2017

Investigation of red-cockaded woodpeckers in Virginia: 2016 report

B. D. Watts
The Center for Conservation Biology, bdwatt@wm.edu

M. D. Wilson
The Center for Conservation Biology

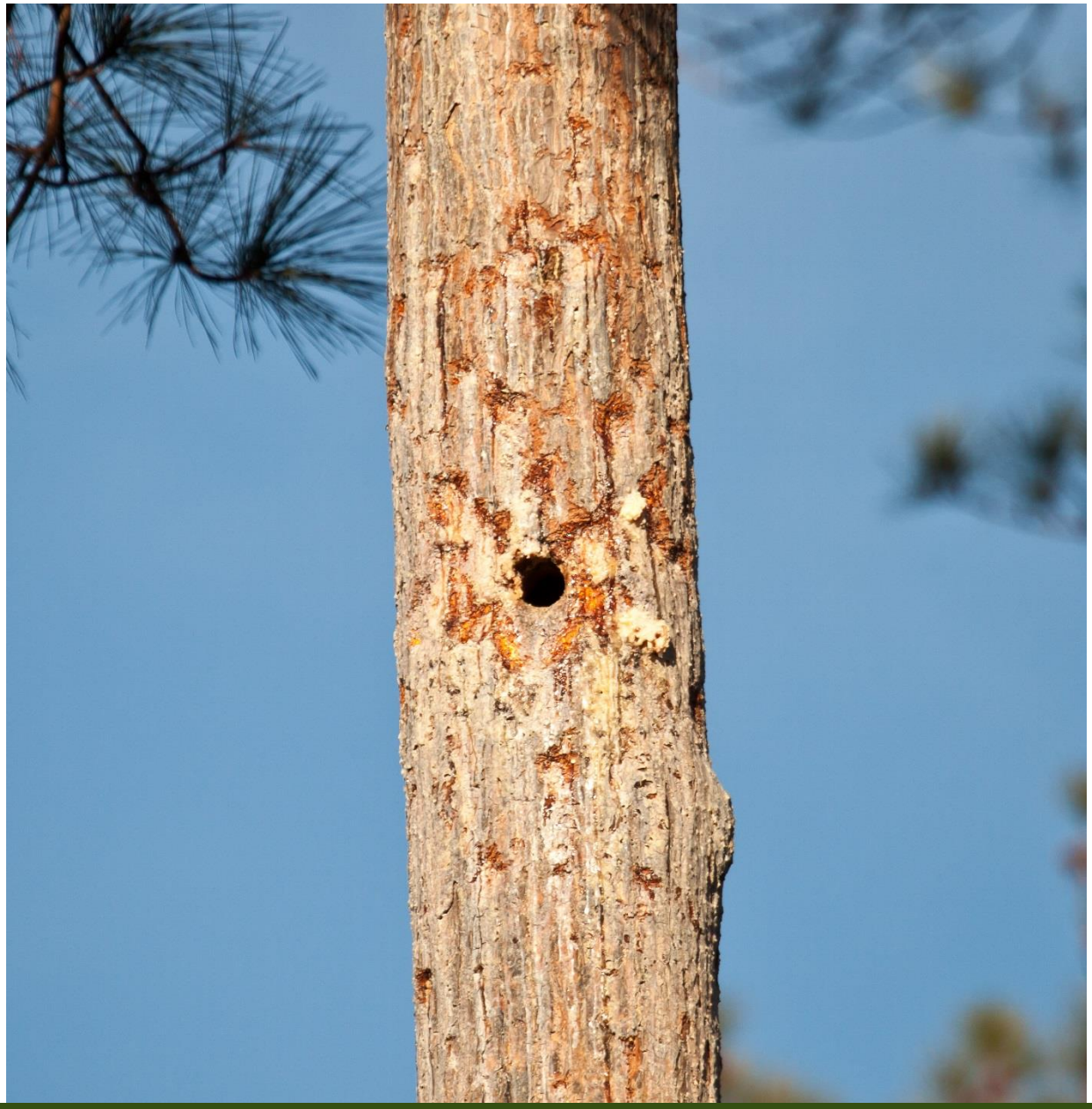
C. J. Lotts

F. M. Smith
The Center for Conservation Biology, fmsmit@wm.edu

B. J. Paxton
The Center for Conservation Biology, bjpaxt@wm.edu

Recommended Citation

Watts, B. D., M. D. Wilson, C. J. Lotts, F. M. Smith, and B. J. Paxton. 2017. Investigation of Red-cockaded Woodpeckers in Virginia: 2017 report. The Center for Conservation Biology Technical Report Series: ccbtr-17-02. College of William & Mary and Virginia Commonwealth University, Williamsburg, VA. 16 pp.



INVESTIGATION OF RED-COCKADED WOODPECKERS IN VIRGINIA: 2016 REPORT

THE CENTER FOR CONSERVATION BIOLOGY

COLLEGE OF WILLIAM AND MARY

VIRGINIA COMMONWEALTH UNIVERSITY

Investigation of Red-cockaded Woodpeckers in Virginia: 2016 report

Bryan D. Watts
Fletcher M. Smith
Barton J. Paxton
Mark Pavlosky, Jr.
The Center for Conservation Biology
College of William and Mary & Virginia Commonwealth University

Recommended Citation:

Watts, B. D., F. M. Smith, B. J. Paxton and M. Pavlosky, Jr. 2017. Investigation of Red-cockaded Woodpeckers in Virginia: Year 2016 report. The Center for Conservation Biology Technical Report Series, CCBTR-17-02. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 16 pp.

Project Funded By:

The Nature Conservancy (Virginia Chapter)

The Center for Conservation Biology
College of William and Mary & Virginia Commonwealth University

Virginia Department of Game and Inland Fisheries through a Federal Aid in Wildlife Restoration Grant from the U.S. Fish and Wildlife Service

Front Cover: Red-cockaded woodpecker roost cavity within Piney Grove Preserve during the winter. Photo by Bryan Watts.

The Center for Conservation Biology is an organization dedicated to discovering innovative solutions to environmental problems that are both scientifically sound and practical within today's social context. Our philosophy has been to use a general systems approach to locate critical information needs and to plot a deliberate course of action to reach what we believe are essential information endpoints.

Table of Contents

Contents

EXECUTIVE SUMMARY

The Virginia population of red-cockaded woodpeckers is the northernmost throughout the species range and has been in eminent danger of extinction for more than 30 years. The Piney Grove Preserve represents a nucleus for recovery in the state and the focus of a multi-organizational partnership designed to increase the population to a sustainable level. The partnership has executed a program of aggressive habitat management, cavity-tree management and woodpecker population monitoring and management that has resulted in a tripling of the breeding population since the early 2000s.

During the 2016 breeding season, Piney Grove Preserve supported 13 potential breeding groups that produced 16 fledglings. All groups made breeding attempts except for cluster 12. Four of the remaining 12 clusters failed to produce fledglings. The population as a whole had a reproductive rate of 1.2±0.34 (mean±SE). The 12 groups that made breeding attempts had a success rate of 67% (8 of 12). Fledging rate for the 8 productive pairs was 2.0±0.33. Of the 41 eggs produced in 2016, 22 (53.7%) hatched, 20 (48.8%) survived to banding age, and only 16 (39.0%) fledged. Birds that fledged included 11 females and 5 males. Eight of these birds were retained and detected during the winter count.

During the calendar year of 2016, 84 individual red-cockaded woodpeckers were identified within Piney Grove preserve including 64 birds produced during previous years and 20 nestlings produced in 2016. Thirty-three birds (39%) were in their fourth year or more and three (3.6%) were in their tenth year or more.

Moving into the breeding season there were 64 birds identified within Piney Grove Preserve distributed among 14 clusters. This is the highest number of adults that Piney Grove has ever carried into the breeding season and compares to 60 birds in 2015 and 56 birds in 2014. The number of birds per cluster varied from two to nine with a mean of 4.4+0.57 (mean+SE). Fifty-four birds were detected during the 2016 winter survey. This represents a 20% reduction (54 vs 68) from the winter of 2015 and is the lowest number carried into the winter since 2012. Winter group size ranged from one to eight birds and averaged 3.6+0.47 (mean±SE) birds per group. Birds present include ten of the 16 birds fledged in 2016 and 44 adult birds hatched in previous years. There were 20 adult birds detected during the spring survey that were not detected during winter survey including three breeding males and one breeding female.

BACKGROUND

Context

The red-cockaded woodpecker (Picoides borealis) is endemic to the southeastern pine ecosystem breeding from Texas and Oklahoma east to Florida and north to Virginia (Jackson 1994). Highly specialized, the species requires old growth, fire maintained pine savannas. Throughout the twentieth century advances in transportation, wood processing, and silvicultural practices shifted the emphasis from long-rotation lumber production to maximum-yield fiber production and resulted in catastrophic declines in habitat availability for this species. Breeding distribution contracted from the edges of the range and became localized within the core of the historic range where remnant old growth remained. The red-cockaded woodpecker was listed as endangered in 1970 and received protection with the passage of The Endangered Species Act in 1973 (16 U.S.C. 1531 et seq).

The historic status and distribution of the red-cockaded woodpecker in Virginia is poorly known because no systematic survey of the species was completed prior to dramatic habitat losses. Early accounts of red-cockaded woodpeckers were made from all physiographic provinces of Virginia. Jurisdictions with records include the counties of Giles (Bailey 1913), Albemarle (Rives 1890), Brunswick (Murray 1952), Dinwiddie (Murray 1952), Chesterfield (Murray 1952), Southampton (Steirly 1949), Sussex (Steirly 1950), Prince George (Steirly 1957), Greensville (Steirly 1957), Isle of Wight (Steirly 1957) and the current independent cities of Norfolk (Bailey 1913), Suffolk (Steirly 1957), Virginia Beach (Sykes 1960), and Chesapeake (van Eerden and Bradshaw, unpublished observation). The first systematic survey of the species was initiated in 1977 and resulted in the documentation of 43 clusters within 5 counties (Miller 1978). By 1980, only 9 of these clusters were still forested (Bradshaw 1990). During the 20-year period between 1980 and 2000, the decline of the Virginia population is well documented (Watts and Bradshaw 2005). By 1990, only 5 of the original 23 clusters detected in 1977 were still active. During the breeding season of 2002, Virginia supported only 2 breeding pairs and 2 clusters with solitary males.

The red-cockaded woodpecker was recommended for endangered status within the state of Virginia in 1978 (Byrd 1979) and 1989 (Beck 1991) and was listed as a Tier I Species of Greatest Conservation Need in the 2005 Virginia Wildlife Action Plan (VDGIF 2005). The stated rationale for recommendations was the extremely low and declining population in Virginia, continued loss and degradation of required old growth forests and the fact that all remaining breeding sites existed on private lands making appropriate management unfeasible. Following these recommendations, the Virginia Department of Game and Inland Fisheries and partners have mounted extensive monitoring and management efforts for the past 30 years. Acquisition of the Piney Grove Preserve in 1998 by The Nature Conservancy was a critical turning point in the species' recovery (Watts and Bradshaw 2005). Intensive habitat and population management on this last remaining site in Virginia has resulted in a population increase from 2 breeding groups in 2002 to 13 breeding groups in 2014 (Wilson et al. 2015). A three-phase conservation plan is in place for the Virginia population that includes the establishment of additional breeding locations (Watts and Harding 2007). Translocation of birds into the Great Dismal Swamp was executed during the falls of 2015 and 2016.

OBJECTIVES

The primary objective of this ongoing project is to monitor the population of Red-cockaded Woodpeckers within the Piney Grove Preserve. A secondary objective is to collect information relevant to the continued management of birds and their habitat in Virginia. Specific objectives include:

1) To determine the number and identification of all birds resident within Piney Grove during the 2016 calendar year.

2) To monitor breeding activity in order to document productivity and allow for the unique banding of all individuals within the population.

3) To monitor and manage nest trees and cavity condition.

METHODS

Site Description

Piney Grove Preserve contains an old-growth loblolly, pond pine, and short-leaf pine community in Sussex County, Virginia. The site supports a complex of moderate-age pine stands interspersed with pockets of older trees ranging from 80 to 140 years. Historically, the site was managed for saw timber on a relatively long rotation by Gray Lumber Company. The site was purchased by Hancock Timber Resource Group in 1993. Under Hancock Timber's management, site quality was improved by removing the dense hardwood understory. The Nature Conservancy purchased the tract from Hancock Timber in 1998. The Nature Conservancy has developed an aggressive management program designed to restore the disturbance regime necessary to return the site to an open pine savannah.

A single clan of Red-cockaded Woodpeckers was discovered within this site in 1985. A second clan was discovered in 1994 and a third in 1995. These 3 clans still remain active. Since 1999, there have been 12 recruitment clusters established by The Nature Conservancy through the installation of artificial cavities.

Banding

Being able to identify individual birds is an essential element of the monitoring program. Banding individuals with unique combinations of color bands allows for their identification and, for this reason, has been one of the project goals.

Adults

Adult birds are captured using a specialized net mounted on a telescopic pole shortly after they roost at dusk. The birds are "roosted" and the net is raised in place and the bird is enticed out into the net. Net poles are only effective on cavities below 50 feet in height. In 1998, Don Schwab banded 10 Red-cockaded Woodpeckers within the Piney Grove complex. In 2000, 7 of these birds were still resident within Piney Grove. During 2000, Bryan Watts banded an additional 4 adult birds, leaving only 2 unbanded birds in the

population (1 each in clusters 3 and 5). The 2 remaining unbanded adults within clusters 3 and 5 were lost during 2004 and 2005 respectively. Since this time, nearly all birds within the population have been individually identified by unique, color-band combinations. The only birds that remain unbanded are nestlings that could not be removed from nest cavities and have not been captured after fledging.

Nestlings

For logistical and safety reasons, banding of Red-cockaded Woodpecker nestlings is restricted to an age window of 5-10 days. Because of this restriction, close monitoring of breeding activity is essential to successful banding. During the early portion of the breeding season, both the breeding pair and the nest cavity from each cluster area were monitored closely to determine clutch initiation dates. Where cavity height permits, breeding status is determined via the use of a miniature video camera mounted on an extendable pole. The pole can accommodate cavity heights to 50 ft (15.2 m). For cavities exceeding that height, breeding status was determined by visual monitoring of activity at the cavity. After dates of incubation were determined, an estimated hatching date was calculated. Nest cavities were monitored closely around the time of expected hatching to verify hatch dates. The window for banding was determined from estimated hatching dates.

All nestlings were banded during the recommended age window. Nest trees were climbed with ladders and nestlings were extracted from cavities using a noose apparatus. Nestlings were then lowered to the ground, banded, and returned to the cavity. Each nestling received a unique combination of color bands as described above. Nestlings were weighed at the time of banding using a Pesola spring scale. In the first 2 weeks after fledging, birds were identified and sex was determined by crown plumage.

General Observations

As in previous years, 2 systematic surveys of all birds within Piney Grove were conducted to identify individuals and to determine distribution. Surveys were conducted in the early spring prior to the expected breeding window and in early winter after the expected dispersal period. All clusters were visited before dawn to count the number of individuals emerging from roost cavities and/or joining emerging birds to determine clan size. Birds were followed while foraging so that color band combinations could be read with spotting scopes. Biologists systematically worked through all sites over a period of days until all individuals were identified. Once clutches were laid, observations were made at the nest cavity to identify the breeding male and female for each site.

It should be noted that color bands applied since 2009 have had unacceptably high loss rates. Prior to 2009 the project used typical celluloid bands that had low rates of loss. When these bands were no longer available on the market the project began to utilize darvic bands (2009) and then acetal bands (2012) provided by Avinet. Both band types had high loss rates in Virginia and within many other locations (personal communication). In 2016 the project transitioned to using bands made by Red Bird. We have initiated a capture program to replace defective bands and this effort is ongoing.

RESULTS

Breeding Observations

Piney Grove supported 13 potential breeding groups in 2016 that produced 16 fledglings (Table 1). All groups made breeding attempts except for cluster 12. Despite several nest checks within cluster 12, no breeding attempt was documented for the first time since 2013. Four of the remaining 12 clusters failed to produce fledglings. The population as a whole had a reproductive rate of 1.2±0.34 (mean±SE). The 12 groups that made breeding attempts had a success rate of 67% (8 of 12). Fledging rate for the 8 productive pairs was 2.0±0.33. Of the 41 eggs produced in 2016, 22 (53.7%) hatched, 20 (48.8%) survived to banding age, and only 16 (39.0%) fledged (Table 1). Birds that fledged included 11 females and 5 males (Table 2). Eight of these birds were retained and detected during the winter count.

Table 1. Summary of 2016 breeding activity for red-cockaded woodpeckers within Piney Grove Preserve.

Breeding Group	Potential Breeding Group?	Breeding Attempt?	Eggs Laid	Eggs Hatched	Banding Age	Fledged
Cluster 1	Yes	Yes	3	0	0	0
Cluster 3	Yes	Yes	4	3	2	2
Cluster 5	Yes	Yes	4	3	3	3
Cluster 6	Yes	Yes	1	0	0	0
Cluster 7	Yes	Yes	3	3	3	3
Cluster 8	Yes	Yes	5	3	3	3
Cluster 10	Yes	Yes	3	1	1	1
Cluster 11	Yes	Yes	4	4	3	0
Cluster 12	Yes	No	-----	-----	-----	-----
Cluster 13	Yes	Yes	3	1	1	1
Cluster 15	Yes	Yes	3	1	1	1
Cluster 18	Yes	Yes	4	1	1	0
Cluster 19	Yes	Yes	4	2	2	2
Total	13	12	41	22	20	16

Table 2. List of red-cockaded woodpecker nestlings banded within Piney Grove Preserve during the 2016 breeding season. Genders were determined during fledge checks.

Breeding Group	Date	USGS Band	Left	Right	SEX
Cluster 3	5/31/2016	2421-02952	LG/YE/LB	AL/YE	F
Cluster 3	5/31/2016	2421-02953	LB/DG/WH	AL/LB	F
Cluster 5	5/24/2016	2421-02947	LG/DG/OR	AL/DG	F
Cluster 5	5/24/2016	2421-02948	DB/WH/YE	AL/DB	F
Cluster 5	5/24/2016	2421-02949	LB/YE/DG	AL/LG	M
Cluster 7	5/19/2016	2421-02943	DB/LG/YE	AL/DB	M
Cluster 7	5/19/2016	2421-02944	LB/WH/OR	AL/DG	F
Cluster 7	5/19/2016	2421-02945	AL/LB	LG/OR/WH	F
Cluster 8	5/19/2016	2421-02940	DB/LB/YE	AL/DB	F
Cluster 8	5/19/2016	2421-02941	LB/DB/OR	AL/DG	F
Cluster 8	5/19/2016	2421-02942	LG/YE/WH	AL/LB	M
Cluster 10	5/19/2016	2421-02946	DB/OR/YE	AL/DB	M
Cluster 11	5/28/2016	2421-02954	LB/DB/YE	AL/DB	Unk[1]
Cluster 11	5/28/2016	2421-02955	DB/LB/OR	AL/DG	Unk[1]
Cluster 11	5/28/2016	2421-02956	LG/DB/WH	AL/LB	Unk[1]
Cluster 13	5/28/2016	2421-02951	DB/DB/DB	AL/OR	F
Cluster 15	5/24/2016	2421-02950	LB/WH/DG	AL/LG	M
Cluster 18	5/14/2016	2421-02937	DB/DB/YE	AL/DB	Unk[2]
Cluster 19	5/14/2016	2421-02938	DB/DB/OR	AL/DG	F
Cluster 19	5/14/2016	2421-02939	DB/DB/WH	AL/LB	F

[1] Nest cavity was empty on day 20.

[2] Young found dead in cavity. Cause unknown.

Breeding Details

Cluster 1 –The breeding male remains in this cluster (DG/YE/DG, WH/AL) for five consecutive breeding seasons, though this cluster did not attempt to breed in 2014 when all birds present were males. In the 2016 season, the laying female was unbanded and is likely the same bird from the 2015 breeding season. Three eggs were recorded on 9, 14, 19, and 24 May in tree #36 but on the 28th May visit the eggs were absent and no re-nesting attempts were documented.

Cluster 3 – The breeding male (WH/AL, DB/RE/DB) was new this breeding season. This marks the fourth breeding season for the female (AL/**(RE)**, LG/YE/DG). The pair nested in tree #179. Breeding activity was first documented on 9 May when 3 eggs were observed. Hatchlings were first observed on May 24 and were aged as "2 days old" at that time. The nest was visited on 28 May, but the young were still too small for banding at that point. The young were banded on 31 May and were quite small for their age (actual age 8 d, physical or key age 7 and 5 d), at 17 and 24 grams. Both birds fledged and were observed on 9 June and identified as females at that time. During the winter count, one of the females was present within Cluster 3, and the other was not observed.

Cluster 5 – The breeding male (LB/WH/LB, AL/DG) was new at Cluster 5, while the breeding female (OR/OR/**(OR)**, AL/LG) remained the same for the third consecutive year. The pair nested in a new unnumbered cavity tree. No breeding activity was recorded on the 16th, 22nd, or 29th of April, and a full clutch of 4 eggs was observed on 9 May. Three young and 1 egg were observed on 19 May, and 3 young were banded on 24 May. Young were 10 days old but keyed to 8 days old at banding. Three birds successfully fledged, comprised of one male and two females. One male and one female were detected during the winter head count (both within Cluster 5) and one female was not detected.

Cluster 6 –The breeding male from the previous 5 seasons (AL/DG, DB/RE/DB) was found dead prior to the breeding season. This bird wedged the primaries of his wing under the restrictor plate of tree #137 and subsequently died. One egg was found in tree #116 on 22 June, but on a subsequent nest check on 27 June the egg was absent. The presumed breeding male was (**(PU)**/YE/**(PU)**, AL/LB)

Clusters 7 & 9 – The breeding male (OR/OR/OR, AL/DG) continued for the fifth consecutive year and the breeding female was new this year (AL/WH, WH/PU/WH or AL/LB, WH/PU/WH, both hatched in Cluster 7 in spring 2015). The pair nested in tree #109. Three eggs were observed on 29 April and 9 May, and three hatchlings were observed on 14 May and banded on 19 May. Young were 8 days old and keyed to 8 days at banding. All three were seen on 31 May and 10 June, and were identified as two males and one female. One male and the female were observed during the fall head count and the 2016 winter head count. Fall head counts were conducted within Cluster 7 and 10 in an effort to identify hatching-year males as candidates for the Great Dismal Swamp National Wildlife Refuge RCWO reintroduction. The male absent during the fall head count was observed in Cluster 15 during the winter head count. Neither of the adult females from the breeding season were observed during the winter head count.

Cluster 8 – The breeding pair here remained the same for the eight consecutive year. The breeding male (LB/WH/LB, AL/**(DB)**) was originally banded in Cluster 5 in 2004 and the breeding female (LB/WH/LB, **(OR)**/AL) was originally banded in Cluster 5 in 2007. Four eggs were observed on 30 April, and a fifth egg

was observed on 9 May. Three young were observed on 9 May, and all three were banded on 14 May. Young were 9 days old and keyed to 9 days at banding. All three fledglings (two females and one male) were observed during the 2016 winter head count, one female was observed in Cluster 17 and one male and one female within Cluster 8.

Cluster 10 – The breeding pair was comprised of a male (WH/RE/WH AL/WH) that has bred at the site for the 7th consecutive year and a female (DG/YE/DG, OR/AL) that has bred at this site for the 8th consecutive year. Three eggs were first detected on 9 May. One chick was banded on 19 May and was 5 days old. This bird was identified as a male during fledge checks, but was not detected during the fall or winter head counts. Fall head counts were conducted within Cluster 10 and 7 in an effort to identify hatching-year males as candidates for the Great Dismal Swamp National Wildlife Refuge RCWO reintroduction.

Cluster 11 – The breeding male (YE/DB/YE, LB/AL) and the breeding female (OR/DB/OR, AL/DB) both paired for the third consecutive year. Tree #270 was used as the nesting tree. The nest tree was observed to have 1 egg on 29 April, 3 eggs on 9 May, and 4 eggs on 14 May. Three young were banded on 28 May, and during the subsequent fledge check none of the birds were observed. Young were 7 days old and keyed to 6 days old at banding. None of the birds were observed during the winter head count.

Cluster 12 – No breeding occurred at this cluster for the first time in 3 years. Cluster 12 was established as an artificial recruitment cluster in the early days of Piney Grove. It remained unoccupied for most of that time aside from its use in one winter in 2011 by a single bird that moved to another cluster before the following spring. In the winter of 2013 this cluster became occupied by a female that bred in Cluster 7 that same season (DB/RE/DB, YE/AL). The female roosted in an artificial cavity and was joined for foraging by a bird that was presumed to be flying over from Cluster 1 (DG/AL, YE/YE/DG). Breeding attempts followed in 2014 and 2015. A new female (AL/LG, YE/OR/YE) occupied the cluster in 2016, the previous breeding female was absent during the 2016 spring/breeding/winter head counts.

Cluster 13 – The breeding male was (WH/RE/WH, AL/DB) and the breeding female was identified as (AL/LG, WH/**(PU)**/WH). The pair nested in tree #271. Three eggs were observed on 9 May, and 2 eggs on 14 May. One egg and one young were observed on 19 May, and one young was banded on 28 May. Young was 9 days old and keyed to 9 days at banding. This bird fledged, and was identified as a female. This young of the year was seen during the winter head count within Cluster 13.

Cluster 14 – This cluster was inactive during the 2016 season as a breeding cluster. The male (AL/LG, WH/LB/WH) occupied this cluster and interacted with the Cluster 17 birds.

Cluster 15 – This was the sixth consecutive year that a pair successfully bred in this cluster and the 5th consecutive year for breeding by this male (YE/DB/YE, AL/YE) and female (WH/LB/WH, **(PU)**/AL). This pair had one female helper during the breeding season. These birds occupied tree #265 during the 2016 breeding season. Three eggs were observed on 9 May, and one nestling and two unhatched eggs were observed on 19 May. One nestling was banded on 24 May. Young was 7 days old and keyed to 7 days at banding. This bird was observed on a fledge check on 10 June and was identified as a female. This bird was not observed during the winter head count.

Cluster 17 – No breeding activity was observed in the cluster during the 2016 season.

Cluster 18 – This was the third time a breeding attempt occurred at this cluster. The breeding male (YE/DB/YE, RE/AL) and the breeding female (AL/WH, YE/LG) were both present. Three eggs were observed on 22 April and 4 Eggs on 29 April. One nestling and one unhatched egg were observed on 9 May, one nestling was banded on 14 May, and the nestling was found dead in the cavity on 28 May. The young was 8 days old and keyed to 8 days at banding. The pair used Tree #254. Later in the season, two new RCWOs were observed vocalizing and chasing the resident breeding pair. They were identified as (AL/LB, YE/OR/YE) and (YE/LG, AL/WH), and no further breeding attempts occurred within the cluster after the first attempt failed.

Cluster 19 – This marked the 5th consecutive year that breeding has occurred at this site. The breeding male (OR/DB/OR, AL/LG) assumed reproductive duties in 2016 but the length of time that the female (AL/**(YE)**, DB/**(RE)**/DB) has held breeding status cannot be fully determined since there were multiple females at this site in previous years that assisted in incubation. Incubation was first observed in tree #224 on 29 April (4 eggs) and 2 eggs and 2 nestlings were observed on 9 May. Two young were banded on 14 May. Young were 7 days old and keyed to 5 days at banding. Both individuals fledged and were observed on 28 May and again on 10 June. Both were identified as female during the fledge check. The young of the year were not seen during the winter head count.

Population Monitoring

During the calendar year of 2016, 84 individual red-cockaded woodpeckers were identified within Piney Grove preserve (Tables 3 and 4). This included 64 birds that were hatched at Piney Grove during previous years and 20 nestlings banded or fledged during the 2016 breeding season. Thirteen birds were still present that were produced during the 2015 breeding season. Thirty-three birds (39%) were in their fourth year or more and three (3.6%) were in their tenth year or more. All of these older birds including one female and two males are breeders within the population.

There were 31 birds detected in 2015 that were not detected in 2016. This includes the loss of 18 adults hatched prior to 2015 and 13 birds hatched in 2015. Only three of the ten juveniles that left prior to the 2016 breeding season were present during the 2015 winter count. Three of the adults lost before the breeding season were previous breeders including males from C3 and C19 and a female from C12.

Moving into the breeding season there were 64 birds identified within Piney Grove Preserve distributed among 14 clusters including C-1, C-3, C-5, C-6, C-7, C-8, C-10, C-11, C-12, C-13, C-15, C-17, C-18 and C-19. This was the highest number of adults that Piney Grove has ever carried into the breeding season and compares to 60 birds in 2015, 56 birds in 2014 and 52 birds in 2013. The number of birds per cluster varied from two to nine with a mean of 4.4+0.57 (mean+SE). Clusters 12, 17 and 18 had only the breeding pair present moving into the breeding season. Clusters eight, seven and ten carried the most birds including nine, seven and seven respectively.

Fifty-four birds were detected during the 2016 winter survey (Table 4). This represents a 20% reduction (54 vs 68) from the winter of 2015 and is the lowest number carried into the winter since 2012. Birds present include ten of the 16 birds fledged in 2016 and 44 adult birds hatched in previous years. There

were 20 adult birds detected during the spring survey that were not detected during winter survey including three breeding males and one breeding female. Three of the birds detected were males that were associated with multiple clusters typical of the prospecting behavior observed prior to the breeding season.

During the winter survey, birds were associated with 14 different cluster areas including C-1, C-3, C-5, C-6, C-7, C-8, C-10, C-11, C-12, C-13, C-15, C17, C-18, and C-19. As in years past, the birds roosting in C-9 actively forage with the birds from C-7 so behave as one functional group. Group size in winter ranged from one to eight birds and averaged 3.6+0.47 (mean±SE) birds per group. Clusters 17, 18 and 19 supported only one to two birds each. As in past years, cluster 8 supported the largest foraging group with eight birds.

Table 3. Individual Red-Cockaded Woodpecker sightings during the Spring 2016 survey within Piney Grove Preserve. Bold band colors between parentheses represent bands lost.

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
1581-66270	DG/YE/DG	WH/AL	M	2006	**1**
821-70970	AL/DB	**(LG)**/YE/**(LG)**	M	2013	**1**
Unbanded	Unbanded	Unbanded	F	2013	**1**
821-70952	YE/**(OR)**/YE	AL/YE	F	2012	**3**
2421-02910	WH/AL (rev)	DB/RE/DB	M	2014	**3**
1581-66297	AL/**(RE)**	LG/YE/DG	F	2009	**3**
Unbanded	Unbanded	Unbanded	M	2015	**3**
2421-02903	OR/WH/OR	AL/LB	F	2014	**5**
1581-66288	LB/WH/LB	AL/DG	M	2008	**5**
2421-02933	WH/LB/WH	AL/LB	M	2015	**5**
821-70930	OR/OR/**(OR)**	AL/LG	F	2011	**5**
2421-02908	WH/LG/WH	AL/OR	F	2014	**5**
2421-02928	YE/YE/DB	AL/DB	F	2015	**5 & 8**
1581-66253	DB/RE/DB	AL/**(WH)**	F	2004	**6**

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
821-70946	**(PU)**/YE/**(PU)**	AL/LB	M	2012	**6**
821-70977	AL/YE	**(PU)/(YE)/(PU)**	M	2013	**6**
821-70988	WH/LB/WH	AL/YE	F	2014	**6**
1541-29906	AL/DG	DB/RE/DB	F	2009	**6**
821-70901	OR/OR/OR	AL/DG	M	2009	**7**
821-70972	WH/**(PU)**/WH	AL/OR	M	2013	**7**
2421-02914	AL/DB	WH/**(PU)**/WH	M	2015	**7**
821-70929	YE/OR/YE	AL/WH	M	2011	**7**
821-70955	WH/**(PU)**/WH	AL/LG	M	2012	**7**
2421-02918	AL/WH	WH/PU/WH	F	2015	**7**
2421-02920	AL/LB	WH/PU/WH	F	2015	**7**
821-70918	YE/DB/**(YE)**	**(YE)**/AL	M	2011	**8**
1581-66251	LB/WH/LB	AL/**(DB)**	M	2004	**8**
1581-66278	LB/WH/LB	**(OR)**/AL	F	2007	**8**
821-70967	AL/OR	YE/YE/DB	M	2013	**8**
821-70994	YE/YE/DB	AL/LG	M	2014	**8**
2421-02927	YE/**(YE)/(DB)**	AL/WH	M	2015	**8**
821-70906	AL/RE	YE/DB/YE	M	2010	**8**
821-70965	AL/LG	YE/YE/DB	F	2013	**8**
Unbanded	Unbanded	Unbanded	U	Unknown	**8**
1581-66273	WH/RE/WH	AL/WH	M	2007	**10**
821-70963	AL/YE	LG/YE/LG	F	2012	**10**
2421-02929	OR/WH/OR	AL/DB	M	2015	**10**
821-70927	OR/OR/OR	AL/MB	M	2011	**10**
1581-66276	DG/YE/DG	OR/AL	F	2007	**10**
2421-02930	OR/WH/OR	AL/WH	F	2015	**10**
2421-02913	AL/YE	LG/DB/LG	F	2015	**10**
821-70919	YE/DB/YE	LB/AL	M	2011	**11**
821-70935	OR/DB/OR	AL/DB	F	2011	**11**

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
821-70958	AL/WH	YE/MB/YE	M	2012	**11**
1581-66296	DG/AL	YE/YE/DG	M	2009	**12**
821-70981	AL/LG	YE/OR/YE	F	2013	**12**
2421-02931	LG/LG/LG	AL/YE	M	2015	**12**
1581-66274	WH/RE/WH	AL/DB	M	2007	**13**
2421-02905	AL/LG	WH/**(PU)**/WH	F	2014	**13**
2421-02907	AL/WH	YE/OR/YE	M	2014	**13**
2421-02906	AL/OR	YE/OR/YE	M	2014	**13**
821-70923	YE/**(LG)**/LG	AL/WH	M	2011	**13&18**
821-70933	WH/LB/WH	**(PU)**/AL	F	2011	**15**
1581-66280	YE/DB/YE	AL/YE	M	2007	**15**
821-70986	WH/YE/WH	AL/WH	F	2014	**15**
1581-66300	AL/RE	LB/WH/LB	M	2009	**17**
2421-02932	WH/LB/WH	AL/WH	F	2015	**17**
821-70949	AL/LG	WH/LB/WH	M	2012	**14 & 17**
821-70921	YE/DB/YE	RE/AL	M	2011	**18**
821-70964	AL/WH	LG/YE/**(LG)**	F	2012	**18**
821-70980	AL/LB	YE/OR/YE	F	2013	**18**
821-70936	OR/DB/OR	AL/LG	M	2011	**19**
1581-66299	AL/**(YE)**	DB/**(RE)**/DB	F	2009	**19**
2421-02916	AL/OR	LG/DB/LG	F	2015	**19 & 7**
Total Number of RCWOs during Spring 2016 Head Count					**64**

Table 4. Individual Red-Cockaded Woodpecker sightings during the winter 2016-17 survey within Piney Grove Preserve. Bold band colors between parentheses represent bands lost.

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
1581-66270	DG/YE/DG	WH/AL	M	2006	**1**
821-70970	AL/DB	**(LG)**/YE/**(LG)**	M	2013	**1**
Unbanded	Unbanded	Unbanded	F	2013	**1**
821-70952	YE/**(OR)**/YE	AL/YE	F	2012	**3**
2421-02910	WH/AL (rev)	DB/RE/DB	M	2014	**3**
2421-02952	LG/YE/LB	AL/YE	F	2016	**3**
1581-66297	AL/**(RE)**	LG/YE/DG	F	2009	**3 & 6**
2421-02903	OR/WH/OR	AL/LB	F	2014	**5**
1581-66288	LB/WH/LB	AL/DG	M	2008	**5**
2421-02948	DB/WH/YE	AL/DB	F	2016	**5**
2421-02949	LB/YE/DG	AL/LG	M	2016	**5**
1581-66300	AL/RE	LB/WH/LB	M	2009	**5**
2421-02933	WH/LB/WH	AL/LB	M	2015	**5 & 17**
1581-66253	DB/RE/DB	AL/**(WH)**	F	2004	**6**
821-70946	**(PU)**/YE/**(PU)**	AL/LB	M	2012	**6**
821-70977	AL/YE	**(PU)/(YE)/(PU)**	M	2013	**6**
821-70988	WH/LB/WH	AL/YE	F	2014	**13**
821-70901	OR/OR/OR	AL/DG	M	2009	**7**
821-70972	WH/**(PU)**/WH	AL/OR	M	2013	**7**
2421-02914	AL/DB	WH/**(PU)**/WH	M	2015	**7**
2421-02943	DB/LG/YE	AL/DB	M	2016	**7**
2421-02944	LB/WH/OR	AL/DG	F	2016	**7**
821-70929	YE/OR/YE	AL/WH	M	2011	**7 & 19**
2421-02945	AL/LB	LG/OR/WH	F	2016	**15**
821-70906	AL/RE	YE/DB/YE	M	2010	**15**
821-70918	YE/DB/**(YE)**	**(YE)**/AL	M	2011	**8**
1581-66251	LB/WH/LB	AL/**(DB)**	M	2004	**8**
1581-66278	LB/WH/LB	**(OR)**/AL	F	2007	**8**
821-70967	AL/OR	YE/YE/DB	M	2013	**8**
821-70994	YE/YE/DB	AL/LG	M	2014	**8**
2421-02927	YE/**(YE)/(DB)**	AL/WH	M	2015	**8**
2421-02940	DB/LB/YE	AL/DB	F	2016	**17**
2421-02941	LB/DB/OR	AL/DG	F	2016	**8**
2421-02942	LG/YE/WH	AL/LB	M	2016	**8**

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
1581-66273	WH/RE/WH	AL/WH	M	2007	**10**
821-70963	AL/YE	LG/YE/LG	F	2012	**10**
2421-02929	OR/WH/OR	AL/DB	M	2015	**10**
821-70919	YE/DB/YE	LB/AL	M	2011	**11**
821-70935	OR/DB/OR	AL/DB	F	2011	**11**
821-70958	AL/WH	YE/MB/YE	M	2012	**11**
1581-66296	DG/AL	YE/YE/DG	M	2009	**12**
821-70981	AL/LG	YE/OR/YE	F	2013	**12**
2421-02931	LG/LG/LG	AL/YE	M	2015	**12**
1581-66274	WH/RE/WH	AL/DB	M	2007	**13**
2421-02905	AL/LG	WH/**(PU)**/WH	F	2014	**13**
2421-02907	AL/WH	YE/OR/YE	M	2014	**13**
2421-02951	DB/DB/DB	AL/OR	F	2016	**13**
821-70949	AL/LG	WH/LB/WH	M	2012	**14 & 17**
821-70933	WH/LB/WH	**(PU)**/AL	F	2011	**15**
1581-66280	YE/DB/YE	AL/YE	M	2007	**15**
821-70921	YE/DB/YE	RE/AL	M	2011	**18**
821-70964	AL/WH	LG/YE/**(LG)**	F	2012	**18**
821-70936	OR/DB/OR	AL/LG	M	2011	**19**
1581-66299	AL/**(YE)**	DB/**(RE)**/DB	F	2009	**19**
Total Number of RCWOs during 2016-17 Head Count					**54**

ACKNOWLEDGMENTS

This project received assistance from many individuals during 2016. Brian vanEerden and Bobby Clontz from TNC provided logistical support and administrative oversight as well as assistance in the field. Funding for all demographic monitoring and cavity management during the breeding season was provided by the Virginia Chapter of the Nature Conservancy and the Center for Conservation Biology. The winter survey is supported with funds provided by the Virginia Department of Game and Inland Fisheries through a Federal Aid in Wildlife Resources Grant from the U.S. Fish and Wildlife Service. Thanks to Sergio Harding for his direct assistance with funds from DGIF. Marie Pitts assisted with report production. We also thank Erica Lawler and Jane Lopez of the Sponsored Programs Office at the College of William and Mary for their administrative assistance.

LITERATURE CITED

Bailey, H. H. 1913. The birds of Virginia. J. P. Bell Company, Lynchburg, VA.

Beck, R. A. 1991. Red-cockaded woodpecker. Pages 513-514 *in* K. Terwilliger (ed.) Virginia's Endangered Species: Proceedings of a symposium. McDonald and Woodward Publishing Company, Blacksburg, VA.

Bradshaw, D. S. 1990. Habitat quality and seasonal foraging patterns of the red-cockaded woodpecker (*Picoides borealis*) in southeastern Virginia. M.A. Thesis, College of William and Mary, Williamsburg, Va.

Byrd, M. A. 1979. Red-cockaded woodpecker. Pages 425-427 *in* D. W. Linzey (ed.) Endangered and threatened plants and animals of Virginia. Blacksburg Center for Environmental Studies, Virginia Polytechnic Institute and State University. Blacksburg, VA.

Jackson, J. A. 1994. Red-cockaded woodpecker (*Picoides borealis*). In A. Poole and F. Gill (eds.)The Birds of North America, No. 85. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Miller, G. L. 1978. The population, habitat, behavioral and foraging ecology of the red-cockaded woodpecker (*Picoides borealis*) in southeastern Virginia. M.A. Thesis, College of William and Mary, Williamsburg, VA.

Murray, J. J. 1952. A check-list of the birds of Virginia. Virginia Society of Ornithology. Virginia Avifauna No. 1.

Rives, W. C. 1890. A Catalogue of the Birds of the Virginias. Proceedings of the Newport Natural History Society. Newport, Rhode Island.

Steirly, C. C. 1949. A note on the red-cockaded woodpecker. Raven 20:6-7.

Steirly, C. C. 1950. Nest cavities of the red-cockaded woodpecker. Raven 21:2-3.

Steirly, C. C. 1957. Nesting ecology of the red-cockaded woodpecker. Atl. Nat. 12:280-292.

Sykes, P. W., Jr. 1960. Recent nesting of the red-cockaded woodpecker in the Norfolk area. Raven 31:107-108.

Virginia Department of Game and inland Fisheries. 2005. Virginia's comprehensive wildlife conservation strategy. Virginia Department of Game and inland Fisheries, Richmond, VA.

Watts, B. D. and D. S. Bradshaw. 2005. Decline and protection of the Virginia red-cockaded woodpecker population. *In* R. Costa and S. J. Daniels (eds.) Red-cockaded woodpecker: road to recovery. Hancock House Publishers, Blain, Washington, USA.

Watts, B.D. and S.R. Harding. 2007. Virginia Red-cockaded Woodpecker Conservation Plan. Center for Conservation Biology Technical Report Series, CCBTR-07-07. College of William and Mary, Williamsburg, VA. 42 pp.

Wilson, M. D., B. D. Watts, C. Lotts, F. M. Smith, and B. J. Paxton, 2015. Investigation of Red-cockaded Woodpeckers in Virginia: Year 2014 report. Center for Conservation Biology Technical Report Series, CCBTR-15-005. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 28 pp.