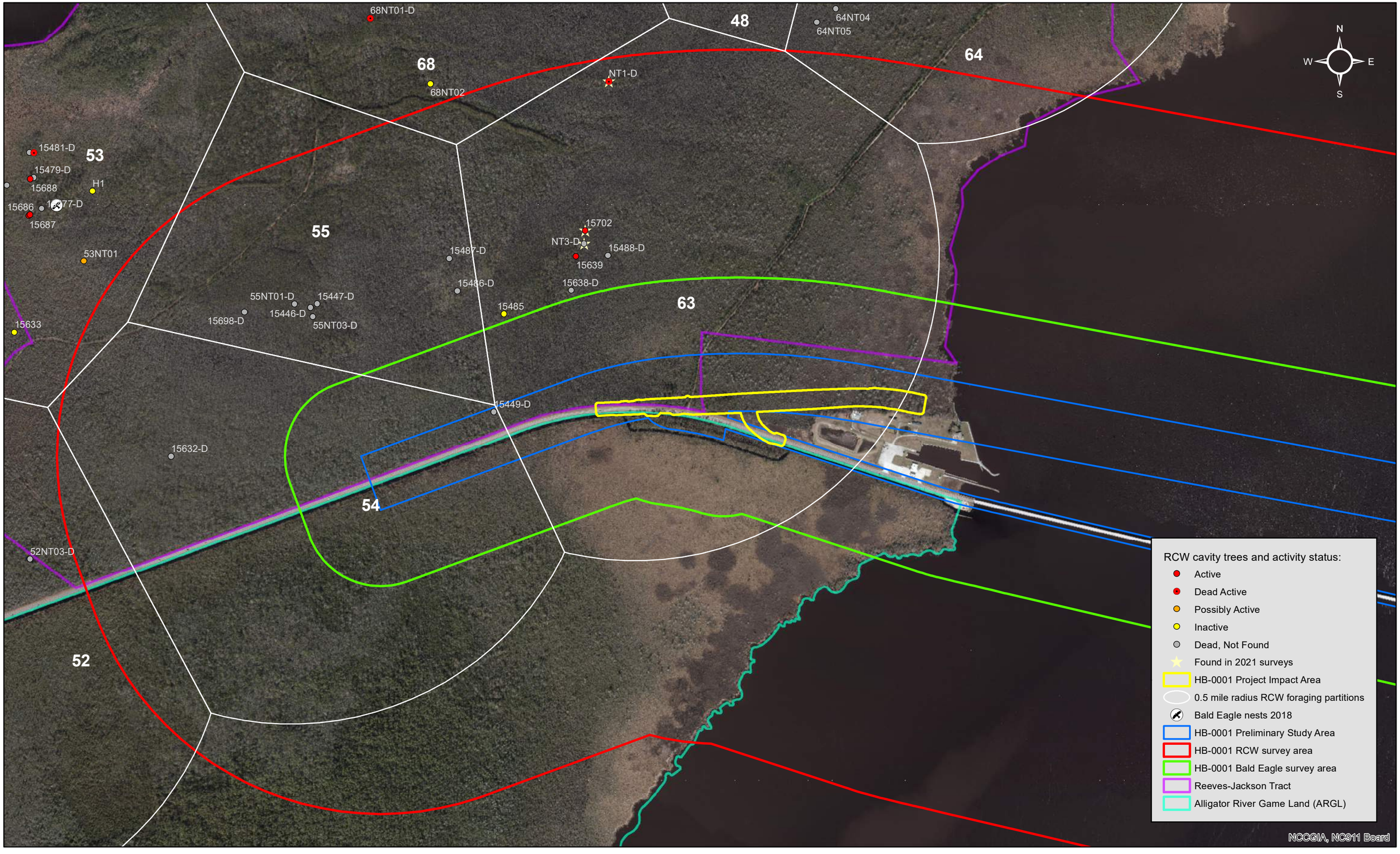

Figure 3. Locations of red-cockaded woodpecker (*Dryobates borealis*) (RCW) cavity trees and bald eagle (*Haliaeetus leucocephalus*) nests documented prior to and during 2021 surveys for the proposed replacement of the U.S. Highway 64 Lindsay C. Warren bridge over the Alligator River (HB-0001), Tyrrell County, North Carolina. Project impact area includes slope stakes plus a 25 foot buffer.

Figure 4. Locations of bald eagle (*Haliaeetus leucocephalus*) nests documented during 2021 surveys for the proposed replacement of the U.S. Highway 64 Lindsay C. Warren bridge over the Alligator River (HB-0001), Dare County, North Carolina. Project impact area includes slope stakes plus a 25 foot buffer.

6. METHODOLOGY

6.1. RCW AND BALD EAGLE SURVEYS

Survey areas were defined by buffering the preliminary study area provided by the NCDOT by 660 ft. for the bald eagle survey and 0.5 mi. for the RCW survey.

Per USFWS guidelines (2003), RCW cavity tree surveys were needed since the project will impact known RCW foraging and/or nesting habitat. The bald eagle survey area was within 1 mi. of known nests and large bodies of water (Alligator River and the Albemarle Sound); therefore, bald eagle surveys were necessary (USFWS 2007).

Helicopter: Biologists from JCA and the NCDOT conducted aerial surveys of potential RCW or bald eagle nesting habitat in the survey areas defined above via a Robinson-44 helicopter piloted by Total Flight Solutions, LLC personnel.

The survey area was surveyed using generally north-south transects, with potential RCW nesting habitat cross-hatched with east-west transects. Transect widths varied with visibility and habitat quality, but typically averaged around 350 ft. in suitable and potentially suitable habitat. All potential RCW or bald eagle nesting habitat was surveyed.

Global Positioning System (GPS) coordinates and activity status were recorded for newly found RCW cavity trees. JCA made a reasonable effort to obtain at least 1 photograph of each RCW cavity tree found. The status of previously known cavity trees that were difficult to access on foot were also updated from the air.

Bald eagle nests were also documented as described above.

UAS: Scenic Environmental Group was subcontracted to operate a DJI Matrice 210 RTK drone owned by the NCDOT. On 23 March 2021, drone pilots from Scenic Environmental Group and a JCA biologist investigated locations of previously known RCW cavity trees that could not be located during the helicopter surveys to verify that they had died and/or fallen. Potential RCW cavity trees found during the helicopter surveys were also investigated. High-quality digital photos were taken of each cavity tree investigated.

Ground: Ground surveys and cavity tree status updates were conducted 29 March-2 April 2021. All cavity trees within the 0.5 mi. project buffer that were alive when last updated and/or were found during aerial surveys were visited, including cavity trees associated with TYR Clusters 54, 55 and 63. Additional habitat potentially containing RCW nesting habitat was surveyed.

6.2. FHA UPDATE

Forest stand data (foraging habitat data) were originally collected by JCA biologists for TYR Clusters 54 and 55 between June and September 2012 and for TYR 63 in December 2013. Plots were placed approximately 5 chains (1 chain = 66 ft.) apart along north-south transects spaced 5 chains apart. Plots that fell on stand boundaries or in obviously unsuitable habitat were moved to the interior of a foraging stand or were skipped. Additional plots were placed between transects when stands were under-represented, resulting in a total of 78 plots for TYR 63.

Foraging substrate was measured with a 10-factor BA prism using the variable radius plot method. In accordance with the 2003 Recovery Plan, subsequent USFWS guidance and the Regional SMS Guidelines for NE NC (Carter 2012, 2014), the diameter at breast height (dbh) of every pine ≥ 4 in. dbh within the plot in 2 in. dbh classes, the age of a representative overstory pine, canopy pine BA, the total BA of all hardwoods ≥ 4 in. dbh and the dbh of all hardwoods ≥ 4 in. dbh in 2 in. dbh classes in the plot were recorded. The density and maximum/minimum height were also recorded for the understory and midstory layers separately to further depict forest structure. Determining midstory density was subjective, but followed these basic criteria: a stand with a sparse hardwood midstory had few or no hardwoods present, a stand with a dense hardwood midstory had limited visibility and movement through the stand was difficult, and a stand with a moderately dense hardwood midstory was intermediate. The heights presented in Section 7 represent the approximate limits of the most discernible layers in the forest; in most stands, there were some saplings between the understory and midstory layers. These stems were factored into the density evaluations of the appropriate layer. Percent cover of herbaceous groundcover within approximately 15 ft. of the plot center was estimated to the nearest 10%. The vegetative community and dominant species were also recorded at each plot.

Stands were delineated according to vegetative community, then subdivided according to a variety of factors including, but not limited to: stand age, overstory pine and hardwood BA, midstory density and/or past management.

Per the RCW Recovery Plan (USFWS 2003), foraging habitat data should be updated at least every 10 years, with midstory data updated at least every 5 years. Since the TYR 63 data was 7.5 years old at the time of scoping for this Biological Assessment, an FHA update was

planned. TYR Clusters 54 and 55 were found to still be inactive during the surveys, therefore their FHAs were not updated or included in this report.

In March and April 2021, JCA biologists reviewed current aerial photography available online and provided by the NCDOT's Photogrammetry Unit and used the helicopter flights described in the previous section to update stand boundaries. These boundaries were checked during ground surveys, and changes in overstory and understory density were documented.

6.3. FORAGING HABITAT GUIDELINES

USFWS guidance issued in 2005 establishes that while all properties necessary for RCW recovery should be managed toward the Recovery Standard, the SMS "defines the minimum foraging habitat requirements considered necessary to avoid foraging habitat-related incidental take" (USFWS 2005). Foraging habitat impacts were assessed pursuant to Sections 7 and 9 of the Endangered Species Act, as amended, using the Regional SMS Guidelines for NE NC (Carter 2014).

The Regional SMS Guidelines for NE NC require a minimum of 3,000 square feet (ft^2) of pine BA on at least 75 acres of good quality suitable foraging habitat as defined (USFWS 2003) or modified below. The minimum dbh requirements for pines to count toward the 3,000 ft^2 BA total vary by community type; pines ≥ 8 in. are counted from suitable Pond Pine Woodland stands, pines ≥ 10 in. are counted from suitable WSLPF, WSPHF, Pine Plantations and Estuarine Fringe Pine Forest stands and pines ≥ 14 in. are counted from suitable Nonriverine Swamp Forest and Peatland Atlantic White Cedar stands. Because minimum pine BA requirements also vary among community types, the minimum area necessary to achieve 3,000 ft^2 of pine BA will usually exceed 75 acres by a substantial amount.

Pine stands must be at least 30 years of age or older (by the time of project construction), unless the minimum pine dbh for that stand type is reached in less than 30 years (W. McDearman, USFWS, personal communication (pers. comm.)).

Since stand contiguity is a recommended criteria with the SMS and since RCWs have repeatedly been observed foraging and moving through hardwood-dominated stands in the survey area (Figure 2) and in similar habitat on P3 since 1999 (JCA, unpublished data), stands were only considered to be noncontiguous if separated from other foraging stands by 200 ft. of permanently unforested habitat (e.g., roads, marshes or open water).

Stands meeting the Regional SMS Guidelines for NE NC contribute to the total BA and acreage required (Table 1). However, active RCW clusters have been found in stands not meeting these criteria, with BAs as low as 3.0 ft^2/ acre in pines ≥ 10 in. dbh (TYR 63). RCWs have also been observed foraging in hardwood-dominated stands with low pine presence. Although these stands do not meet the regional guidelines and are not likely to meet them in the future, RCWs are using them as nesting and/or foraging habitat and such stands are therefore important. Arguably, these stands should count as "suitable" habitat, or at a minimum, impacts to this habitat should be regulated regardless of apparent "suitability."

Table 1. Summary of regional Standard for Managed Stability foraging habitat requirements in northeastern North Carolina and southeastern Virginia.

Natural Community	**Pond Pine Woodland**	**Nonriverine Swamp Forest**	**Estuarine Fringe Pine Forest**	**WSLPF and WSPHF[1]**	**PAWC[2]**	**Pine Plantation**
Pine BA (Minimum)	30 ft^2/ac (8 in. dbh min.)	10 ft^2/ac (14 in. dbh min.)	30 ft^2/ac (10 in. dbh min.)	40 ft^2/ac (10 in. dbh min.)	10 ft^2/ac (14 in. dbh min.)	40 ft^2/ac (10 in. dbh min.)
Overstory Non-Pine BA (Maximum) *Including cypress spp. And AWC	10 ft^2/ac	N/A	30 ft^2/ac	30 ft^2/ac in WSLPF & Canopy hardwoods ≥ 30 ft^2/ac, but less than 50% of canopy in WSPHF	N/A	30 ft^2/ac
Midstory/ Understory Density & Height	N/A	N/A	N/A	N/A	N/A	N/A

[1]Wet Successional Loblolly Pine Forest (WSLPF) and Wet Successional Pine-Hardwood Forest (WSPHF).
[2]Peatland Atlantic White Cedar Forest

Stands in otherwise "unsuitable" habitat would be counted as suitable if one or more of the following criteria are met:

1) Stands contain at least one active RCW cavity tree.
2) Stands containing any pines overlap with the cluster area (defined as a 200 ft. radius buffer around the minimum convex polygon containing all of a RCW group's active and inactive cavity trees (USFWS 2003)).
3) Any stand within a foraging partition where RCWs have been observed foraging.

6.4. CLASSIFICATION OF HABITAT

Pine stands that met all of the criteria outlined for the Regional SMS Guidelines for NE NC were considered to be "suitable" foraging habitat.

If present, "potentially suitable habitat" would have been described as stands that could be managed, or were being managed for pine (WSLPF, WSPHF and Pine Plantations) that met all minimum criteria, but exceeded the maximum limits for overstory hardwood density. Such stands have the necessary pine BA and could meet the Regional SMS Guidelines for NE NC with overstory hardwood removal, if management were possible and practicable.

In other areas within the RCW's range, stands on sites managed for pine that do not fall into the suitable or potentially suitable categories are typically classified as "future potential habitat." These stands do not meet the minimum standards defined in the Regional SMS Guidelines for NE NC, but would be expected to meet in the future with time and management. For this analysis, however, we recognize that stands that would be classified as "future potential" may never meet the regional guidelines due to rising water levels and increased flooding frequency; much of the acreage within the TYR Cluster 63 foraging habitat partition is in the process of transitioning to vegetative communities no longer dominated by pine species. These stands are instead classified herein as "deficient habitat."

Palustrine communities (Tidal Swamp (Cypress-Gum Subtype), NrSF and PAWC) not meeting the minimum requirements were classified as "unsuitable habitat." Unsuitable habitat consisted of several distinct habitat conditions:

1.) Stands of hardwoods, cypress and/or Atlantic white cedar with no pines.

2.) Stands as described in #1 above, with large pines, but too low of a pine BA to be considered suitable habitat.

3.) Stands as described in #1 above, with an adequate pine BA but with pine stems too small (≤ 14 in. dbh) to be considered suitable habitat.

4.) Stands as described in #1 above, but with inadequate pine stem size and pine BA.

However, RCWs have been observed foraging in stands that meet all 4 conditions described above and nesting in stands that meet #s 2 and 3 above. Therefore, the boundary between suitable and unsuitable habitat, if there is one, remains to be determined in NE NC.

"Non-foraging habitat" is defined as permanently non-forested habitat such as: 1) Tidal Freshwater Marsh vegetative community, 2) cleared land such as agricultural lands or recent clearcuts, 3) roads, 4) utility rights-of-way and 5) bodies of water (Carter 2014).

6.5. FORAGING HABITAT IMPACT CALCULATIONS AND "TAKE" DETERMINATION

Direct Impacts: RCW foraging habitat removals from the affected foraging partition were based on project impact area files received from the NCDOT 9 July 2021. JCA biologists calculated foraging habitat removals using ArcGIS™ software.

Incidental Take for foraging habitat impacts: If a cluster's associated foraging partition did not meet the minimum foraging habitat threshold of 3,000 sq. ft. BA of appropriately-sized pines pre-project, any removal of pines ≥ 10 in. dbh was determined to require Incidental Take (Carter 2014). RCWs occupying partitions with little or no suitable or potentially suitable habitat have adapted to these substandard conditions in ways not currently understood. Therefore, the removal of one or more pine stems (≥ 10 in. dbh), regardless of natural community type, was considered to require "take" even if the pine occurred in habitat classified as "unsuitable."

6.6. GROUP-LEVEL ANALYSES

Per USFWS guidance (USFWS 2005), when Incidental Take is found to occur in the cluster-level analysis, it is necessary to assess the impact of that loss on the demographic stability of neighboring RCW groups. This is done by examining the density of RCW groups on the landscape. A RCW group is defined as a solitary male or a pair of adults (breeding or non-breeding) and any helpers.

Retaining sufficient foraging habitat alone does not ensure the persistence of a RCW group. The continued occupation of a cluster not only depends on the amount of foraging habitat available, but also depends on the density of active clusters around it (Hooper and Lennartz 1995). Research has shown that the more aggregated RCW clusters are, the higher the probability of persistence, even with substantial foraging habitat loss (Crowder et al. 1998, Letcher et al. 1998). RCW groups in moderately dense to dense populations have been shown to be less sensitive (i.e., in group size and productivity) to drastic loss in habitat than in sparser

populations with seemingly more available foraging habitat (Hooper and Lennartz 1995). Reducing cluster density causes populations to be more vulnerable to demographic stochasticity (Crowder et al. 1998, Walters et al. 2002). This potential impact is captured under the group and neighborhood-level analyses as "take" under the definition of harm.

For the group density analyses, clusters having > 4.7 groups within 1.25 mi. were considered healthy and were given a "dense" designation. Clusters with 2.6 to 4.6 groups within 1.25 mi. were considered to have "moderate" density. Clusters with < 2.5 groups within 1.25 mi. were considered "sparse" and therefore more vulnerable to abandonment because of lack of emigration/ immigration (Conner and Rudolph 1991).

A 1.25 mi. radius buffer was drawn around the cluster center for every active cluster affected by the proposed project (some foraging habitat or cavity trees removed). For each cluster analyzed, the number of active clusters within 1.25 mi. of its cluster center pre- and post-project was calculated. All active clusters with a cluster area (minimum convex polygon of all cavity trees and a 200 ft. buffer around them) within 1.25 mi. of the target cluster's center were included in the pre-project cluster density totals. For post-project density, clusters expected to require "take" at the cluster level were not counted.

Note: RCW clusters outside of the 0.5 mile radius RCW survey area for HB-0001 are no longer monitored and were not visited in 2021. The most recent activity data available were used for the group and neighborhood analyses which, for most clusters, was 2018 data.

Clusters with > 4.7 groups within 1.25 mi. post-project were considered to be unaffected by the proposed project. Clusters whose densities were reduced from "dense" or "moderate" to "sparse" were considered to require Incidental Take due to group density reduction. Clusters that were "sparse" pre-project and density was further reduced by the proposed action were also considered to require Incidental Take.

6.7. NEIGHBORHOOD-LEVEL ANALYSES

Per the 2005 USFWS guidance, when an "is likely to adversely affect" determination is made at the cluster or group-levels, a neighborhood analysis will typically be warranted. The neighborhood-level analysis involves assessment of the density of RCW groups that are within the project "neighborhood," but are not directly affected by the project (USFWS 2005).

The intent of the "neighborhood analysis" is to account for the potential negative impacts of a project on RCW demography through isolation, habitat loss or fragmentation within the Action Area.

When demographic data are available, the average dispersal distance for each population is typically used to define the RCW neighborhood/Action Area surrounding a project site or project corridor (USFWS 2005). In order to calculate this number, all documented, successful RCW dispersals to and from clusters on P3 from 1999-2014 were analyzed. The average dispersal distance was determined to be 1.88 mi. for females, 3.72 mi. for males, and 2.55 mi. for all RCWs (NCDOT 2014). The RCW neighborhood (Action Area) for this report was defined as a 2.55 mi. buffer around the proposed U.S. Hwy. 64 project impact area in Tyrrell County.

As with the group-level analyses, if the post-project analysis showed that less than 2.5 RCW groups would remain post-project within a 1.25-mi. radius of the subject cluster, it was considered to require "take" at the neighborhood-level.

6.8. POPULATION-LEVEL ANALYSIS

Per USFWS guidance (R. Costa, USFWS, pers. comm., 27 August 2006), all major projects are to be analyzed at the population level, regardless of whether or not there is Incidental Take at the partition level. This is necessary because some project-related impacts may not reach the threshold of Incidental Take for some groups (i.e., going below the SMS), but project impacts may preclude those groups' partitions from meeting the Recovery Standard Guidelines (RSG) in the future (i.e., not being able to achieve 120 acres of good quality foraging habitat) (memo from R. Costa, 27 August 2006). This analysis is necessary to determine if the population can reach its recovery goal population size in the future with a sufficient number of partitions meeting the RSG. Note: Because of the uniqueness and variety of habitats utilized by RCWs for nesting and foraging in NE NC and the lack of naturally occurring vegetative communities in the project area that will ever meet the RSG (USFWS 2003), impacts were not analyzed using the RSG for this assessment.

For RCW populations such as P3 with recovery roles defined in the RCW Recovery Plan (USFWS 2003), impacts must be analyzed at the population level. Although RCWs on the Reeves-Jackson Tract are not addressed in the Recovery Plan, they are connected to the P3 and ARGL populations (see Results for more discussion).

6.9. RECOVERY UNIT-LEVEL ANALYSIS

The Recovery Unit Level Analysis will be conducted by the USFWS during their review of the Biological Assessment. See Section 7.1.10 for information about the role of RCW clusters on the Reeves-Jackson Tract in the species' recovery.

7. RESULTS AND DISCUSSION

7.1. RCW

7.1.1. RCW Characteristics

The RCW is a small black and white woodpecker with horizontal bars on its back, spotted flanks and a white belly. The cap and chin stripe are black and the male has a small, difficult to see, red spot on each side of the black cap. It is most easily identified by the large white cheek patches that distinguish it from similar species (USFWS 2003).

7.1.2. Distribution and Habitat Requirements

The RCW is endemic to mature, fire-maintained pine forests in the southeastern United States, where it was historically common. Prime nesting habitat for RCWs includes open, mature southern pine forests dominated by longleaf, loblolly, pond, slash (*Pinus elliotti*) or other southern pine species greater than 60 years of age with little or no mid- or understory development. Pine flatwoods and pine-dominated savannas, which have been maintained by frequent fires, serve as ideal nesting and foraging habitat for RCWs. Potential foraging habitat in most of its range is defined as open pine or pine/hardwood stands 30 years of age or older (USFWS 2003).

In NE NC, RCWs also occur in a wide variety of upland and wetland habitats and can utilize habitat dominated by hardwoods and/or with dense midstories.

7.1.3. Threats to the Species

Logging, fire exclusion and conversion of forestlands for agricultural, short-rotation forestry, development and other uses have destroyed most of this species' habitat range-wide (USFWS 2003).

7.1.4. Survey Results

Suitable nesting habitat was found in Tyrrell and Dare Counties, north and south of U.S. Hwy. 64.

RCW cavity trees: One new active cavity tree (#15702) and one new dead cavity tree (NT3-D) were found in TYR Cluster 63 (Figure 3). An additional dead cavity tree (NT1-D) was found on the northern edge of the Cluster TYR 63 foraging partition, 0.25 mi. from the nearest cavity tree. This cavity appeared to have been worked on by a RCW since the tree's death, but not in recent months. Habitat containing live pines in the vicinity of NT1-D were surveyed on foot, but no additional cavity trees were found. RCW recordings were played periodically, but no RCWs responded or were observed in the area.

7.1.5. RCW Cluster and Cavity Tree Status

TYR Cluster 54 occurs on the Reeves-Jackson Tract and the partition includes acreage on the Reeves-Jackson Tract north of U.S. Hwy. 64 and ARGL to the south. In 2019, this cluster contained 2 cavity trees: Trees #15632-D and 15449-D. Both trees were dead as of 2018 and were still standing in 2019 (Figure 3, Table 2). No new cavity trees were found in 2021, and neither dead cavity tree was detected during aerial surveys. The cluster is considered to be abandoned.

TYR Cluster 55 and its foraging habitat partition are on the Reeves-Jackson Tract. This cluster consisted of 7 cavity trees, all of which were dead when last visited (Figure 3, Table 2). No new cavity trees were found during aerial and ground surveys in 2021. This cluster is considered to be abandoned.

TYR Cluster 63 occurs on the Reeves-Jackson Tract and its foraging partition includes portions of the Reeves-Jackson Tract, adjacent private properties north and south of U.S. Hwy. 64 and ARGL south of the highway. It was found by JCA biologists in November 2013. Prior to 2021 surveys, it was known to contain 3 live cavity trees: #s 15485, 15638 and 15639 (Figure 3). One dead cavity tree (#15488-D) was still standing in 2019. In 2021, one new tree with an active cavity (#15702) and 2 dead cavity trees (#s NT1-D and NT3-D) were found during aerial and ground surveys, and the remaining cavity trees were updated (Figure 3, Table 2). Previously

Table 2. Location and status of red-cockaded woodpecker (*Dryobates borealis*) (RCW) cavity trees for Tyrrell County (TYR) clusters with cavity trees within a 0.5 mile radius of the project impact area for the proposed U.S. Highway 64 Bridge Replacement Project (HB-0001), Tyrrell County, North Carolina.

Cluster	Cavity Tree #	Tree Status	Date Found	Dead Date	Cavity Stage	Cavity Activity	GPS Coordinates[1]		Removed for Project (Y/N)[2]	Impacts within 200 ft.? (Y/N)
							Easting	Northing		
TYR 54	15449-D	Dead-Standing	5/2/2012	6/2019	Complete	Dead	2875857.0	798203.7	N	N
TYR 54	15632-D	Dead-Standing	7/20/2015	2/2018	Complete	Dead	2873050.1	797819.5	N	N
TYR 55	15446-D	Dead-Standing	5/7/2017	5/2017	Adv. Start	Dead	2874263.2	799110.7	N	N
TYR 55	15447-D	Dead-Standing	1/24/2012	5/2017	Adv. Start	Dead	2874320.8	799143.7	N	N
TYR 55	15486-D	Dead-Standing	11/26/2013	12/2015	Complete	Dead	2875539.4	799256.5	N	N
TYR 55	15487-D	Dead-Standing	11/26/2013	6/2018	Adv. Start	Dead	2875467.2	799538.2	N	N
TYR 55	15698-D	Dead-Down	3/29/2017	2/2019	Complete	Dead	2873689.0	799072.5	N	N
TYR 55	55NT01-D	Dead-Standing	4/26/2013	5/2017	Start	Dead	2874124.0	799142.2	N	N
TYR 55	55NT03-D	Dead	9/28/2012	2012	Complete	Dead	2874283.5	799030.7	N	N
TYR 63	15485	Alive	11/26/2013	few needles 3/30/21	Complete	Inactive	2875944.5	799055.6	N	N
TYR 63	15488-D	Dead-Down	11/8/2013	2016	Complete	Dead	2876846.0	799564.1	N	N
TYR 63	15638-D	Dead-Standing	12/1/2015	3/2021	Complete	Dead	2876529.3	799260.6	N	N
TYR 63	15639	Alive	12/1/2015	NA	Complete	Active	2876570.5	799555.5	N	N
TYR 63	15702	Alive	3/10/2021	top dead 3/2021	Rec. Complete	Active	2876649.6	799780.0	N	N
TYR 63	NT1-D	Dead-Standing	3/11/2021	3/2021	Complete	Dead, Possibly Active	2876854.7	801076.3	N	N
TYR 63	NT3-D	Dead-Standing	3/30/2021	3/2021	Complete	Dead	2876640.8	799665.7	N	N

[1]Coordinates in NAD 83 StatePlane feet

[2]Y = yes, N = no

Red = Cavity trees found during 2021 surveys

active tree #15638 had died and #15485 remained alive, but was inactive. No cavity trees associated with TYR 63 occur within 200 ft. of the project study area or will be removed by the project.

7.1.6. Cluster-level Analyses

Cavity tree impacts:

No RCW cavity trees were found within 200 ft. of the project impact area.

Foraging Habitat and Impact Analyses

TYR 63: The pre-project foraging habitat totals were 701.7 ft^2 of pine BA on 54.7 acres of suitable habitat, 266.0 ft^2 pine BA on 13.2 acres of deficient habitat, 181.5 ft^2 pine BA on 167.0 acres of unsuitable habitat and 234.9 acres of non-foraging habitat (e.g., roads, open water or marsh habitat) (Figure 5, Table 3). This partition is deficient in pine BA and acreage and does not meet the Regional SMS Guidelines for NE NC pre-project.

The project impact area will remove 14.4 ft^2 of pine BA on 0.9 acre of suitable habitat and 0.8 ft^2 of pine BA on 7.1 acres of unsuitable habitat (Table 3, Figure 5).

Post-project, TYR Cluster 63 would contain 687.3 ft^2 of pine BA on 53.9 acres of suitable habitat, 266.0 ft^2 of pine BA of 13.2 acres of deficient habitat, 180.6 ft^2 of pine BA on 159.8 acres of unsuitable habitat and 112.4 acres of non-foraging habitat, for a total of 1,133.9 ft^2 of pine BA on 226.9 acres of forested habitat (Table 3, Figure 5). This cluster is deficient in pine BA pre- and post-project using the Regional SMS Guidelines for NE NC (Carter 2014). Therefore, this cluster is expected to require Incidental Take due to project-related foraging habitat impacts.

7.1.7. Group-level Analysis

The Group-level Analysis evaluates density effects to active RCW groups directly impacted by the U.S. Hwy. 64 widening project, but not requiring "take" at the cluster level. The only other foraging partitions directly affected by the proposed action are for abandoned clusters TYR 54 and 55; no RCW groups qualified for inclusion in the group analysis.

Table 3. Red-cockaded woodpecker (RCW) pre-project and post-project foraging habitat totals using the Regional Standard for Managed Stability Guidelines for northeastern North Carolina (Carter 2014) within the partition 0.50 mile radius foraging for **TYR Cluster 63**, Tyrrell County, NC.

PRE-PROJECT

Stand #	Forested Habitat (acres)	Pine Age (years)	Pine Data - Average Values per Acre: 4.0-9.9 inches (in.) dbh Stems	4.0-9.9 inches (in.) dbh BA	10.0-13.9 in. dbh Stems	10.0-13.9 in. dbh BA	14.0+ in. dbh Stems	14.0+ in. dbh BA	10.0+ in. dbh Stems	10.0+ in. dbh BA	Total Stand BA (pines + hwds)	Total Pine BA	Canopy Pine BA	Hardwood Data[2]: Total Hwd BA	Hardwood Data[2]: Canopy Hwd BA	Canopy: Height (ft.) Min.	Canopy: Height (ft.) Max.	Midstory: Density	Midstory: Height (ft.) Min.	Midstory: Height (ft.) Max.	Understory: Density	Understory: Height (ft.) Min.	Understory: Height (ft.) Max.	HGC (% cover)	Suitable Acres	Suitable BA	Potentially Suitable Acres	Potentially Suitable BA	Deficient Acres	Deficient BA	Unsuitable and Nonforaging Habitat Acres	Unsuitable and Nonforaging Habitat BA
WSLPF/ WSPHF																																
72	7.7	58	124.8	35.0	23.8	17.9	3.0	4.3	26.8	22.1	97.9	57.1	50.7	40.7	15.7	50.0	56.4	D	25.7	32.9	D	5.4	14.3	25.7					7.7	169.5		
95	5.5	67	35.7	5.0	5.4	5.0	9.3	12.5	14.7	17.5	40.0	22.5	17.5	17.5	5.0	90.0	110.0	D	25.0	30.0	D	7.5	12.5	5.0					5.5	96.5		
85[3]	8.3	79	38.7	13.3	29.0	21.7	9.5	11.7	38.4	33.3	95.0	46.7	35.0	48.3	6.7	68.3	68.3	D	37.5	46.7	M	5.0	12.2	0.0	8.3	276.1						
Subtotals	**21.5**																								**8.3**	**276.1**	**0.0**	**0.0**	**13.2**	**266.0**	**0.0**	**0.0**
Nonriverine Swamp Forest (NrSF)[1]																																
64	3.2	68	22.9	4.6	9.6	7.9	0.0	0.0	9.6	7.9	57.5	12.5	10.4	45.0	2.5	61.7	63.8	D	36.7	37.9	D	8.5	15.7	15.4							3.2	0.0
67	2.0	----	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	75.0	15.0	66.3	67.5	D	47.5	50.0	D	10.5	17.5	0.0							2.0	0.0
69	1.0	----	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.1	0.0	0.0	67.1	11.4	63.6	63.6	D	40.0	40.0	D	9.0	13.9	5.7							1.0	0.0
70	1.7	86	23.2	7.9	8.9	7.1	8.2	11.7	17.1	18.8	58.8	26.7	22.5	32.1	2.9	65.4	66.7	D	37.1	40.4	D	6.4	13.8	19.2	1.7	20.0						
74	12.7	68	11.7	4.4	23.4	17.8	3.4	4.4	26.8	22.2	111.1	26.7	25.6	84.4	28.3	65.0	69.4	S	30.6	39.4	M	5.2	14.9	7.2							12.7	56.3
79	78.5	61	0.7	0.3	1.6	1.3	0.0	0.0	1.6	1.3	84.3	1.6	1.3	82.7	28.5	59.6	68.8	D	27.3	36.0	D	8.0	15.0	34.2							78.5	0.0
88[3]	39.4	46	44.0	8.2	3.3	2.7	0.0	0.0	3.3	2.7	76.9	10.9	6.4	66.0	12.0	50.5	58.0	M	19.0	31.5	M	3.1	13.5	27.0	36.0	0.0					3.4	0.0
89	13.9	63	9.1	4.0	10.3	8.0	5.7	7.0	16.0	15.0	88.0	19.0	16.0	69.0	17.0	65.0	79.0	D	28.0	39.0	D	7.8	15.0	26.0							13.9	97.2
92	4.2	61	23.8	3.3	7.2	6.7	5.4	6.7	12.7	13.3	30.0	16.7	13.3	13.3	3.3	71.7	85.0	M	30.0	36.7	D	7.0	15.0	20.0							4.2	28.0
Subtotals	**156.6**																								**37.7**	**20.0**	**0.0**	**0.0**	**0.0**	**0.0**	**118.8**	**181.5**
Estuarine Fringe Pine Forest (EFPF)																																
91	5.8	77	53.3	18.8	51.6	40.0	11.7	15.0	63.3	55.0	86.3	73.8	66.3	12.5	10.0	62.5	73.8	S	15.0	26.3	M	5.0	13.8	27.5	5.8	317.5						
93	2.9	71	39.8	17.5	0.0	0.0	18.3	30.0	18.3	30.0	75.0	47.5	32.5	27.5	10.0	60.0	80.0	D	30.0	40.0	D	6.0	15.0	17.5	2.9	88.1						
Subtotals	**8.7**																								**8.7**	**405.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Tidal Swamp																																
90	6.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----							6.2	0.0
96	41.9	34	58.2	10.6	3.7	2.5	0.0	0.0	3.7	2.5	40.0	13.1	5.6	26.9	5.0	57.5	71.9	M	23.8	31.3	D	10.0	15.6	47.5							41.9	0.0
Subtotals	**48.1**																								**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**48.1**	**0.0**
Tidal Freshwater Marsh (Nonforaging Habitat)																																
94	2.4	32	55.2	10.0	2.5	1.7	0.0	0.0	2.5	1.7	48.3	11.7	1.7	36.7	6.7	37.5	45.8	M	19.7	24.5	D	8.0	14.0	72.5							2.4	4.0
97	46.0	15	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----							46.0	0.0
98	39.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----							39.5	0.0
Subtotals	**87.9**																								**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**87.9**	**4.0**
Nonforaging Habitat (open water, roads, buildings)																																
NA	16.5		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----							16.5	0.0
TOTAL	**339.3**		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	**54.7**	**701.7**	**0.0**	**0.0**	**13.2**	**266.0**	**271.4**	**185.5**

[1]Palustrine habitats (e.g. NrSF) that did not meet the SMS criteria were classified as "unsuitable" instead of "future potential" (e.g., insufficient pine BA) or "potentially suitable" (e.g. too many hardwoods or small pines). It is doubtful these areas will support higher densities of pine over time and they cannot feasibly be managed to reduce hardwood density.

[2]Hardwood basal area (BA), including cypress species and Atlantic white cedar.

[3]Stands that did not meet the regional SMS guidelines, but active cavity trees and/or foraging RCWs were observed, were considered to be "suitable."

[4]All forested acres subject to project removals were counted as nonforaging habitat post-project.

[5]Although the current study corridor would cause habitat south of U.S. Hwy. 64 to become noncontiguous, it was assumed that the final designs would be <200 ft. wide and no losses were calculated for noncontiguous habitat.

BA	Basal area	WSLPF	Wet Successional Loblolly Pine Forest
dbh	Diameter at breast height	WSPHF	Wet Successional Pine-Hardwood Forest
	Unsuitable foraging habitat characteristics according to the regional SMS guidelines (Carter 2014).	----	Few or no pines ≥ 10"; data not collected.
blue	Parameters considered to determine stand suitability (suitable, potentially suitable, etc.)		
italics	Approximate age; stand data not collected.		

Acreage	**Suitable**	**Potential**	**Deficient**	**Unsuitable**	**Total-Foraging**	**Non-foraging[4]**
Pre-Project	54.7	0.0	13.2	167.0	234.9	104.4
-Removals	1.0	0.0	0.0	7.1	8.2	+ impact-
-Noncontiguous[5]	0.0	0.0	0.0	0.0	0.0	ed habitat
Post-Project	**53.7**	**0.0**	**13.2**	**159.8**	**226.7**	**112.6**
BA						
Pre-Project	701.7	0.0	266.0	181.5	1,149.2	0.0
-Removals	14.4	0.0	0.0	0.8	15.2	0.00
-Noncontiguous[5]	0.0	0.0	0.0	0.0	0.0	0.0
Post-Project	**687.3**	**0.0**	**266.0**	**180.7**	**1,133.9**	**0.0**

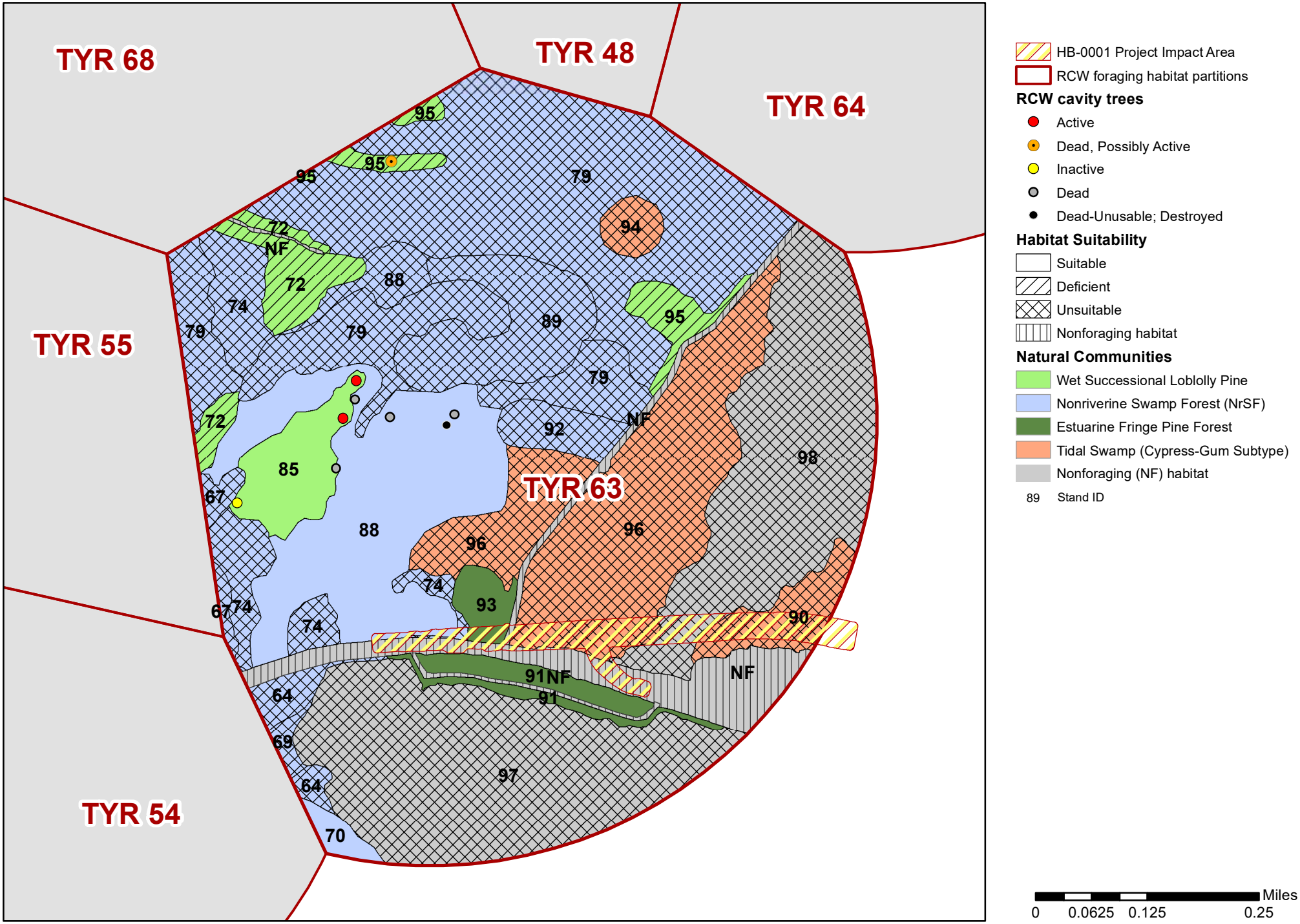

Figure 5. Foraging habitat associated with red-cockaded woodpecker (RCW) Tyrrell (TYR) **Cluster 63** and projected impacts from the U.S. Highway 64 Alligator Bridge Replacement Project (HB-0001), Tyrrell County, North Carolina. The project impact area is comprised of slope stakes plus a 25-foot buffer.

7.1.8. Neighborhood-level Analysis

Foraging habitat loss and fragmentation can have direct effects on cluster activity, group size and reproduction at the cluster-level. Additionally, by affecting habitat configuration at the landscape level, projects may affect the health and distribution of RCWs at the neighborhood scale. Habitat fragmentation may adversely affect dispersal of individuals to adjacent or nearby groups and lessen the likelihood that breeding vacancies are filled (USFWS 2003). Demographic viability of groups, neighborhoods and populations are primarily dependent on the ability of group members to freely disperse. If dispersal opportunities are limited or inhibited by a project, even if adequate foraging habitat remains post-project, group status, group size and reproduction may be affected. It is important that these neighborhood effects be assessed during the analysis of project impacts (USFWS 2003).

As mentioned in Section 6.6, the most current activity data available for groups within the Action Area were used for the neighborhood analyses. Of the clusters involved in group and neighborhood calculations, but outside of the RCW survey area and not directly affected by the proposed HB-0001 project, only TYR Clusters 51 and 64 have been visited since 2018 (as part of the color band removal work mentioned in Section 2). One new RCW cavity tree discovered by TCF personnel in 2021 was visited by JCA biologists in March 2021 and was determined to be associated with the TYR 51 RCW group. Four RCWs were consistently seen in this area; 2 RCWs roosted in cavities in the new tree and the other 2 came from the direction of other known TYR 51 cavity trees. Six previously known cavity trees associated with TYR 64 that were accessible from a dirt road were visited in March 2021; 4 cavity trees were dead standing, 1 was snapped at the cavity and 1 could not be located. However, on the evenings of 22 and 23 March 2021, 1 and 2 RCWs, respectively, flew in and foraged around these cavity trees before flying back west, presumably to roost. Two trees on the southern edge of the TYR 64 foraging partition (#s 64NT04 and 64NT05) were not found with the helicopter or UAS and were presumed to have fallen (no live, mature pines were present in the area). The tree containing the nest cavity in past years, #15572, was alive and active when last visited in 2018, but appeared to be unhealthy at that time (JCA, unpublished data).

Using the Regional SMS Guidelines (Carter 2014), the cluster-level "take" of active TYR Cluster 63 would reduce the RCW group density within a 1.25 mi. radius of 5 active TYR clusters, but all would retain a "moderate" density post-project based on the most current data

available (ranging from 2018-2021) (Table 4). Note, however, that the densities around Clusters 48 and 64 will be reduced to 3 active clusters within 1.25 miles as a result of the proposed action; if just 1 of their adjacent clusters being counted is no longer active, this would reduce the group density to "sparse" and could require additional Incidental Take. No clusters will require "take" at the neighborhood level for the proposed HB-0001 project based on currently available data.

Table 4. Red-cockaded woodpecker clusters located within the 2.55 mile radius action area for the Neighborhood Analysis for the U.S. Highway 64 Alligator River Bridge Replacement project (HB-0001), Tyrrell County, North Carolina.

Cluster Number	Pre-Project		Post-Project		Neighborhood Level Take (Yes/No)
	# Active Clusters within 1.25 Miles*	Density Rating**	# Active Clusters within 1.25 Miles	Density Rating	
TYR 47	5	Dense	4	Moderate	No
TYR 48	4	Moderate	3	Moderate	No
TYR 53	5	Dense	4	Moderate	No
TYR 64	4	Moderate	3	Moderate	No
TYR 68	5	Dense	4	Moderate	No

* Based on the most current data available
**Density rating: ≥ 4.7 active clusters within 1.25 miles = Dense
2.6 - 4.6 active clusters within 1.25 miles = Moderate
≤ 2.5 active clusters within 1.25 miles = Sparse

7.1.9. Population-level Analysis

Areas of non-foraging habitat can inhibit a RCW group's ability to utilize foraging habitat within its partition and may inhibit the ability of RCWs to disperse from their natal territory to vacant breeding niches. Territory isolation by habitat fragmentation and/or reduction of group density decreases the likelihood of clusters being inhabited by potential breeding groups because dispersing females often fail to locate solitary males or find the territories substandard. This problem is a function of the number and spatial arrangement of active clusters.

Home range follows and radio telemetry work conducted via Virginia Tech have indicated that female RCWs of any age are reluctant to cross openings between 492 and 2,132 ft., and will not cross openings of > 2,132 ft. (Walters et. al. 2011). Male RCWs are not as affected by forest gaps (J.R. Walters, VA Tech, pers. comm.). The proposed widening for the bridge approach will increase the distance between suitable stands north and south of U.S. Hwy.

64 from 70-103 ft. to 128-215 ft. The proposed action is not expected to impede dispersal of RCWs from their natal territories to and from RCW clusters south of Hwy. 64 or affect the viability of the RCW population around TYR Cluster 63.

The USFWS will ultimately determine the population level effects of the proposed project based on the best available scientific and commercial data.

7.1.10. Recovery Unit-level Analysis

The Reeves-Jackson Tract was under private ownership and RCW clusters on the property, if known to occur at that time, were not considered in developing the 2003 RCW Recovery Plan (USFWS 2003); therefore, this specific property does not have a defined role in the species' recovery. The RCW population on P3, which is demographically connected to the Reeves-Jackson RCW groups, is part of the Mid-Atlantic Coastal Plain RCW Recovery Unit, which contains 2 Primary Core Populations: 1) Coastal North Carolina, which is made up of the Croatan National Forest, Holly Shelter Game Land and Marine Corps Base Camp Lejeune and 2) Francis Marion National Forest in South Carolina (USFWS 2003). Both of these populations have a recovery goal of at least 350 potential breeding groups (PBGs) (or 400-500 active clusters). The Recovery Unit also contains one Essential Support Population (ESP) (NE NC/Southeast Virginia), comprised of ARNWR, Dare County Bombing Range, P3, Pocosin Lakes National Wildlife Refuge (PLNWR) and Piney Grove Preserve, which must meet 100 PBGs to reach recovery. P3 is part of the ESP and has a goal of 25+ active RCW clusters (USFWS 2003).

Since the completion of the 2003 RCW Recovery Plan, efforts have been made to survey additional potential RCW habitat in NE NC. Previously undocumented RCW populations have been located on federal, state, non-governmental organizations, and private properties (JCA 2012). For RCW demographic Geographic Information System (GIS) models conducted for a RCW Species Status Assessment (USFWS 2020), RCW clusters on the Reeves Jackson tract were included in the "Palmetto-Peartree Preserve Complex," a population with 102 total active clusters which also included P3, Alligator River Game Land (State), PLNWR (federal), Roper Island (private) and Emily and Richardson Preyer Buckridge Coastal Reserve (State). This population was found to have Moderate population resilience (USFWS 2020).

The Recovery Unit Level Analysis will be conducted by the USFWS during their review of the Biological Assessment.

7.2. BALD EAGLE

7.2.1. Biology

The bald eagle is a large, North American fish-eagle in the hawk family (Accipitridae). It can range from 27-35 inches in length and averages 10 to 12 pounds, with a wingspan that can reach nearly 7 ft. Both males and females have dark brown plumage with a pure white head and tail and a large yellow bill. Juveniles are dark brown with white mottles until adult plumage is obtained at age 5 or 6 (Buehler 2000).

The bald eagle is found throughout the lower 48 states, Alaska and Canada. It typically inhabits mature conifer forests close to clean bodies of water populated with fish, most often rivers, estuaries, coastlines or large lakes. It feeds primarily on fish, when available, but may also eat other birds and mammals, including carrion. Bald eagles usually nest in the tops of tall conifers located near water. The breeding season varies throughout their range, but generally begins in winter in the Southeast (Buehler 2000).

The bald eagle was removed from the federal list of threatened and endangered wildlife on 8 August 2007 (USFWS 2007b). After de-listing, the Bald and Golden Eagle Protection Act (BGPA) became the primary law protecting bald eagles. The BGPA prohibits the "take" of bald and golden eagles and provides a definition of "take" that includes disturbance.

Under the National Bald Eagle Management Guidelines (USFWS 2007a), road construction within 660 ft. of a nest during the breeding season should be avoided.

7.2.2. Survey Results and Impacts

No bald eagle nests were found during aerial surveys within the preliminary HB-0001 study area or 660 ft. buffer (Figure 4). One active eagle nest was found in a dead pine within 0.5 mi. of the preliminary study area, east of the Alligator River and south of U.S. Hwy. 64 (Figure 4). Two additional nests were found east of the river that appeared to be unoccupied (Figure 4).

No bald eagle nests will be impacted by the proposed bridge replacement.

8. CONSERVATION MEASURES

In order to compensate for the potential loss of 1 RCW group at TYR Cluster 63, the NCDOT proposes to debit 1 credit from its conservation credits at P3.

P3 consists of approximately 9,732 acres and was created with the primary purpose of protecting the existing RCW population, improving habitat to increase the population and to provide NCDOT with credits to offset unavoidable impacts to RCWs from transportation projects in the NC Coastal Plain. P3 was previously owned and managed by TCF in accordance with a Memorandum of Understanding (MOU) and 2 subsequent addenda signed by TCF, NCDOT and the USFWS.

On 22 April 1999, NCDOT, USFWS and TCF entered into a MOU for the protection and mitigation credit of RCWs through the establishment of a Wildlife Management Area (WMA) in Tyrrell County, NC known as the P3 WMA.

On 7 September 2000, USFWS wrote a letter to NCDOT clarifying P3 as a RCW mitigation bank. P3 was estimated to have 23 conservation credits and the potential to create 10 creation credits through habitat restoration and the installation of artificial cavities.

In October 2001, NCDOT, USFWS and TCF signed Addendum 1 to the MOU agreeing to 23 "conservation management" credits and the potential for 10 or more "creation" credits through habitat restoration.

The USFWS confirmed in a letter dated 9 September 2013 that the NCDOT had 23 conservation credits and 10 creation credits on P3 available for debiting. These credits would remain available to NCDOT until debited even if the groups were lost or their habitat destroyed by a natural disaster beyond the control of NCDOT.

A joint meeting was held between the USFWS and NCDOT on 25 September 2013 to discuss the use of conservation and creation credits for the U.S. Hwy. 64 widening project (R-2544/2545). The USFWS stated that for direct "take," a 1:1 ratio of creation credits and 1:1 ratio for conservation credits (2:1 ratio total) would be required. Indirect "take" would require a 2:1 ratio of conservation credits. It was decided that credits used for indirect "take" could be reclaimed and returned to the P3 RCW Mitigation Bank for reuse. In order to reclaim conservation credits, full demographic monitoring of RCWs would be required on P3 and on private properties impacted by the U.S. Hwy. 64 project pre-project, through construction and then a minimum of 5 years post-clearing.

A MOU between the NCDOT and the USFWS was signed in December 2017 concerning the status and future of RCW monitoring and conservation credits on P3 (NCDOT and USFWS 2017, Appendix B). Agreements in the MOU included:

- RCW demographic monitoring would be discontinued after 2018.
- 23 conservation credits could be used by NCDOT to offset unavoidable impacts to RCWs from future NCDOT projects.
- These 23 credits could be used at a 1:1 ratio whether the impacts were direct, indirect or cumulative.
- These 23 credits would remain available "regardless of the status of the WMA RCW population" (NCDOT and USFWS 2017).
- These credits would not expire and would remain available to the NCDOT until debited.

The Alligator River Bridge Replacement project will result in the Incidental Take of 1 RCW cluster, TYR Cluster 63, and the debit of 1 conservation credit from the P3 conservation bank. Post-project, NCDOT will have 22 conservation credits remaining on P3.

9. CONCLUSIONS

No RCW cavity trees will be removed or impacted by the proposed project.

RCW Cluster TYR 63 does not meet the Regional SMS Guidelines for NE NC (Carter 2014) pre- or post-project and will require Incidental Take due to foraging habitat loss. No additional RCW groups will require Incidental Take due to group density or neighborhood-level impacts.

As compensation for impacts to TYR Cluster 63, 1 credit will be debited from NCDOT's conservation credits at P3; post-project, 22 conservation credits will remain.

Biological Conclusion **May affect, likely to adversely affect**

No bald eagles or nests were detected within the 660 ft. radius eagle survey corridor during ground or aerial surveys.

Biological Conclusion **No effect**

10. LITERATURE CITED

Carter III, J.H. 2012. Revised red-cockaded woodpecker SMS foraging habitat standards for northeastern North Carolina. Submitted via email to W. McDearman, USFWS RCW Recovery Coordinator, 29 June 2012. Updated and approved by W. McDearman 10 July 2013.

Carter III, J.H. 2014. Revised red-cockaded woodpecker Standard for Managed Stability foraging habitat guidelines for the Northeastern North Carolina Essential Support Population. 6 February 2014.

Dr. J. H. Carter III and Associates, Inc. 2012. Red-cockaded woodpecker and bald eagle aerial survey for the widening of US Highway 64, (Project #s R-2544 and R-2545) from Columbia to near Mann's Harbor, Dare and Tyrrell Counties, North Carolina. Dated 14 March 2012. Report prepared for NCDOT. 31 pp.

Conner, R.N. and D.C. Rudolph. 1991. Forest habitat loss, fragmentation and red-cockaded woodpecker populations. *Wilson Bulletin*. 103(3): 446-457.

Crowder, L. B., J. A. Priddy, and J. R. Walters. 1998. Demographic isolation of red-cockaded woodpecker groups: a model analysis, Project Final Report. Duke University, Nicholas School of the Environment, Beaufort, NC. 17 pp.

Hooper, R.G. and M.R. Lennartz. 1995. Short-term response of a high density red-cockaded woodpecker population to loss of foraging habitat. Pp 283-289 *in* D.L. Kulhavy, R.G. Hooper and R. Costa, (eds). Red-cockaded woodpecker: species recovery, ecology and management. Stephen F. Austin State University, Nacogdoches, Texas.

Letcher, B.H., J.A. Priddy, J.R. Walters and L.B. Crowder. 1998. An individual-based, spatially explicit simulation model of the population dynamics of the endangered red-cockaded woodpecker, *Picoides borealis. Biological Conservation* 86:1-14.

NC Department of Transportation. 2012a. US 64 improvements project from 0.9 mile east of Columbia to US 264 near Mann's Harbor, Tyrrell and Dare Counties, North Carolina. Draft Environmental Impact Statement. Prepared for the US Army Corp of Engineers.

_____. 2012b. Red-cockaded woodpecker and bald eagle aerial survey for the widening of US Highway 64, (Project #s R-2544 and R-2545) from Columbia to near Mann's Harbor, Dare and Tyrrell Counties, North Carolina. 14 March 2012. 31 pp.

_____. 2013a. Revised red-cockaded woodpecker foraging habitat analysis report for the widening of US Highway 64 from Columbia to near Mann's Harbor, Dare and Tyrrell Counties, North Carolina. 2 January 2013. 93 pp.

_____. 2013b. NEPA/404 Merger project team meeting agreement: concurrence point number 3, LEDPA/Preferred Alternative selection. 14 February 2013.

_____. 2013c. Red-cockaded woodpecker ground and aerial surveys for the widening of US Highway 64 from Columbia to near Mann's Harbor, Dare and Tyrrell Counties, North Carolina. 27 May 2013. 12 pp.

_____. 2014. Red-cockaded woodpecker biological assessment for the widening of US Highway 64 from Columbia to near Mann's Harbor, Dare and Tyrrell Counties, North Carolina. T.I.P. Number R-2544/R-2545. 6 June 2014. 90 pp.

_____. 2021a. HB-0001 Merger Team Concurrence Point 2/2A meeting summary. 22 April 2021.

_____. 2021b. HB-0001 Merger Team Concurrence Points 3 and 4A meeting summary. June 23, 2021.

NC Department of Transportation and U.S. Fish and Wildlife Service. 2017. Memorandum of Understanding between North Carolina Department of Transportation and U.S. Fish and Wildlife Service. Signed 12 December 2017.

NC Wildlife Resources Commission. 2020. Downloadable Game Land Data .kmz files. Fall 2020. Downloaded 12 May 2021 at https://www.ncwildlife.org/Hunting/Where-To-Hunt-Shoot/Public-Places

Schafale, M.P. 2012. Guide to the natural communities of North Carolina, fourth approximation. NC Department of Natural Resources, Natural Heritage Program. 208 pp.

Schafale, M.P., in prep. Classification of the Natural Communities of North Carolina (Fourth Approximation). Completed sections accessible at https://www.ncnhp.org/classification-natural-communities-fourth-approximation

US Fish and Wildlife Service. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): Second revision. USFWS, Atlanta, Georgia. 296 pp.

_____. 2005. Memo from N. Walsh. 4 May 2005. Implementation procedures for use of foraging habitat guidelines and analysis of project impacts under the red-cockaded woodpecker (*Picoides borealis*) recovery plan: second revision.

_____. 2007a. National bald eagle management guidelines. US Fish and Wildlife Service, Atlanta, GA. 23 pp.

_____. 2007b. Endangered and threatened wildlife and plants; removing the bald eagle in the lower 48 states from the list of endangered and threatened wildlife. 50 CFR Part 17. *Federal Register*, Volume 72, No. 130. Washington, DC. 28 pp.

_____. 2014. Letter to W. Biddlecome, U.S. Corps of Engineers. Biological Opinion for the proposed US 64 Improvements Project in Tyrrell and Dare Counties, North Carolina. 10 September 2014. 39 pp.

_____. 2020. Species status assessment report for the red-cockaded woodpecker (*Picoides borealis*). Version 1.3, April 2020. U.S. Fish and Wildlife Service, Atlanta, Georgia. 198 pp. plus appendices.

USFWS and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook, Procedures for conducting consultation and conference activities under section 7 of the Endangered Species Act. 315 pp.

Walters, J.R., L. B. Crowder and J. A. Priddy. 2002. Population viability analysis for red-cockaded woodpeckers using an individual-based model. *Ecological Applications* 12:249-260.

Walters, J.R., P. Baldassaro, K.M. Convery, R. McGregor, L.B. Crowder, J.A. Priddy, D.C. Kessler and S.A. Tweddale. 2011. A decision support system for identifying and ranking critical habitat parcels on and in the vicinity of Department of Defense Installations. SERDP Project RC-1472. January 2011. 214 pp.

APPENDIX A

Comparison of aerial photography
within the foraging habitat partition for
Tyrrell County red-cockaded woodpecker
(*Dryobates borealis*) Cluster 63

1998. NC Department of Information Technology, Center for Geographic Information and Analysis.	2010. NC Department of Transportation. Received June 2012.	2021. NC Department of Transportation, Photogrammetry Unit. Flown 25 March 2021.

Figure A1. Comparison of aerial photography dated 1998, 2010 and 2021 in the vicinity of red-cockaded woodpecker (*Dryobates borealis*) (RCW) Cluster TYR 63, Tyrrell County, North Carolina. 1:2,400

1998. NC Department of Information Technology, Center for Geographic Information and Analysis.	2010. NC Department of Transportation. Received June 2012.	2021. NC Department of Transportation, Photogrammetry Unit. Flown 25 March 2021.

Figure A2. Comparison of aerial photography dated 1998, 2010 and 2021 south of U.S. Highway 64 and within the foraging partition for (*Dryobates borealis*) (RCW) Cluster TYR 63, Tyrrell County, North Carolina. 1:2,400

APPENDIX B.

Memorandum of Understanding

between

North Carolina Department of Transportation

and U.S. Fish and Wildlife Service

December 2017

Memorandum of Understanding
between
North Carolina Department of Transportation
and U.S. Fish and Wildlife Service

THIS AGREEMENT (the "MOU") is made and entered into on the date herein below last written, by and between the **STATE OF NORTH CAROLINA, acting through the DEPARTMENT OF TRANSPORTATION** (NCDOT) and the **UNITED STATES OF AMERICA, ACTING THROUGH THE U.S. FISH AND WILDLIFE SERVICE** (USFWS) (hereinafter "the Parties").

WITNESSETH:

WHEREAS, the USFWS is authorized to enter into agreements with NCDOT in accordance with the Endangered Species Act (18 U.S.C. 1531, et seq.; as amended) (ESA), and

WHEREAS, NCDOT is authorized to enter into agreements with USFWS, and

WHEREAS, NCDOT implements transportation improvements across the state of North Carolina (the "Projects") which may impact the red-cockaded woodpecker (RCW) which is listed as a federally endangered species, and

WHEREAS, NCDOT desires to minimize the impacts of the Projects on RCW populations, and

WHEREAS, NCDOT and USFWS (along with The Conservation Fund, a non-profit corporation) previously entered into a Memorandum of Understanding in April, 1999 (1999 MOU) (FWS Agreement No. 1448-40181-99-K-005) with Addendum 1 entered in October 2001 and Addendum 2 in June 2003 (collectively herein referred to as the "1999 MOU"). The 1999 MOU established the Palmetto Peartree Wildlife Management Area ("WMA") in Tyrrell County, NC, which consisted of approximately 9,732 +/- acres and cost approximately $16,300,000.00. The primary purpose of the WMA is to protect, enhance and/or preserve RCW populations to offset the loss of RCWs or their habitat associated with NCDOT Projects in the Coastal Plain.

WHEREAS, in addition to the 1999 MOU, a conservation easement dated April 28, 1999 was imposed on the WMA to further protect, enhance and/or preserve RCW populations and habitat and to preserve the natural environmental characteristics of the WMA.

WHEREAS, since its inception, the WMA has generated twenty-three (23) RCW conservation credits and ten (10) RCW creation credits which are available to NCDOT to offset RCW impacts from NCDOT Projects.

WHEREAS, since the establishment of the twenty-three (23) RCW conservation credits, NCDOT has avoided and minimized all potential effects and had no takes to RCW populations for all

projects constructed over the last 18 years within the WMA service area.

WHEREAS, pursuant to the 1999 MOU, annual monitoring of RCW populations has been performed. However, the 1999 MOU and Conservation Easement were terminated on July 7, 2015 at the agreement of the Parties (including The Conservation Fund). The WMA is currently owned by NCDOT and NCDOT is seeking a qualified entity to take over ownership and management of the WMA that is consistent with the goal of preserving the natural environmental characteristics of the WMA.

WHEREAS, the Parties agree that due to sea level rise, land subsidence, and other causes of cavity tree loss such as pine beetle infestations, the RCW population within the WMA is likely not sustainable over the long term.

WHEREAS, the Parties agree that preserving the genetic diversity of the RCW population and expanding the range is beneficial for the species.WHEREAS, the Parties agree that translocations of RCW donor birds for the augmentation of eligible populations and recipient clusters is beneficial for the species.

WHEREAS, the Parties agree to the translocation of RCW from within the WMA to locations approved by USFWS and agreed upon by both parties.

WHEREAS, the Parties agree that the clusters located within the current corridor for NCDOT's Alligator River Bridge and US Highway 64 widening are first priorities for translocation if they meet the criteria per the RCW Recovery Plan.

NOW THEREFORE, the parties hereto agree as follows:

(1) The RCW credits can be used to offset unavoidable impacts to RCWs from NCDOT Projects.

(2) The RCW credits will be utilized only to offset unavoidable impacts of the RCW when the NCDOT can demonstrate to the satisfaction of the USFWS that there are no available or practical avoidance and minimization alternatives.

(3) It is understood that NCDOT will consult with the USFWS concerning any Project which would affect RCWs. RCW credits from the WMA will be considered for application against those Projects which would impact RCWs and determined by USFWS not to jeopardize the continued existence of the species.

(4) The WMA has generated twenty-three (23) RCW conservation credits for the benefit of NCDOT to offset possible future RCW impacts from NCDOT Projects. These RCW credits cannot expire, or be revoked, and will be available to NCDOT until debited. The success of the translocations will in no way affect these RCW credits.

FURTHERMORE, the specific obligations of the respective parties to the Memorandum of Understanding are set forth below:

(A) The USFWS will:

(1) Grant NCDOT 23 RCW conservation credits from the establishment of the WMA.

These credits cannot expire, or be revoked, and will remain available to NCDOT until debited regardless of the status of the WMA RCW population.

(2) Agree that NCDOT may use the 23 RCW conservation credits at a 1:1 ratio regardless of whether the RCW impacts are direct, indirect, or cumulative for any future RCW consultations for NCDOT projects.

(3) Agree that if future NCDOT Projects, requiring compensation, occur within the boundaries of the WMA, then the WMA may be utilized to off-set those losses, with the available credits reduced by the number of incidental takes by the project.

(4) Agree to coordinate and assist with any translocation of RCWs from within the WMA.

(B) NCDOT will:

(1) Continue to provide RCW ground monitoring for 2017 and 2018 as provided in previous years.

(2) Fund the translocation of RCWs by an approved third party under the direction and guidance of the USFWS.

(3) Provide annual data collection reports of RCW activity in the WMA to the USFWS for two years.

(4) In any event, NCDOT will provide funding of no more than a total of One Million Dollars ($1,000,000.00) for ground monitoring and translocation efforts.

Amendment or modification of this Memorandum of Agreement may be proposed at any time but will not be adopted unless agreed to by all parties in writing.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding to be executed as of the date below last written.

STATE OF NORTH CAROLINA,
acting through the DEPARTMENT OF TRANSPORTATION

By: _____ **Date:** 12-12-17

Its: _____**, Duly Authorized.**

UNITED STATES OF AMERICA,
acting through the U. S FISH AND WILDLIFE SERVICE

By: _____ **Date:** 12·4·17

Its: _____**, Duly Authorized.**