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Investigation of Red-cockaded Woodpeckers in Virginia: Year 2018 report

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INVESTIGATION OF RED-COCKADED WOODPECKERS IN VIRGINIA: 2018 REPORT

THE CENTER FOR CONSERVATION BIOLOGY

COLLEGE OF WILLIAM AND MARY

VIRGINIA COMMONWEALTH UNIVERSITY

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Front Cover Image: Nestling woodpecker being extracted from cavity in cluster 1 for banding. 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.

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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 quadrupling of the breeding population since the early 2000s.

During the 2018 breeding season, Piney Grove Preserve supported 15 potential breeding groups (including one in the Big Woods) that produced 25 fledglings. All groups made breeding attempts except for cluster 18 and a new cluster in the Big Woods. Only two of the remaining clusters failed to produce fledglings. The population as a whole had a reproductive rate of 1.7±0.33 (mean±SE) young/breeding group. The 13 groups that made breeding attempts had a success rate of 85% (11 of 13). Fledging rate for the11 productive pairs was 2.3±0.27. Of the 46 eggs followed in 2018, 21 (45.7%) hatched, 21 (45.7%) survived to banding age, and 20 (43.5%) fledged. Birds that fledged included 12 females, 10 males and 1 bird where gender remains unknown. Eleven of these birds were retained and detected during the winter count and two (male and female, hatching-year birds) were translocated to Great Dismal Swamp, NWR on 8 November.

During the calendar year of 2018, 91 individual red-cockaded woodpeckers were identified within Piney Grove preserve including 66 birds that were hatched at Piney Grove during previous years and 25 nestlings that fledged during the 2018 breeding season. Thirty-six birds (40%) were in their fourth year or more and six birds (7%) were at least in their tenth year. Two birds were fourteen years old (fifteenth calendar year).

Moving into the breeding season there were 65 birds were 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. The number of birds per cluster varied from two to nine with a mean of 4.5+0.53 (mean+SE). Seventy-three birds were detected during the 2018 winter survey. This represents a 7% increase over the winter of 2017 and a 35% increase over the winter of 2016. Birds present include 12 of the 25 birds fledged in 2017 and 61 adult birds hatched in previous years. Group size in winter ranged from two to eight birds and averaged 4.9+0.52 (mean±SE) birds per group.

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 by 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 National Wildlife Refuge has been executed during the falls of 2015, 2016, 2017 and 2018 with the intent of establishing a second breeding population within the

state (Watts et al. 2019). The first successful breeding in the refuge was documented during the spring of 2017 (Watts et al. 2018).

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 2018 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 or during emergence in the morning. 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, we monitored both the breeding pair and the nest cavity from each cluster area to determine clutch initiation dates. We used a miniature video camera mounted on a telescopic, extendable pole to monitor breeding status. The pole can accommodate cavity heights to 50 ft (15.2 m). For cavities exceeding that height, we determined breeding status by monitoring adult activity around the cavity entrance or by climbing nest trees. We estimated hatching dates from egg dates and closely monitored nest cavities around the time of expected hatching to verify hatch dates. We projected the banding window for nestlings from estimated hatching dates.

We banded all nestlings within the recommended age window. We climbed nest trees with Swedish climbing ladders and extracted nestlings from cavities using a noose apparatus. We lowered nestlings to the ground, banded, weighed and measured them and returned them to cavities. 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. We determined the sex of nestlings either by examining crown plumage while in the cavity or during fledge checks. We confirmed fledging of all birds in the first two weeks after the projected fledge date.

General Observations

As in previous years, we conducted two systematic surveys of all birds within Piney Grove Preserve to identify individuals and to determine distribution. We conducted surveys in the early spring prior to the expected breeding window and in early winter after the expected dispersal period. We visited all clusters before dawn to count the number of individuals emerging from roost cavities and/or joining emerging birds to determine clan size. We followed birds while they were foraging to read combinations of color bands with spotting scopes. We 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.

Translocation

The U.S. Fish and Wildlife Service, the Virginia Department of Game & Inland Fisheries, and The Nature Conservancy, agreed in the spring of 2017 and again in the summer of 2018 to attempt to move a pair of woodpeckers from Piney Grove Preserve to the Great Dismal Swamp National Wildlife Refuge. This decision was in support of ongoing efforts to establish a second breeding population in Virginia. Following the breeding season, we assessed possible donor clusters based on fledging results. Clusters that produced young were considered potential donors if they met criteria established in the national management plan. Clusters were considered to be potential donors of a male if 1) the cluster contained a hatching-year male at the time of anticipated translocation and 2) the group supported at least 1 additional helper male. Clusters were considered to be potential donors of a female if the group supported a hatching-year female at the time of anticipated translocation. Clusters were eliminated from the potential donor pool for logistical reasons if roost cavities were >50 feet (15.2 m). Selection of donor clusters for male and females were determined independently except that the pair would not be taken from the same cluster.

We roosted birds in September within potential donor clusters to determine retention of hatching-year birds and to identify target birds. Target birds and two backup birds were identified for possible translocation. Target and backup birds were roosted again during the first week of October in preparation for captures. We deployed two teams to capture birds prior to roosting during the night of the translocation. Birds were captured after entering cavities using pole nets. Once captured, birds were lowered to the ground and handled to confirm identification and gender. Birds were placed in transport boxes and driven to the Great Dismal Swamp, NWR for placement.

Birds were placed in artificial cavities, screened in for the night and released at dawn the following morning. We climbed recipient trees using Swedish climbing ladders, placed birds in artificial cavities and tacked screens over the entrance. A release team returned to the recruitment cluster before dawn the following morning. Screens were removed just after dawn and birds were allowed to fly out into their new habitat.

RESULTS

Breeding Observations

Piney Grove supported 15 potential breeding groups (including one in Big Woods) in 2018 that produced 25 fledglings (Table 1). All potential breeding groups made breeding attempts except for cluster 18 in Piney Grove and the pair in the Big Woods. Clusters 6 and 8 each made two breeding attempts but produced no young. Cluster 10 failed in its first breeding attempt and apparently produced two young in a second breeding attempt after 14 June (see details below). The population as a whole had a reproductive rate of 1.7±0.33 (mean ± SE) young/breeding group. The 13 groups that made breeding attempts had a success rate of 85% (11 of 13). Fledging rate for the 11 productive pairs was 2.3±0.27. Of the 46 eggs followed in 2018, 21 (45.7%) hatched, 21 (45.7%) survived to banding age, and 20 (43.5%) fledged (Table 1). Birds that fledged included 12 females, 10 males and 1 bird where gender remains unknown (Table 2). Eleven of these birds were retained and detected during the winter count and two were translocated to Great Dismal Swamp, NWR.

Table 1. Summary of 2018 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	2	1	1	1
Cluster 3	Yes	Yes	Unk	Unk	3	3
Cluster 5	Yes	Yes	3	3	3	2
Cluster 6(c1)	Yes	Yes	2	0	0	0
Cluster 6(c2)	Yes	Yes	3	0	0	0
Cluster 7	Yes	Yes	4	4	4	4
Cluster 8(c1)	Yes	Yes	5	0	0	0
Cluster 8(c2)	Yes	Yes	4	0	0	0
Cluster 10(c1)	Yes	Yes	2	0	0	0
Cluster 10(c2)	Yes	Yes	Unk	Unk	Unk	≥2
Cluster 11	Yes	Yes	4	2	2	2
Cluster 12	Yes	Yes	2	2	2	2
Cluster 13	Yes	Yes	3	3	3	3
Cluster 15	Yes	Yes	4	1	1	1
Cluster 17	Yes	Yes	4	3	3	3
Cluster 18	Yes	No	-----	-----	-----	-----
Cluster 19	Yes	Yes	4	2	2	2
Big Woods	Yes	No	-----	-----	-----	-----
Total	**15**	**16**	**≥51**	**≥26**	**≥26**	**≥25**

Table 2. List of red-cockaded woodpecker nestlings banded within Piney Grove Preserve during the 2018 breeding season. Genders were determined during fledge checks.

Breeding Group	Date	USGS Band	Left	Right	SEX
Cluster 7	5/16/2018	2421-02985	AL/LB	WH/RE/WH	M
Cluster 7	5/16/2018	2421-02982	AL/OR	WH/RE/WH	F
Cluster 7	5/16/2018	2421-02983	AL/LG	WH/RE/WH	F
Cluster 7	5/16/2018	2421-02984	AL/OR	WH/RE/WH	M
Cluster 13	5/20/2018	2421-02989	YE/RE/YE	AL/DB	F
Cluster 13	5/20/2018	2421-02990	YE/RE/YE	AL/OR	M
Cluster 17	5/20/2018	2421-02986	DG/WH/DG	AL/LB	M
Cluster 17	5/20/2018	2421-02987	DG/WH/DG	AL/OR	F
Cluster 17	5/20/2018	2421-02988	DG/WH/DG	AL/DB	M
Cluster 19	5/20/2018	2421-02991	YE/WH/YE	AL/LB	F
Cluster 19	5/20/2018	2421-02992	YE/WH/YE	AL/OR	M
Cluster 11	5/24/2018	2421-02994	LB/YE/LB	AL/DB	M
Cluster 11	5/24/2018	2421-02993	LB/YE/LB	AL/LG	F
Cluster 12	5/24/2018	2421-02995	YE/RE/YE	AL/DB	M
Cluster 12	5/24/2018	2421-02996	YE/RE/YE	AL/YE	F
Cluster 3	5/29/2018	2421-02997	DB/RE/DB	AL/RE	F
Cluster 3	5/29/2018	2421-02998	DB/RE/DB	AL/DB	F
Cluster 3	5/29/2018	2421-02999	DB/RE/DB	AL/YE	F
Cluster 15	6/2/2018	2421-03000	OR/DB/OR	AL/DB	F
Cluster 1	6/4/2018	2421-01604	DB/YE/DG	DB/AL	M
Cluster 5	6/4/2018	2421-01601	AL/DB	LB/WH/LB	U
Cluster 5	6/4/2018	2421-01602	AL/LG	LB/WH/LB	M

Breeding Group	Date	USGS Band	Left	Right	SEX
Cluster 5	6/4/2018	2421-01603	AL/OR	LB/WH/LB	F

Breeding Details

Cluster 1 – The breeding male (DG/YE/DG, WH/AL) was present for the seventh consecutive breeding season, though no breeding was recorded in 2014 when all birds present were males. In the 2018 season, the laying female was unbanded and is likely the same bird (2015-2018) for the previous three seasons. Two eggs were detected on 16 May in tree #214. This tree has a very low DBH and the cavity was extremely narrow. A single chick was documented on 2 June and banded on 4 June at 7 days of age (actual and physical age). A fledge check on 23 June identified the bird as a male. This bird was not detected during the 2018 winter count.

Cluster 3 – The breeding male (WH/AL, DB/RE/DB) remained for the third consecutive year and the breeding female (YE/OR/YE, AL/YE) for the second season. The pair nested in tree #179. Incubation was confirmed on 8 May when exchanges were documented. Incubation continued on 16 May with no feeding behavior. Three young were recorded to be 4 days old on 23 May and all three were banded on 29 May. A fledge check on 15 June identified all three young as females. Only one of these birds was identified during the 2018 winter count and it was resident in cluster 3.

Cluster 5 – Both breeding adults from the 2017 nesting season were still present in 2018. The represents the third consecutive year at cluster 5 for the male (LB/WH/LB, AL/DG) and the second breeding season for the female (OR/WH/OR, AL/LB). The pair nested in cavity tree #260. Breeding activity was first documented on 16 May when multiple incubation exchanges were observed. Three eggs were documented on 24 May. Three young were banded on 4 June between 5 and 7 days (physical age; keyed age 7 days for 2 young and 5 days for third young). Two young were identified on 23 June as a male and a female. The third young (runt) was not detected during fledge checks. Both of these birds were identified during the 2018 winter survey in cluster 5.

Cluster 6 – Both breeding adults from 2017 nesting season were still present within the cluster during the 2018 season. This includes male (**(PU)**/YE/**(PU)**, AL/LB) and female (DB/RE/DB, AL/(WH)). No breeding activity was found on 28 April. Two eggs were observed on 4 May in cavity tree #268. However, the cavity was empty on 16 May. Three eggs were observed on 223 May in cavity tree #256. On 4 June a flying squirrel was observed in cavity tree. No other breeding attempts were documented within the cluster.

Clusters 7 & 9 – The breeding male (OR/OR/OR, AL/DG) continued for the seventh consecutive year. The breeding female from 2017 (LB/WH/OR, AL/DG) was absent during the spring. The breeding female during the 2018 breeding season was believed to be (GY/DB/LB, HP/AL). The nest cavity was in tree #276. Four eggs were observed on 29 April and again on 4 May. Three young and one egg were observed on 8 May. Four young were banded on 16 May at 6-7 days (physical age; keyed to 7 days for 3 young and 6 days for 1 young). During a fledge

check on 3 June, all birds were identified including two males and two females. Two of these birds including one male and one female were still present in cluster 7 during the 2018 winter survey.

Cluster 8 – The breeding pair here remained the same for the tenth 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. No breeding activity was observed on 29 April. Incubation exchanges were observed on 4 May, 8 May and 16 May. On 24 May the tree was climbed and 5 eggs were observed. A break in incubation was suspected on 29 May and the tree was climbed again on 4 June. Four eggs were observed and based on the condition of the eggs (freshness) this clutch was believed to be a second clutch. Incubation activity was observed on 8 June. The cluster was monitored through 16 June with no indication of further incubation activity and no chicks were present in the nest.

Cluster 10 – This breeding male (OR/WH/OR, AL/DB) was present for the second consecutive year. The breeding female was (AL/YE, LG/YE/LG). The nest cavity was in tree #214. No breeding activity was observed on 29 April or 4 May. Two eggs were observed on 8 May but the cavity was empty on 16 May. The pair continued to be present within the cluster area during the day through the season but no breeding was documented through June 14. However, during the winter count two unbanded, hatching-year birds were observed in the area including one that was roosting in cluster 10 and the other roosting in an adjacent cluster. We believe that these birds were produced in cluster 10 after mid-June. This would be the latest breeding documented within Virginia. One of the unbanded birds was captured and banded as a female (AL/DB, OR/OR/OR). Attempts will continue to capture the other bird for banding.

Cluster 11 – The breeding pair including male (YE/DB/YE, LB/AL) and female (OR/OR/DB (rev), AL/DB) were the same for the fifth consecutive year. For the second year the nest cavity was in tree #293. One egg and one recently hatched young were observed on 16 May and two young were banded on 24 May. During a fledge check on 11 June the young were determined to be a male and a female. The male was translocated to Great Dismal Swamp, NWR on 8 November. The female was not detected during the 2018 winter count.

Cluster 12 – Both the male (LG/LG/LG, AL/YE) and female (WH/LB/WH, AL/YE) were paired for the second consecutive year. No activity was recorded on a 29 April visit. The pair nested in cavity tree #266 which was not used in 2017 but had been used in the past. Two eggs were recorded on 16 May and two young were recorded on on 23 May. On 24 May two young were banded at 6 days (physical age; keyed at 6 days for both birds). During a fledge check on 13 June birds were identified as one male and one female. Both of these birds were identified in cluster 12 during the 2018 winter survey.

Cluster 13 – The breeding male (WH/RE/WH, AL/DB) and female (AL/LG, WH/(PU)/WH) were present for their third consecutive breeding season as a pair (and ninth season overall for the male). The nest tree was #13NT1 that was completed during 2016. Two eggs were observed on 29 April and three eggs were observed on 4 May. Two young approximately four days old were observed on 16 May and were banded on 20 May at eight days old. Both of these birds were observed during a fledge check on 7 June and were determined to be one male and one female. Neither of these birds were detected during the 2018 winter survey.

Cluster 15 – Both male (AL/RE, YE/DB/YE) and female (WH/LB/WH, (PU)/AL) from the 2017 breeding season were present. This is the second breeding season for the male and the seventh for the female. The cavity tree was #265. No breeding activity was observed on 29 April, 4 May or 8 May. Two eggs were observed on 16 and 24 May. A single chick was banded on 2 June and was seven days old. During a fledge check on 21 June this bird was identified as a female. This bird was present in cluster 15 during the 2018 winter survey.

Cluster 17 – The breeding male was (AL/LG, WH/LB/WH) and the breeding female was (AL/LG, YE/YE/DB). This was the first breeding season for both birds. The nest cavity was in tree #282. Four eggs were observed on 29 April and again on 4 May. Three young approximately four days old were observed on 16 May and were banded on 20 May at eight days (physical age: keyed to 8 days). During a fledge check on 7 June these birds were determined to include two males and one female. A male and female were detected in cluster 17 during the 2018 winter survey.

Cluster 18 – The breeding male (YE/**(LG)**/LG, AL/WH) was present throughout the breeding season and a new female (LG/YE/LB, AL/YE) was also present. The male was roosting in the artificial cavity in tree #278. The female appeared to be roosting in the blown out natural cavity across the road. The birds were followed during the morning on several occasions and did not indicate breeding. Cavities were checked regularly between 29 April and 17 June with no nests observed. Both breeding adults were present within the cluster during the 2018 winter survey.

Cluster 19 – Both the breeding male (OR/DB/OR, AL/LG) and female (DB/DB/WH, AL/LB) were the same as in 2017. This was their third and second consecutive seasons respectively. The nest cavity was in tree #232. Four eggs were observed on 29 April and again on 4 June. Two young were observed on 16 May and were banded on 20 may at nine days (physical age: keyed to 8 and 9 days). A fledge check on 6 June identified one as a male and the other as a female. Neither of these birds was detected during the 2018 winter survey. However, the breeding female was observed within the Big Woods cluster.

Big Woods – A pair of birds was observed within the Big Woods cluster during the breeding season. The male (YE/OR/YE, AL/OR) was the same bird that was observed in cluster 7 during roosting in preparation for the translocation in the fall of 2017. No breeding activity was documented during the 2018 season. The male was present during the 2018 winter survey. The breeding female (DB/DB/WH, AL/LB) from cluster 19 was also present during the 2018 winter survey.

Population Monitoring

During the calendar year of 2017, 91 individual red-cockaded woodpeckers were identified within Piney Grove Preserve/Big Woods (Tables 2,3,4). This included 66 birds that were hatched at Piney Grove during previous years and 25 nestlings that fledged during the 2018 breeding season. Eleven birds that had been produced during the 2017 breeding season were still present in the population during 2018. Thirty-six birds (39.6%) were in their fourth year (fifth calendar year) or more and six birds (6.6%) were at least in their tenth year (eleventh calendar year). Two birds were fourteen years old (fifteenth calendar year).

There were 16 birds detected in 2017 that were not detected in 2018. This includes the loss of 8 adults hatched prior to 2017 and 8 birds hatched in 2017. Only six of the eleven juveniles that left prior to the 2018 breeding season were present during the 2017 winter count. Only two of the breeding adults from 2017 were lost before the 2018 breeding season including the female from cluster 10 and the female from cluster 7.

Moving into the breeding season there were 65 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, C-19 and Big Woods. This was the highest number of adults that Piney Grove has ever carried into the breeding. The number of birds per cluster varied from two to nine with a mean of 4.5+0.53 (mean ± SE). Clusters 18 and the Big Woods had only the breeding pair present moving into the breeding season. Clusters eight, five and seven carried the most birds including nine, seven and seven respectively.

Seventy-three birds were detected during the 2018 winter survey (Table 4). This represents a 7% increase over the 2017 winter survey and a 35% increase over the 2016 winter survey (73 vs 68 vs 54). Birds present include 12 of the 25 birds fledged in 2018 and 61 adult birds hatched in previous years. There were three adult birds detected during the spring survey that were not detected during winter survey.

During the winter survey, birds were associated with 15 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, C-19 and Big Woods. 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 two to eight birds and averaged 4.9+0.52 (mean ± SE) birds per group. Clusters five, seven and eight each supported eight birds.

Table 3. Individual red-cockaded woodpecker sightings during the 2018 spring 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
2421-02916	AL/OR	LG/DB/LG	F	2015	1
2421-02944	LB/WH/OR	AL/DG	F	2016	1
821-70970	AL/DB	**(LG)**/YE/**(LG)**	M	2013	1
Unbanded	Unbanded	Unbanded	F	Unknown	1
2421-02910	WH/AL **(rev)**	**(DB)**/RE/DB	M	2014	3
821-70952	YE/**(OR)**/YE	AL/YE	F	2012	3
Unbanded	Unbanded	Unbanded	M	Unknown	3

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
2421-02977	OR/DB/LB	HP/AL	F	2017	3, 8
1581-66288	LB/WH/LB	AL/DG	M	2008	5
1581-66300	AL/RE	LB/WH/LB	M	2009	5
2421-02903	OR/WH/OR	AL/LB	F	2014	5
2421-02949	LB/YE/DG	AL/LG	M	2016	5
2421-02978	LG/DB/YE	HP/AL	F	2017	5
2421-02981	LB/DB/OR	HP/AL	F	2017	5
821-70983	AL/WH	WH/LB/WH	F	2013	5
1581-66253	DB/RE/DB	AL/**(WH)**	F	2004	6
1581-66297	AL/**(RE)**	LG/YE/DG	F	2009	6
2421-02948	DB/WH/YE	AL/DB	F	2016	6
2421-02975	WH/DB/YE	HP/AL	M	2017	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 (2)	F	2014	6, 12, 17
2421-02914	AL/DB	WH/**(PU)**/WH	M	2015	7
2421-02943	DB/LG/YE	AL/DB	M	2016	7
2421-02959	GY/DB/LB	HP/AL	F	2017	7
821-70901	OR/OR/OR	AL/DG	M	2009	7
821-70929	YE/OR/YE	AL/WH	M	2011	7
821-70972	WH/**(PU)**/WH	AL/OR	M	2013	7
Unbanded	Unbanded	Unbanded	U	Unknown	7
1581-66251	LB/WH/LB	AL/**(DB)**	M	2004	8

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
1581-66278	LB/WH/LB	**(OR)**/AL	F	2007	8
2421-02927	YE/**(YE)/(DB)**	AL/WH	M	2015	8
2421-02942	LG/YE/WH	AL/LB	M	2016	8
2421-02960	LB/DB/GY	AL/PK	F	2017	8
2421-02965	YE/WH/BK	PK/AL	M	2017	8
821-70967	AL/OR	YE/YE/DB	M	2013	8
821-70994	YE/YE/DB	AL/LG	M	2014	8
821-70918	**(YE)**/DB/**(YE)**	**(YE)**/AL	M	2011	8, 19
2421-02929	OR/WH/OR	AL/DB	M	2015	10
2421-02941	LB/DB/OR	AL/DG	F	2016	10
821-70963	AL/YE	LG/YE/LG	F	2012	10
2421-02970	LG/DB/LB	HP/AL	M	2017	11
2421-02971	OR/DB/YE	HP/AL	F	2017	11
821-70919	YE/DB/YE	LB/AL	M	2011	11
821-70935	OR/OR/DB **(rev)**	AL/DB	F	2011	11
2421-02931	LG/LG/LG	AL/YE	M	2015	12
821-70989	LG/LG/LG	AL/LG	M	2014	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
2421-02964	WH/DB/OR	HP/AL	M	2017	13
2421-02945	AL/LB	LG/OR/WH	F	2016	15

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Spring Cluster
821-70906	AL/RE	YE/**(DB)**/YE	M	2010	15
821-70933	WH/LB/WH	**(PU)**/AL	F	2011	15
2421-02933	WH/LB/WH	AL/LB	M	2015	17
821-70949	AL/LG	WH/LB/WH	M	2012	17
821-70965	AL/LG	YE/YE/DB	F	2013	17
2421-02952	LG/YE/LB	AL/YE	F	2016	18
821-70923	YE**/(LG)**/LG	AL/WH	M	2011	18
2421-02939	DB/DB/WH	AL/LB	F	2016	19
2421-02969	LB/DB/GY	HP/AL	M	2017	19
821-70936	OR/DB/OR	AL/LG	M	2011	19
821-70928	YE/OR/YE	AL/OR	M	2011	BW[a]

[a]Big Woods

Table 4. Individual red-cockaded woodpecker sightings during the 2018-2019 winter survey within Piney Grove Preserve. Bold band colors between parentheses represent bands lost.

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
1581-66270	DG/YE/DG	WH/AL	**M**	2006	1
2421-02916	AL/OR	LG/DB/LG	F	2015	1
2421-02944	LB/WH/OR	AL/DG	F	2016	1
821-70970	AL/DB	**(LG)**/YE/**(LG)**	M	2013	1
Unbanded	Unbanded	Unbanded	F	2013	1
2421-02910	WH/AL **(rev)**	**(DB)**/RE/DB	M	2014	3
2421-02999	DB/RE/DB	AL/YE	F	2018	3
821-70952	YE/**(OR)**/YE	AL/YE	F	2012	3
901-29851	OR/DG/OR	AL/LB	M	2015	3
2421-02977	OR/DB/LB	HP/AL	F	2017	3, 5
1581-66288	LB/WH/LB	AL/DG	M	2008	5
1581-66300	AL/RE	LB/WH/LB	M	2009	5
2421-01602	AL/LG	LB/WH/LB	M	2018	5
2421-01603	AL/OR	LB/WH/LB	F	2018	5
2421-02903	OR/WH/OR	AL/LB	F	2014	5
2421-02949	LB/YE/DG	AL/LG	M	2016	5
821-70983	AL/WH	WH/LB/WH	F	2013	5
2421-02981	LB/DB/OR	HP/AL	F	2017	5, 11
1581-66253	DB/RE/DB	AL/**(WH)**	F	2004	6
1581-66297	AL/**(RE)**	LG/YE/DG	F	2009	6
2421-02948	DB/WH/YE	AL/DB	F	2016	6

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
2421-02975	WH/DB/YE	PK/AL	M	2017	6
821-70946	**(PU)**/YE/**(PU)**	AL/LB	M	2012	6
821-70977	AL/YE	**(PU)/(YE)/(PU)**	M	2013	6
2421-02914	AL/**(DB)**	WH/**(PU)**/WH	M	2015	7
2421-02943	DB/LG/YE	AL/DB	M	2016	7
2421-02959	GY/DB/LB	HP/AL	F	2017	7
2421-02982	AL/OR	WH/RE/WH	F	2018	7
2421-02984	AL/YE	WH/RE/WH	M	2018	7
821-70901	OR/OR/OR	AL/DG	M	2009	7
821-70929	YE/OR/YE	AL/WH	M	2011	7
821-70972	WH/**(PU)**/WH	AL/OR	M	2013	7
1581-66278	LB/WH/LB	**(OR)**/AL	F	2007	8
2421-02927	YE/**(YE)/(DB)**	AL/WH	M	2015	8
2421-02942	LG/YE/WH	AL/LB	M	2016	8
2421-02960	LB/DB/GY	AL/PK	F	2017	8
2421-02965	YE/WH/BK	PK/AL	M	2017	8
821-70918	**(YE)**/DB/**(YE)**	**(YE)**/AL	M	2011	8
821-70967	AL/OR	YE/YE/DB	M	2013	8
821-70994	YE/YE/DB	AL/LG	M	2014	8
2421-02929	OR/WH/OR	AL/DB	M	2015	10
2421-02941	LB/DB/OR	AL/DG	F	2016	10
Unbanded	Unbanded	Unbanded	U	2018	10
2421-02970	LG/DB/LB	HP/AL	M	2017	11

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
2421-02971	OR/DB/YE	HP/AL	F	2017	11
821-70919	YE/DB/YE	LB/AL	M	2011	11
821-70935	OR/OR/DB **(rev)**	AL/DB	F	2011	11
2421-02931	LG/LG/LG	AL/YE	M	2015	12
2421-02995	YE/RE/YE	AL/DB	M	2018	12
2421-02996	YE/RE/YE	AL/YE	F	2018	12
821-70988	WH/LB/WH	AL/YE	F	2014	12
821-70989	LG/LG/LG	AL/LG	M	2014	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
2421-02964	WH/DB/OR	(HP)/AL	M	2017	13
2421-02945	AL/LB	LG/OR/WH	F	2016	15
2421-03000	OR/DB/OR	AL/DB	F	2018	15
821-70906	AL/RE	YE/**(DB)**/YE	M	2010	15
821-70933	WH/LB/WH	**(PU)**/AL	F	2011	15
2421-02933	WH/LB/WH	AL/LB	M	2015	17
2421-02986	DG/WH/DG	AL/LB	M	2018	17
2421-02987	DG/WH/DG	AL/OR	F	2018	17
821-70949	AL/LG	WH/LB/WH	M	2012	17
821-70965	AL/LG	YE/YE/DB	F	2013	17
2421-01605	Al/DB	OR/OR/OR	F	2018	18

USGS Band #	Left Leg	Right Leg	Sex	Hatch Year	Winter Cluster
2421-02952	LG/YE/LB	AL/YE	F	2016	18
821-70923	YE**/(LG)/(LG)**	AL/WH	M	2011	18
2421-02969	LB/DB/GY	HP/AL	M	2017	19
821-70936	OR/DB/OR	AL/LG	M	2011	19
2421-02939	DB/DB/WH	AL/LB	F	2016	BW[a]
821-70928	YE/OR/YE	AL/OR	M	2011	BW[a]

[a]Big Woods

Translocation

Single male and female hatching-year birds were captured in Piney Grove Preserve on 8 November, 2018 and taken to Great Dismal Swamp, NWR for release. The birds were transported in holding boxes, placed in artificial cavities and screened in for the night. Both birds were released just after dawn on 9 November by removing the cavity screens. Both birds emerged successfully from cavities and foraged in the surrounding canopy.

Table 5. Summary of translocation activities for red-cockaded woodpeckers from Piney Grove Preserve during 2018.

USGS Band	Left Leg	Right Leg	Sex	Date Moved	Origin	Destination
2421-02994	LB/YE/LB	AL/DB	M	11/8/18	PGP-C11	GDSNWR-C2-2
2421-02991	YE/WH/YE	AL/LB	F	11/8/18	PGP-C19	GDSNWR-C2-2

Tree and Cavities

A total of 259 woodpecker cavities trees supporting 303 cavities were known and still standing during 2018 (Appendix I). This total includes 212 natural cavities and 91 artificial inserts. Of the 212 natural cavities 79 (37.3%) were starts in various stages of completion. Of the 139 completed natural cavities, 74 (53.2%) were considered active in December.

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APPENDICES

Appendix I. Status of Red-cockaded Woodpecker Cavity Trees at the Piney Grove Preserve in 2018.

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
1	32		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Recent
1	34		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
1	35		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
1	36		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Old/None
1	37		Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
1	39		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
1	42		Loblolly	Live	Natural	Relic	Start	Healing	Unavailable	Old/None
1	43		Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
1	44	a	Loblolly	Live	Natural	Inactive	Complete	>2X	Unstarted	Old/None
1	44	b	Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
1	46		Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None
1	48		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
1	49		Loblolly	Live	Natural	Inactive	Complete	Normal	Unstarted	Old/None
1	52		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
1	53		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
1	54	a	Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
1	54	b	Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
1	55	a	Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
1	55	b	Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None
1	55	c	Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
1	57		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
1	58	a	Loblolly	Live	Natural	Active	Start (Adv)	Normal	Unstarted	Fresh
1	58	b	Loblolly	Live	Natural	Active	Complete	Restrictor	Complete	Fresh
1	58	c	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
1	59	a	Loblolly	Live	Natural	Inactive	Start (Adv)	<2X	Unstarted	Old/None
1	59	b	Loblolly	Live	Natural	Inactive	Start (Adv)	<2X	Unstarted	Old/None
1	117	a	Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
1	117	b	Loblolly	Live	Natural	Inactive	Insert	Normal	Unstarted	Old/None
1	212		Shortleaf	Live	Natural	Active	Complete	Normal	Complete	Fresh
1	213		Loblolly	Live	Natural	Active	Complete	>4X	Complete	Fresh
1	225		Shortleaf	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
1	241		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
1	242		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
1	257	a	Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Fresh
1	257	b	Loblolly	Live	Natural	Inactive	Start (Adv)	<2X	Complete	Old/None
1	273		Shortleaf	Live	Natural	Active	Complete	>2X	Complete	Fresh
1	1NT2		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
1	1NT5		Loblolly	Live	Natural	Relic	Start (Adv)	Normal	Complete	Old/None
1	1NT6		Shortleaf	Live	Natural	Inactive	Start (Adv)	<2X	Unstarted	Old/None
1	1NT7		Loblolly	Live	Natural	Active	Start (Adv)	Normal	Incomplete	Recent
2	60		Loblolly	Live	Artificial	Relic	Insert	Unavailable	Unstarted	Old/None
2	63		Loblolly	Live	Artificial	Relic	Insert	Unavailable	Unstarted	Old/None
3	1		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
3	2		Loblolly	Live	Artificial	Inactive	Insert	Restrictor	Complete	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
3	6		Loblolly	Live	Natural	Relic	Start (Adv)	Normal	Incomplete	Old/None
3	7		Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
3	8		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
3	9		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
3	72		Loblolly	Live	Natural	Inactive	Complete	>2X	Unstarted	Old/None
3	74		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
3	75		Loblolly	Live	Natural	Relic	Complete	Normal	Unstarted	Old/None
3	76		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
3	79		Loblolly	Live	Artificial	Inactive	Insert	Restrictor	Complete	Old/None
3	80		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Complete	Old/None
3	128		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
3	177		Loblolly	Live	Artificial	Relic	Insert	Unavailable	Unstarted	Old/None
3	178		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
3	179		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
3	208		Loblolly	Live	Natural	Relic	Start	Healing	Unstarted	Old/None
3	258		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
3	259		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
3	289		Loblolly	Live	Natural	Relic	Start (Adv)	<2X	Unstarted	Old/None
3	3NT2		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
3	3NT3		Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
4	82		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
4	82		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
4	84		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
4	180		Loblolly	Live	Natural	Unavailable	Unavailable	Normal	Complete	Recent

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
4	186		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
4	186		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
5	14		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
5	15		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	16		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
5	17		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	18		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
5	19	a	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
5	19	b	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
5	19	c	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
5	20		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
5	22		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
5	24	a	Loblolly	Live	Natural	Active	Complete	Restrictor	Complete	Fresh
5	24	b	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	24	c	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	25		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
5	26		Loblolly	Live	Natural	Inactive	Complete	Restrictor	Complete	Old/None
5	28		Loblolly	Live	Natural	Relic	Complete	Restrictor	Unstarted	Old/None
5	30		Loblolly	Live	Artificial	Inactive	Start (Adv)	Normal	Unstarted	Old/None
5	92		Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
5	94		Loblolly	Live	Artificial	Relic	Complete	Restrictor	Complete	Old/None
5	95		Loblolly	Live	Artificial	Inactive	Insert	Unavailable	Unstarted	Old/None
5	127		Loblolly	Live	Artificial	Relic	Insert	Healing	Unavailable	Old/None
5	191		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
5	217		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Recent
5	218		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	236		Loblolly	Live	Natural	Active	Complete	<2X	Complete	Fresh
5	237		Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
5	248		Loblolly	Live	Natural	Inactive	Complete	Normal	Incomplete	Old/None
5	260		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	261		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	262		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
5	290	a	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
5	290	b	Loblolly	Live	Natural	Active	Start	Normal	Complete	Fresh
5	5NT1		Loblolly	Live	Natural	Inactive	Start	Healing	Unavailable	Old/None
5	5NT11		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
5	5NT13		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Incomplete	Old/None
6	234	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	234	b	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	234	c	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	234	d	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	234	e	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	234	f	Loblolly	Live	Natural	Active	Start (Adv)	Normal	Unstarted	Old/None
6	234	g	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Old/None
6	10		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
6	116		Loblolly	Live	Artificial	Active	Insert	Restrictor	Complete	Fresh
6	135	a	Loblolly	Live	Natural	Inactive	Start (Adv)	>4X	Complete	Old/None
6	135	b	Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Complete	Recent

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
6	135	c	Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
6	136	a	Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Complete	Old/None
6	136	b	Loblolly	Live	Natural	Inactive	Start	Normal	Complete	Old/None
6	136	c	Loblolly	Live	Natural	Inactive	Start	<2X	Complete	Old/None
6	137		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Fresh
6	139	a	Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
6	139	b	Loblolly	Live	Natural	Active	Start	Normal	Complete	Recent
6	166		Loblolly	Live	Artificial	Relic	Insert	Normal	Incomplete	Old/None
6	199		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Fresh
6	200		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
6	206		Loblolly	Live	Natural	Inactive	Start (Adv)	>2X	Incomplete	Old/None
6	233		Loblolly	Live	Natural	Inactive	Complete	Restrictor	Complete	Recent
6	235		Loblolly	Live	Natural	Inactive	Start (Adv)	<2X	Incomplete	Old/None
6	256	a	Loblolly	Live	Natural	Active	Complete	Restrictor	Complete	Recent
6	256	b	Loblolly	Live	Natural	Active	Start	Normal	Complete	Recent
6	268		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
6	33	a	Loblolly	Live	Natural	Inactive	Start	>2X	Unstarted	Old/None
6	33	b	Loblolly	Live	Natural	Inactive	Start	>2X	Unstarted	Old/None
6	33	c	Loblolly	Live	Natural	Inactive	Start	>2X	Unstarted	Old/None
6	6NT1		Loblolly	Live	Natural	Active	Start	Normal	Complete	Old/None
7	243		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Old/None
7	253		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
7	275		Loblolly	Live	Natural	Active	Start (Adv)	Normal	Complete	Recent
7	277		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
7	284		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
7	297		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
7	299		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
7	300		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Incomplete	Old/None
7	105		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
7	106	a	Loblolly	Live	Natural	Relic	Complete	>4X	Complete	Old/None
7	106	b	Loblolly	Live	Natural	Relic	Start	Normal	Complete	Old/None
7	106	c	Loblolly	Live	Natural	Active	Start	Normal	Complete	Recent
7	107	a	Loblolly	Dead	Natural	Unavailable	Unavailable	Normal	Unavailable	Unavailable
7	107	b	Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
7	108		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
7	109	a	Loblolly	Live	Natural	Active	Complete	>2X	Complete	Recent
7	109	b	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
7	110		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
7	111		Loblolly	Dead	Artificial	Unavailable	Insert	Restrictor	Unavailable	Unavailable
7	195		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
7	216		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
7	272		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
7	276		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
8	129		Loblolly	Live	Natural	Active	Complete	<2X	Complete	Fresh
8	170		Loblolly	Live	Artificial	Inactive	Insert	Unavailable	Complete	Old/None
8	171		Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
8	173		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Old/None
8	174		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
8	175		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Old/None
8	176	a	Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
8	176	b	Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
8	209	a	Loblolly	Live	Natural	Relic	Complete	>2X	Complete	Old/None
8	209	b	Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Complete	Old/None
8	210		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Recent
8	211		Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
8	219		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Fresh
8	220		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
8	226		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
8	227		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
8	228		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
8	229		Loblolly	Live	Natural	Relic	Start (Adv)	<2X	Unstarted	Old/None
8	230		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
8	231		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
8	263		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
8	286		Loblolly	Live	Natural	Active	Start (Adv)	Normal	Incomplete	Old/None
8	287		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
8	288		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Complete	Old/None
8	809		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
8	8NT1		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
8	8NT1		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
8	8NT2		Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
9	85		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Fresh

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
9	86		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
9	87		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Recent
9	88		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
10	64		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
10	65		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
10	66		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
10	67		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
10	68		Loblolly	Live	Natural	Inactive	Start	<2X	Complete	Old/None
10	150		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
10	154		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
10	156		Loblolly	Live	Natural	Inactive	Complete	Restrictor	Complete	Old/None
10	157		Loblolly	Live	Natural	Inactive	Complete	Restrictor	Complete	Old/None
10	214		Loblolly	Live	Natural	Active	Complete	Restrictor	Complete	Fresh
10	215		Loblolly	Dead	Natural	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
10	247		Loblolly	Live	Natural	Inactive	Complete	Restrictor	Complete	Old/None
10	274		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
10	301		Loblolly	Live	Natural	Active	Start (Adv)	<2X	Incomplete	Recent
10	302		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
10	303		Shortleaf	Live	Natural	Active	Complete	Normal	Complete	Fresh
10	10nt3	a	Loblolly	Live	Natural	Inactive	Start (Adv)	<2X	Unstarted	Old/None
10	10nt3	b	Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
10	10nt3	c	Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
10	10nt4	a	Loblolly	Live	Natural	Inactive	Complete	<2X	Unstarted	Old/None
10	10nt4	b	Loblolly	Live	Natural	Relic	Start	Normal	Unstarted	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
10	10nt6	a	Shortleaf	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
10	10nt6	b	Shortleaf	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
11	140		Loblolly	Live	Artificial	Relic	Complete	<2x Enlarged	Complete	Old/None
11	141		Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
11	142		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Old/None
11	143		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Old/None
11	238		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
11	239		Loblolly	Live	Natural	Active	Complete	>2X	Complete	Recent
11	240		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
11	269		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
11	270		Loblolly	Live	Natural	Active	Complete	<2X	Complete	Fresh
11	291		Loblolly	Live	Natural	Inactive	Start (Adv)	>2X	Complete	Recent
11	292		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Old/None
11	293		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
11	294		Loblolly	Live	Natural	Inactive	Complete	>2X	Incomplete	Old/None
12	131		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Fresh
12	132		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
12	133		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
12	158		Shortleaf	Dead	Artificial	Unavailable	Insert	Restrictor	Unavailable	Unavailable
12	159		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
12	189		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Old/None
12	244	a	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
12	244	b	Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Recent
12	244	c	Loblolly	Live	Natural	Active	Start	Normal	Complete	Recent

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
12	244	d	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
12	295		Loblolly	Live	Natural	Active	Complete	<2X	Complete	Recent
13	119		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Recent
13	120		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
13	121		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Fresh
13	122		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
13	123		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
13	124		Loblolly	Live	Artificial	Inactive	Insert	Restrictor	Complete	Old/None
13	144		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
13	145		Loblolly	Live	Natural	Inactive	Start (Adv)	>2X	Complete	Old/None
13	168		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Recent
13	169		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Recent
13	271		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
13	13NT1		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
13	13NT2		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Fresh
13	13NT3		Loblolly	Live	Natural	Inactive	Start (Adv)	Normal	Unstarted	Old/None
14	88		Loblolly	Live	Natural	Relic	Start	<2X	Unstarted	Old/None
14	89		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Old/None
14	91		Loblolly	Live	Artificial	Relic	Complete	<2x Enlarged	Unstarted	Old/None
14	100		Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Old/None
14	101		Loblolly	Live	Natural	Inactive	Complete	Normal	Complete	Old/None
15	160		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
15	161		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
15	162		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
15	163		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
15	187		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
15	198		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
15	205		Loblolly	Live	Natural	Inactive	Complete	>4X	Complete	Fresh
15	221		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
15	264		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
15	265	a	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
15	265	b	Loblolly	Live	Natural	Active	Start	Normal	Complete	Fresh
15	15NT1		Loblolly	Live	Natural	Relic	Start (Adv)	Normal	Unstarted	Old/None
15	15NT4		Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
16	167		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
16	16NT1		Loblolly	Live	Natural	Inactive	Start (Adv)	>2X	Incomplete	Old/None
17	146		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
17	147		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	249		Loblolly	Live	Artificial	Inactive	Insert	Normal	Complete	Old/None
17	250		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	251		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	252		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	282		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
17	283		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Fresh
18	181		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Recent
18	182		Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
18	183		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Old/None
18	184		Loblolly	Live	Artificial	Inactive	Complete	Normal	Unstarted	Old/None

Cluster	Tree	Cavity	Species	Condition	Cavity	Status	Condition	Entrance	Plate	Resin Work
18	207		Shortleaf	Live	Natural	Inactive	Complete	>4X	Complete	Old/None
18	254	a	Loblolly	Live	Natural	Inactive	Complete	>2X	Complete	Recent
18	254	b	Loblolly	Live	Natural	Active	Complete	>2X	Complete	Recent
18	278		Loblolly	Live	Artificial	Active	Complete	Normal	Complete	Recent
18	279		Loblolly	Live	Artificial	Active	Complete	Normal	Complete	Old/None
18	280		Loblolly	Live	Artificial	Active	Complete	Normal	Complete	Fresh
18	281		Loblolly	Live	Artificial	Inactive	Complete	Normal	Complete	Old/None
19	134		Loblolly	Live	Artificial	Active	Insert	Normal	Incomplete	Fresh
19	148		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
19	149		Loblolly	Live	Artificial	Inactive	Insert	Normal	Incomplete	Old/None
19	201		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Recent
19	203		Loblolly	Live	Artificial	Active	Insert	Normal	Complete	Fresh
19	223	a	Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
19	223	b	Loblolly	Live	Natural	Active	Start (Adv)	Normal	Incomplete	Recent
19	224		Loblolly	Live	Natural	Active	Complete	>4X	Complete	Fresh
19	232		Loblolly	Live	Natural	Active	Complete	Normal	Complete	Recent
19	245		Loblolly	Live	Natural	Inactive	Start	Normal	Incomplete	Old/None
19	246		Loblolly	Live	Natural	Active	Complete	>4X	Complete	Old/None
19	19NT1		Loblolly	Live	Natural	Active	Start (Adv)	<2X	Unstarted	Recent