

# Investigation of Red-cockaded Woodpeckers in Virginia: 2011 report



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

# Investigation of Red-cockaded Woodpeckers in Virginia: 2011 report

Michael D. Wilson  
Bryan D. Watts  
Christopher J. Lotts  
Fletcher M. Smith  
Barton J. Paxton  
Center for Conservation Biology  
College of William and Mary  
Williamsburg, VA 23187-8795

## Recommended Citation:

Wilson, M. D., B. D. Watts, C. Lotts, F. M. Smith, and B. J. Paxton, and 2012.  
Investigation of Red-cockaded Woodpeckers in Virginia: Year 2012 report.  
Center for Conservation Biology Technical Report Series, CCBTR-12-03.  
College of William and Mary and Virginia Commonwealth University,  
Williamsburg, VA. 33 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

Cover Photo: Hatch year female Red-cockaded Woodpecker banded in Cluster 5.  
Photo by Bart J. Paxton.



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

<b>EXECUTIVE SUMMARY</b> .....	1
<b>BACKGROUND</b> .....	2
Context .....	2
Objectives.....	3
<b>METHODS</b> .....	4
Description.....	4
Banding.....	4
General Observations.....	5
Cavity Monitoring and Management.....	6
<b>RESULTS</b> .....	7
Population Monitoring.....	7
Breeding Observations.....	8
Translocations.....	18
Cavity Trees .....	17
Cavity Competitors .....	17
Historic Sites.....	17
Cavity Trees.....	18
Competitor Inspection and Removal.....	18
<b>ACKNOWLEDGMENTS</b> .....	18
<b>APPENDIX I</b> .....	19

## EXECUTIVE SUMMARY

Red-cockaded Woodpeckers at Piney Grove set new high marks for population size and breeding productivity in 2011. Nine breeding attempts were documented during the 2011 season. This is the highest number attempted since Piney Grove has been monitored. This was also the first year breeding occurred at Clusters 6 and 15. A breeding attempt in Cluster 7 failed after one egg was laid in the nest cavity then disappeared. No second attempt was initiated. A combined total of 25 chicks survived to fledge from the 8 successful nests.

The inaugural breeding event at Cluster 15 might be the first example of “budding” at Piney Grove. Budding is typically defined as the splitting of two clans into separate breeding clusters where no additional space is used. Budding is considered different from “pioneering” where birds move into a new space to initiate a new breeding cluster. Prior to this season, the birds at Cluster 15 regularly foraged and even assisted with breeding duties at Cluster 8. Most of the birds that occupied Cluster 15 prior to 2011 were offspring from Cluster 8. However, now Clusters 8 and 15 now behave individually and birds no longer forage together.

A total of 70 Red-cockaded Woodpeckers were identified within Piney Grove preserve in 2011 (Table 1). This included 42 birds that were hatched at Piney Grove from previous years, 26 fledglings produced during the 2010 breeding season, 2 birds translocated to Piney Grove in previous years.

Forty-four adult birds were detected within the Piney Grove Preserve leading into the breeding season of 2011 (Table 1). This is the highest spring total since monitoring began at the Preserve, beating the high mark in spring of 2010 by 10 more birds and almost triple the number counted in 2002 when only 16 birds were present.

Forty-seven birds were detected during the winter survey. This includes 35 birds hatched at Piney Grove before 2011 and 12 of the 25 birds fledged this summer. This is a much lower retention rate of fledgling birds making it to the winter survey compared to other years.

It appears as the last two remaining birds that were translocated from the Carolina Sandhills are now gone from the population. The last two remaining birds were breeding males in Cluster 1 and 7. Both birds attempted breeding this past summer but the male at Cluster 7 disappeared after one egg was laid and the nest subsequently failed. Neither were detected during the winter survey.

In the winter assessment, birds were roosting in 13 different cluster areas including although two of these areas forage with nearby clusters thereby reducing the number of active clans to eleven.

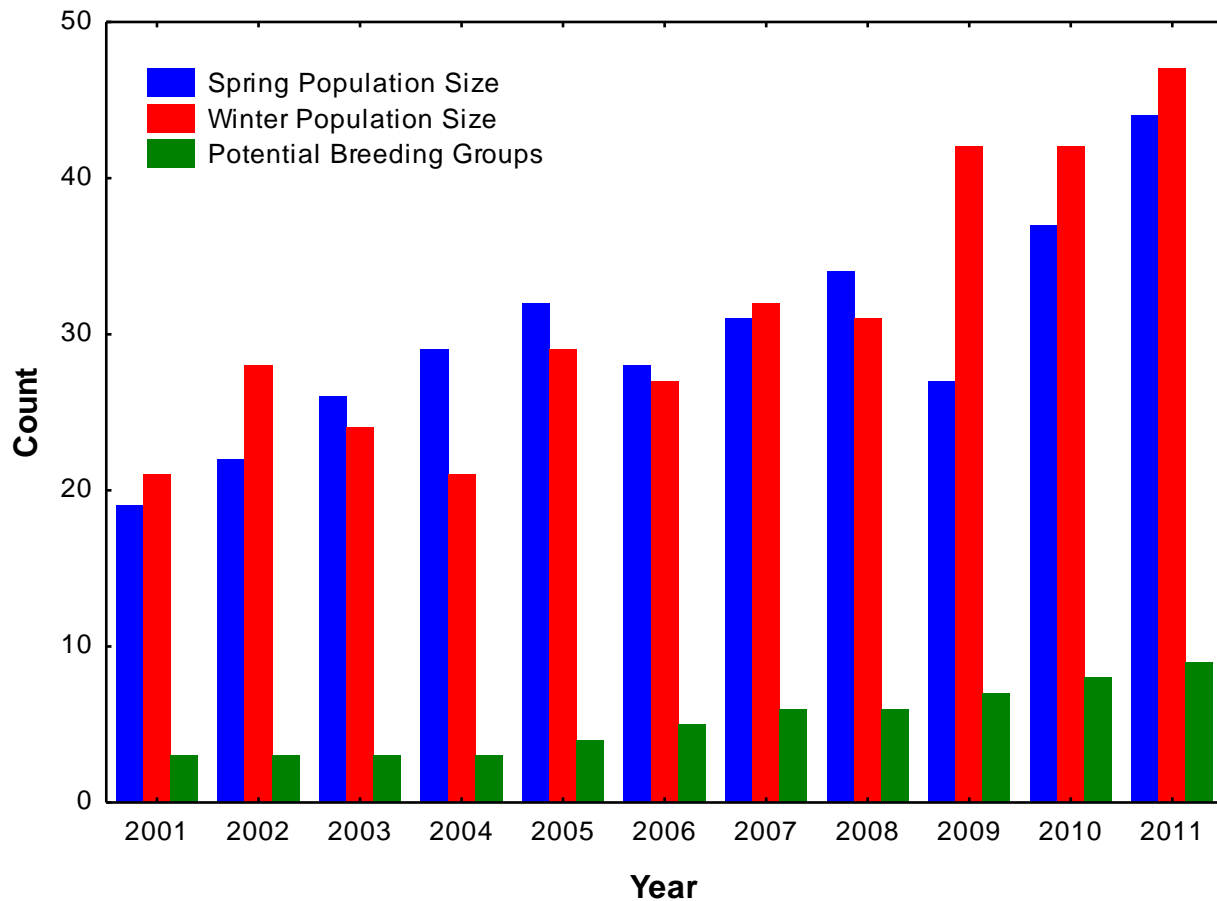
## **BACKGROUND**

### **Context**

The Red-cockaded Woodpecker (*Picoides borealis*) is a federally endangered species. Within the past 100 years Red-cockaded Woodpeckers have disappeared completely from the northern portion of their breeding range. Historically, this species was recorded north into New Jersey and Pennsylvania. As recently as the 1930's and 1940's resident birds were known from the open maritime forests of Maryland. Since the recent loss of habitat in Kentucky, Virginia has supported the only population north of the Carolinas. In Virginia, breeding has continued to the present time but the number of both sites and birds has declined dramatically over the past 40 years. As recently as 1977, 23 clans were known scattered across 5 counties. In 1980, all clusters determined to be active in 1977 were surveyed in preparation for an investigation of habitat use (Bradshaw 1990). Of the 23 original clusters, only 9 were still forested. In the 4 years from 1977 to 1980, more than half of the known state population had been lost. By 1990, only 5 of the original 23 clusters detected in 1977 were still active. By 2000, this number had declined to only 2 clusters. During the breeding season of 2002, Virginia supported only 2 breeding pairs and 2 clusters with solitary males.

The Red-cockaded Woodpecker remains in eminent danger of extinction within Virginia. However, in 1998 a multi-organizational partnership was formed under the primary mission of stabilizing the population and restoring it back to pre-1980 levels. During that year, The Nature Conservancy negotiated a deal with Hancock Timber to purchase 1,100 ha of land supporting the last 3 known Red-cockaded Woodpecker breeding groups. The site has since been expanded and now includes 1,270 ha of pine land. The tract, located in Sussex County is named the Piney Grove Preserve and lies in the heart of the species former Virginia range. The site has become the nucleus for restoration work in Virginia.

Restoration of the Red-cockaded Woodpecker population in Virginia will require a long-term commitment and the use of aggressive techniques that have proven successful further south. Habitat management, population monitoring and management, and translocation of birds into the population have been ongoing since 2000 and have had dramatically positive results. Since 2001, the total population and the number of potential breeding clusters (defined as having 1 adult male and 1 adult female) have doubled (Figure 1).



**Figure 1.** Spring and winter population counts for Red-cockaded woodpeckers at the Piney Grove Preserve.

## 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 2010 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**

### **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. There are now 15 independent cluster sites with either natural or 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. 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.

## **Cavity Monitoring and Management**

Cavity tree status – Data on the status of each cavity tree were collected during March and April 2011. Each cavity tree was visited once for 2011 from January through July to evaluate tree characteristics and characteristics for each cavity on the tree. Tree condition was categorized into the following: live or dead; standing, broken, or fallen; beetles; lightning strike; and red heart disease. Characteristics of each cavity were collected to describe its condition, entrance, plate, and activity status (Appendix I). Cavity characteristics were categorized as follows:

Cavity stage/ 09 Condition:

- 1-Complete – Natural cavity
- 2-Complete (New) – Newly completed since last update
- 3-Advanced Start: > 10 cm centimeter depth
- 4-Start: 1-10 cm depth
- 5-Sub-start: Less than one centimeter depth
- 6-Insert – Artificial cavity

Entrance enlargement:

- 0-Gone
- 1-Normal size entrance

- 2-Enlarged less than twice the normal diameter
- 3-Enlarged two to four times the normal diameter
- 4-Enlarged more than four times the normal diameter
- R-Restrictor plate reducing entrance to normal size
- H-Healing over

Activity:

- 1-Active: Chipping on resin wells to some degree with fresh sap flow
- 2-Possibly active: Slight but inconclusive evidence of RCW activity
- 3-Inactive: No recent RCW activity
- 4-Relic: No RCW activity for 4 years

Plate size:

- 5-Unstarted: No plate
- 4-Started: 0-15 cm diameter plate
- 3-Completed: 15-30 cm diameter plate
- 2-Completed: 30-45 cm diameter plate
- 1-Completed: Greater than 45 cm diameter plate

Chipping on resin wells:

- 4-Old: No recent RCW activity
- 3-Recent: Few resin wells have little chipping with little to no sap flow
- 2-Fresh: Most of resin wells have chipping and bark scaled slightly
- 1-Fresh: All resin wells have chipping and bark scaled extensively

Sap (applies to fresh and dry):

- 4-None
- 3-Less than 1 m of sap flow above and below the cavity
- 2-One to 2 m of sap flow above and below the cavity
- 1-Greater than 2m of sap flow above and below cavity around circumference of tree at cavity height

Cavity competitor inspection and removal – All active, completed inactive cavities, and artificial cavity inserts within 50 ft from the ground were checked on a one-month cycle using a camera and monitor mounted on a telescoping pole. Data on competitors is only presented for April, May, and June 2011. When cavity competitors were located, the tree was climbed to remove the competitor or nest material. Amphibians, wasps and bird nests with a tending adult, fresh eggs, or nestlings were not removed.

## RESULTS

### Population Monitoring

During the calendar year of 2011, 70 Red-cockaded Woodpeckers were identified within Piney Grove preserve (Table 1). This included 42 birds that were hatched at Piney Grove from previous years, 26 fledglings produced during the 2010 breeding season, 2 birds translocated to Piney Grove in previous years.

Among the 42 birds detected in 2011 that were originally hatched at Piney Grove, 2 of these were hatched in 2000, 1 hatched in 2004, 1 hatched in 2005, 3 hatched in 2006, 5 hatched in 2007, 4 hatched in 2008 12 hatched in 2009, and 12 hatched in 2010. The 2 translocated birds remaining in the population in 2011 were moved here from the Carolina Sandhills National Wildlife Refuge (NWR) in 2002 and 2003. Three birds were present during the spring survey, and assumed breeding activities as in previous years, but were not detected during the winter survey.

There were 11 birds detected in 2010 that were not detected in 2011. Five of the birds lost between years were 2010 hatch year individual that were not detected in the winter of 2010 either. The other birds lost included 1 bird hatched in 2004, 1 bird hatched in 2005, 2 birds hatched in 2007, and a bird hatched in 2008.

Forty-four adult birds were believed to be present within the Piney Grove Preserve going into the breeding season of 2011 (Table 1). This is the highest spring total since monitoring began at the Preserve, beating the high mark in spring of 2010 ago by 10 more birds and almost triple the number counted in 2002 when only 16 birds were present.

Forty-seven birds were detected during the winter survey. This includes 36 birds hatched at Piney Grove before 2011, 9 of the 18 birds fledged in 2010, 11 of the 16 birds fledged in 2009, 3 of the 8 birds fledged in 2008, 5 of the 9 birds fledged in 2007, 3 of the 7 birds fledged in 2006, 1 of the 9 birds fledged in 2005, 2 of the 8 birds fledged in 2004, and 2 birds hatched from 2000. Only 12 of the 25 birds fledged in 2011 were detected in winter. This is a much lower retention rate compared to other years. There were 9 adult birds that were not observed in the winter survey but detected during the spring survey including the last two translocated birds remaining in the population. There was one adult detected in winter that was not observed since 2008.

In the winter assessment, birds were roosting in 13 different cluster areas including C-1, C-3, C-4, C-5, C-6, C-7, C-8, C-9 C-10, C-12, C-13, C-15, and C-19 (Table 2). As in years past, the single bird roosting in C-4 was part of the C-3 clan. C-9 supported three birds. Two of these birds foraged with C-7 while one bird was witnessed on three separate occasions to fly southward and forages alone. This was the first year a bird has used C-12. In 2011, C-19 was established with artificial cavity inserts and was occupied by 2 birds (HY

individuals from C15) in the winter. Cluster 15 and C-8 birds did not interact as in previous winters and foraged as two separate groups.

## **Breeding Observations**

Nine breeding attempts were documented during the 2011 season at C-1, C-3, C-5, C-6, C-7, C-8, C-10, C-13 and C-15. This is the highest number attempted since Piney Grove has been monitored. This was the first year breeding occurred at C-6 and C-15. Cluster 7 failed after one egg was laid in the nest cavity then disappeared. No second attempt was initiated. A combined total of 25 chicks survived to fledge from the 8 successful nests.

Cluster 1 – The breeding male (AL/OR, DB/DB/WH) in 2010 has remained as the same individual since 2007 marking the fifth consecutive year this male assumed reproductive duties. This male was translocated from Carolina Sandhills NWR in 2002. This was the second consecutive year for the breeding female (YE/YE/DB, AL/DB), A C-8 bird hatched in 2009 and moved to C-1. Incubation duties were also augmented by at least one helper male (DG/YE/DG, WH/AL) that was originally hatched in C-1 in 2006 and has remained at this cluster since that time. This male is very aggressive to intruders, the breeding female, and to other birds in the cluster. A first egg was detected on 26 April in tree # 54. This was the second consecutive year this tree was used for breeding. A full clutch of 4 eggs were discovered on 29 April. Four hatched nestlings were first observed on 10 May and estimated to be 0-1 days old. On 16 May 4 nestlings were banded and estimated to be 6-7 days of development. All 4 nestlings successfully fledged and identified as 1 male and 3 female by 6 June. Only 2 females among the 4 fledgling birds were observed during the winter survey.

Cluster 3 – The breeding male (RE/DB, WH/AL) remained the same since 2007. This was the fifth consecutive year this male held breeding status. It is presumed that breeding female (LB/WH/LB, RE/AL) remained the same since 2008 since this bird was observed incubating and brooding young. This is the fourth consecutive year this female would have assumed breeding duties. Incubation was aided by a third-year female (LB/WH/LB, AL/PU) and feeding of young was aided by two-year old helper male (OR/OR/OR, AL/DG). The birds nested in a new tree (#179) for the second consecutive year This cavity is too high to be examined by peeper scope and two awkward to be climbed for banding of nestlings. Incubation behavior was first observed on 26 April and food deliver was first noted on 10 May. On 6 June two of three birds were witnessed to undertake their fledgling flight and the last bird fledged on 7 June. Hatch year birds were identified as 2 males and 1 female. Since all birds were not banded it is difficult to determine their individual whereabouts. During the winter, only two birds were detected without bands in the population. One unbanded bird was captured and banded on 12 January 2012 as a female. One additional unbanded bird was detected in C-3 but not captured, so it is presumed that 2 of the 3 fledges from this cluster remain in the Piney Grove population.

Cluster 5 – The breeding pair makeup at this cluster has remained the same for second consecutive year. The breeding male (WH/LB/WH, PU/AL) has remained the same

since 2007. The breeding female (AL/DB, YE/DG/YE) began duties in 2010. An additional male (LB/WH/LB, AL/RE) was seen helping in all breeding activities from incubating, brooding, and feeding young for the second consecutive year. The breeding pair nested in a tree # 23) for the second consecutive year. This nest cavity that was too high be examined with the peeper scope. Incubation was first detected on 29 April. On 24 May , 3 nestlings were banded at 8 days age. A previous climb to band birds on 19 May revealed one unhatched egg in the nest. All 3 nestlings successfully fledged and were identified as 3 females on 10 June. No fledged birds from C-3 were observed during the winter survey.

Cluster 6 – This was the first season birds in this cluster ever attempted breeding. This site had been occupied in most years by at least one bird since 2008 and sometimes by 2 or 3 birds just prior to the breeding season but breeding was never detected. The breeding male (AL/DG, DB/RE/DB) was hatched in C-3 in 2008 and has occupied C-6 since 2009. Two females shared in breeding duties so it is difficult to ascertain which one was the genetic parent of the young birds. One female (AL//DB, WH/RE/WH) was hatched in C-7 and first detected roosting in C-6 in the winter of 2010. The other female (DB/RE/DB, AL/WH) was hatched in C-3 in 2004 and roosted there for all years after until moving to C-6 when it was first detected roosting there in the spring of 2011. Breeding at this site was first determined on 16 May when 4 eggs were discovered in tree #116. Only 3 young were in the nest when banded as 8 day old chicks on 30 May. The 3 nestlings successfully fledged and were identified as 3 males on 24 June. None of the 3 fledglings were observed at Piney Grove during the winter.

Cluster 7 – This cluster of birds failed to breed in 2011 despite laying one egg that was later removed from the nest tree. The breeding male (AL/YE, YE/YE/WH) remained the same since 2005. This bird was translocated to C-7 from Carolina Sandhills, NWR in 2003 and has been present within this cluster since that time. This bird seemed to disappear from the site at the same time the nest failed. A new male (OR/OR.OR, AL/DG) moved into the group of birds and was observed foraging and calling on multiple occasions without approach or attack by the breeding male. Typically, when a new male enters a site it is chased off by the breeder male. This may provide evidence of the breeder's disappearance and it is possible that this loss was associated with the nest failure. The breeding female (DB/RE/DB, YE/AL) remained the same for the second consecutive year. This female was hatched at C-3 in 2006 but was first detected using C-7 in 2007. Three regular sized eggs and one undersized egg were first discovered in a new nest cavity on 30 April. This was the second consecutive year the breeding pair nested in a new cavity. The first egg hatched on 8 May and on 18 May 3 nestlings were observed and the undersized eggs was still in the nest. We banded 2 of 3 nestlings on 18 May. The last chick could not be extracted from the cavity. There was a large disparity in size of the nestlings. Two of the nestlings showed characteristics of 8-9 day chicks as expected with their actual age. However, the third chick was underdeveloped and had characteristics comparable with a 5 day old chick. Only the more developed young fledged and were identified as one male and one female (unbanded) on 8 June. Only the male fledgling was detected in the population during winter surveys.

**Table 1.** Occurrence of individual Red-cockaded Woodpeckers at Piney Grove Preserve 2004-2011. (X<sub>j</sub> indicates 2011 hatch-year bird that fledged) identified by USGS Serial band number and color band combination.

USGS	Left Leg	Right Leg	Sex	2004	2005	2006	2007	2008	2009	2010	2011
C-3											
Unbanded	Unbanded	Unbanded	U	X							
C-5											
Unbanded	Unbanded	Unbanded	M	X	X						
1581-66201	WH/LB/WH	RE/AL	M								
1581-66202	WH/LB/WH	LG/AL	M	X	X						
1581-66203	RE/DB/RE	YE/AL	F								
1581-66204	RE/DB/RE	PU1/AL	F								
1581-66205	RE/DB/RE	DG/AL	M								
1581-66206	DG/YE/DG	DB/AL	M								
1581-66207	WH/LB/WH	WH/AL	F	X	X	X					
1581-66208	RE/DB/RE	PK1/AL	U								
1581-66209	DG/YE/DG	PU/AL	F								
1581-66210	WH/LB/WH	DB1/AL	U								
1581-66211	DG/YE/DG	RE1/AL	F								
1581-66212	WH/LB/WH	YE/AL	M	X	X						
1581-66213	WH/LB/WH	DB2/AL	F								
1581-66214	RE/DB	WH/AL	M	X	X	X	X	X	X	X	X
1581-66215	RE/DB	LG1/AL	U	X							
1581-66216	RE/DB	RE1/AL	U								
1581-66219	DG/YE/DG	WH/AL	M								
1581-66220	WH/LB/WH	PU/AL	U	X	X		X	X	X	X	X
1581-66221	WH/LB/WH	PK1/AL	U								
1581-66222	WH/LB/WH	AL/RE	U								
1581-66223	DG/YE/DG	YE/AL	F								
1581-66224	DG/YE/DG	RE2/AL	M	X	X	X					
1581-66225	RE/DB/RE	RE2/AL	M								
1581-66226	RE/DB/RE	LG2/AL	F								
1581-66227	RE/DB/RE	PK2/AL	M								
1581-66228	RE/DB/RE	PU2/AL	M	X							
1581-66229	WH/LB/WH	DG/AL	F								
1581-66230	WH/LB/WH	AL/YE	F	X	X	X	X				
1581-66231	WH/LB/WH	PK2/AL	M	X	X	X	X				
1581-66232	WH/LB/WH	AL/DB	M								
1581-66233	WH/LB/WH	AL/LB	F								
1581-66234	RE/DB/RE	AL/YE	F								
1581-66235	RE/DB/RE	AL/RE	F								
1581-66236	RE/DB/RE	AL/DB	M								
1581-66237	WH/LB/WH	AL/RE	M		X						
1581-66238	WH/LB/WH	AL/PU	F	X				X			
1581-66239	WH/LB/WH	AL/DG	U								
1581-66240	WH/LB/WH	AL/LG	M								
1581-66241	DG/YE/DG	AL/LG	F	X							

USGS	Left Leg	Right Leg	Sex	2004	2005	2006	2007	2008	2009	2010	2011
1581-66242	RE/DB/RE	AL/LB	F	X							
1581-66243	RE/DB/RE	AL/PK	F								
1581-66244	RE/DB/RE	AL/DG	M	X							
1581-66245	DG/YE/DG	AL/LB	M	X	X	X					
1581-66246	DG/YE/DG	AL/PU	U								
1581-66247	DG/YE/DG	AL/WH	U	X							
1581-66248	DG/YE/DG	AL/PU	M	X							
1581-66249	DG/YE/DG	AL/DB	U	X							
1581-66250	LB/WH/LB	AL/PK	M	X	X						
1581-66251	LB/WH/LB	AL/DB	M	X	X	X	X	X	X	X	X
1581-66252	LB/WH/LB	AL/LB	F	X	X						
1581-66253	DB/RE/DB	AL/WH	F	X	X	X	X	X	X	X	X
1581-66254	DB/RE/DB	AL/RE	M	X	X	X	X	X			
1581-66256	LB/WH/LB	AL/OR	F		X						
1581-66257	LB/WH/LB	AL/RE	M		X	X	X	X	X	X	X
1581-66258	LB/WH/LB	AL/YE	F		X	X	X	X	X		
1581-66259	DG/YE/DG	AL/DG	F		X						
1581-66260	DG/YE/DG	AL/OR	F		X						
1581-66261	DB/RE/DB	AL/DB	M		X	X	X	X	X	X	
1581-66262	DB/RE/DB	AL/YE	F		X						
1581-66263	DB/RE/DB	AL/PU	F		X	X		X	X	X	
1581-66264	WH/RE/WH	AL/DG	M		X	X	X	X	X	X	
1581-66265	LB/WH/LB	AL/WH	F			X	X	X	X		
1581-66266	LB/WH/LB	RE/AL	F			X	5	X	X	X	X
1581-66267	WH/RE/WH	AL/RE	F			X					
1581-66268	WH/RE/WH	AL/YE	M			X	X	X			
1581-66269	DG/YE/DG	YE/AL	M			X	X				
1581-66270	DG/YE/DG	WH/AL	M			X	X	X	X	X	X
1581-66271	DB/RE/DB	YE/AL	F			X	X	X	X	X	X
1581-66272	OR/OR/OR	RE/AL	M			X					
1581-66273	WH/RE/WH	AL/WH	M				X	X	X	X	X
1581-66274	WH/RE/WH	AL/DB	M				X	X	X	X	X
1581-66275	OR/AL	DB/RE/DB	F				X				
1581-66276	DG/YE/DG	OR/AL	F				X	X	X	X	X
1581-66277	LB/WH/LB	YE/AL	F				X				
1581-66278	LB/WH/LB	OR/AL	F				X	X	X	X	X
1581-66279	YE/DB/YE	AL/RE	F				X	X	X	X	
1581-66280	YE/DB/YE	AL/YE	M				X	X	X	X	X
1581-66281	OR/OR/OR	YE/AL	F				X	X	X		
1581-66282	YE/DG/YE	DB/AL	F					X	X	X	
1581-66283	WH/AL	YE/DG/YE	F					X	X	X	
1581-66284	DB/RE/DB	WH/AL	F					X	X	X	
1581-66285	DB/RE/DB	DB/AL	M					X	X	X	X
1581-66286	DB/RE/DB	RE/AL	F					X			
1581-66287	LB/WH/LB	AL/PU	F					X	X	X	X
1581-66288	LB/WH/LB	AL/DG	M					X	X	X	X

USGS	Left Leg	Right Leg	Sex	2004	2005	2006	2007	2008	2009	2010	2011
1581-66289	YE/DB/YE	AL/WH	U								
1581-66290	YE/DB/YE	AL/PU	M					X	X	X	X
1581-66291	WH/WH/WH	RE/AL	F					X	X	X	X
1581-66292	YE/DB/YE	AL/DG	F						X		X
1581-66293	YE/DB/YE	AL/LB	F						X	X	X
1581-66294	YE/YE/DB	AL/DB	F						X	X	X
1581-66295	YE/DB/YE	RE/AL	U						X		
1581-66296	DG/AL	YE/YE/DG	M						X	X	X
1581-66297	AL/RE	YE/DG/YE	F						X	X	X
1581-66298	AL/DB	YE/DG/YE	F						X	X	X
1581-66299	AL/YE	DB/RE/DB	F						X	X	X
1581-66300	AL/RE	LB/WH/LB	M						X	X	X
1541-29901	AL/DB	LB/WH/LB	M						X		
1541-29902	AL/DB	WH/RE/WH	F						X	X	X
1541-29903	AL/YE	WH/RE/WH	M						X	X	
1541-29904	AL/LB	WH/RE/WH	F						X		X
1541-29906	AL/DG	DB/RE/DB	M						X	X	X
821-70901	OR/OR/OR	AL/DG	M						X	X	X
1541-29907	OR/OR/OR	AL/WH	F						X	X	
821-70910	AL/YE	YE/LG/YE	F							X	X
821-70911	AL/WH	YE/LG/YE	M							X	
821-70912	AL/OR	YE/LG/YE	M							X	X
821-70940	AL/WH	DB/RE/DB	M							X	X
unbanded			M							X	X
unbanded			F							X	
821-70913	AL/YE	LB/WH/LB	M							X	X
821-70914	AL/LB	LB/WH/LB	M							X	X
821-70915	AL/LG	LB/WH/LB	F							X	
821-70916	AL/OR	LB/WH/LB	F							X	
821 70908	AL/OR	WH/RE/WH	M							X	X
821 70909	AL/LG	WH/RE/WH	U							X	
unbanded			F							X	
821-70904	AL/LB	YE/DB/YE	M							X	X
821-70905	AL/OR	YE/DB/YE	U							X	
821-70907	AL/LG	YE/DB/YE	F							X	X
821-70906	AL/RE	YE/DB/YE	M							X	X
821-70902	OR/OR/OR	AL/YE	M							X	X
821-70903	OR/OR/OR	AL/LB	M							X	X
821 70917	YE/OR/YE	AL/DB	M							X	X
821-70922	LG/YE/LG	AL/LB	F								Xj
821-70923	LG/YE/LG	AL/WH	M								Xj
821-70924	LG/YE/LG	AL/DB	F								Xj
821-70925	LG/YE/LG	AL/OR	F								Xj
821-70931	WH/LB/WH	WH/AL	F								Xj
821-70932	WH/LB/WH	OR/AL	F								Xj
821-70933	WH/LB/WH	PU/AL	F								Xj

USGS	Left Leg	Right Leg	Sex	2004	2005	2006	2007	2008	2009	2010	2011
821-70937	PU/YE/PU	AL/WH	M								Xj
821-70938	PU/YE/PU	AL/OR	M								Xj
821-70939	PU/YE/PU	AL/LG	M								Xj
821-70918	YE/DB/YE	YE/AL	M								Xj
821-70919	YE/DB/YE	LB/AL	M								Xj
821-70920	YE/DB/YE	OR/AL	M								Xj
821-70921	YE/DB/YE	RE/AL	F								Xj
821-70926	OR/OR/OR	AL/PU	F								Xj
821-70927	OR/OR/OR	AL/DB	M								Xj
821-70930	OR/OR/OR	AL/LG	F								Xj
821-70928	YE/OR/YE	AL/OR	M								Xj
821-70929	YE/OR/YE	AL/WH	M								Xj
821-70934	OR/DB/OR	AL/YE	F								Xj
821-70935	OR/DB/OR	AL/DB	F								Xj
821-70936	OR/DB/OR	AL/LG	M								Xj
unbanded			M								Xj
unbanded			M								Xj
821-70941	AL/OR	DB/RE/DB	F								Xj
<b>Translocated and Foreign birds</b>											
1751-83047	AL/LG	DB/DB/YE	M								
1681-89697	AL/LB	ST/ST/OR	F								
1681-89743	AL/DG	WH/WH/PU	F								
1751-42837	YE/DB/YE	WH/AL	M								
1751-42838	YE/DB/YE	LG/AL	M								
801-40249	BK/YE/DB	RE/AL	F	X	X	XX	X	X			
1751-83163	AL/OR	DG/DG/OR	F								
1751-83133	AL/WH	ST/ST/OR	F								
1751-83208	AL/OR	WH/WH/MV	M								
1681-89800	AL/LG	PU/PU/LG	M								
1751-82968	AL/WH	OR/OR/DB	F								
1751-83201	AL/OR	WH/WH/LB	F								
1751-83213	AL/OR	OR/OR/LG	M								
1751-83142	AL/OR	DB/DB/WH	M	X	X	X	X	X	X	X	X
1751-83234	AL/YE	WH/WH/WH	F								
951-26443	AL/YE	DG/DG/LG	F								
951-26448	AL/YE	DG/DG/MV	M	X	X	X	X				
1751-83183	AL/OR	YE/YE/WH	M	X	X	X	X				
951-26305	AL/YE	YE/YE/WH	M	X	X	X	X	X	X	X	X
1581-66262	WH/WH/WH	AL/WH	M		X						
941-92246	AL / ST	OR/OR/YE	M		X						
1951-05035	AL / PU	WH/WH/MV	M		X						
1951-05086	AL/MV	MV/MV/WH	F		X	X	X	X	X		
941-92233	AL / ST	WH/WH/LG	F		X	X	X	X			
941-92268	AL / ST	PU/PU/WH	F		X						
	MV/LG	LG/AL	?		X						
1841-53714	RE/YE/RE	AL/OR	F				X	X			

**Table 2.** Foraging group clusters for Red-cockaded Woodpeckers detected within Piney Grove Preserve during the 2010 winter survey. Clans at C-3, C-7, and C-8 are joined by one or more birds roosting from C4, C-9, and C-15, respectively.

Roost Cluster	USGS Band #	Left Leg	Right Leg	Sex	Age
C-1	1581-66296	DG/AL	YE/YE/DG	M	2
C-1	1581-66270	DG/YE/DG	WH/AL	M	5
C-1	1581-66294	YE/YE/DB	AL/DB	F	2
C-1	821-70912	AL/OR	YE/LG/YE	M	1
C-1	821-70910	AL/YE	YE/LG/YE	F	1
C-1	821-70923	LG/YE/LG	AL/WH	M	0
C-3	1581-66214	RE/DB	WH/AL	M	11
C-3	1581-66266	LB/WH/LB	RE/AL	F	5
C-3	1581-66285	DB/RE/DB	DB/AL	M	3
C-3	1581-66299	AL/YE	DB/RE/DB	F	2
C-3	821-70910	AL/YE	YE/LG/YE	F	3
C-3	Unbanded			U	0
C-5	1581-66294	AL/DB	YE/DG/YE	F	2
C-5	1581-66220	WH/LB/WH	PU/AL	M	11
C-5	1581-66288	LB/WH/LB	AL/DG	M	3
C-5	1581-66257	LB/WH/LB	AL/RE	M	6
C-5	1581-66300	AL/RE	LB/WH/LB	M	2
C-5	821-70941	AL/OR	DB/RE/DB	F	0
C-6	1581-66253	DB/RE/DB	AL/WH	F	8
C-6	1541-29906	AL/DG	DB/RE/DB	M	2
C-6	1541-29902	AL/DB	WH/RE/WH	F	2
C-7 / C9	1581-66271	DB/RE/DB	YE/AL	F	5
C-7 / C9	821-70940	AL/WH	DB/RE/DB	M	1
C-7	821-70924	LG/YE/LG	AL/DB	F	0
C9	821-70901	OR/OR/OR	AL/DG	M	2
C9	821-70914	AL/LB	LB/WH/LB	M	1
C-8	1581-66251	LB/WH/LB	AL/DB	M	7
C-8	1581-66278	LB/WH/LB	OR/AL	F	4
C-8	821-70906	AL/RE	YE/DB/YE	M	1
C-8	821-70921	YE/DB/YE	RE/AL	F	0
C-8	1581-66293	YE/DB/YE	AL/LB	F	2

Continued on next page

Table continued

Roost Cluster	USGS Band #	Left Leg	Right Leg	Sex	Age
C-10	1581-66276	DG/YE/DG	OR/AL	F	1
C-10	821-70904	AL/LG	YE/DB/YE	M	1
C-10	1581-66273	WH/RE/WH	AL/WH	M	4
C-10	821-70930	OR/OR/OR	AL/LG	F	0
C-10	821-70902	OR/OR/OR	AL/YE	M	1
C-10	821-70927	OR/OR/OR	AL/DB	M	0
C-12	821-70919	YE/DB/YE	LB/AL	M	0
C-13	1581-66291	WH/WH/WH	RE/AL	F	2
C-13	1581-66274	WH/RE/WH	AL/DB	M	3
C-13	1581-66297	AL/RE	YE/DG/YE	F	3
C-13	821-70929	YE/OR/YE	AL/WH	M	0
C-15	1581-66290	YE/DB/YE	AL/PU	M	3
C-15	821-70904	AL/LB	YE/DB/YE	M	1
C-15	821-70934	OR/DB/OR	AL/YE	F	0
C-19	821-70935	OR/DB/OR	AL/DB	F	
C-19	821-70936	OR/DB/OR	AL/LG	M	

Cluster 8 – The breeding pair remained the same for the fourth consecutive year. The breeding male (LB/WH/LB, AL/DB) was originally banded in C-5 in 2004 and the breeding female (LB/WH/LB, OR/AL) was originally banded at C-5 in 2007. The pair nested in tree #179 for the second consecutive year. Sex eggs were discovered on 26 April although one egg was noticeably smaller and estimated to be 1/3 the size of a regularly sized egg. Four nestlings were banded on 16 May and estimated to be 8-10 days old. All 4 nestlings fledged and were identified as 3 males and 1 female on 31 May. At least one helper was identified as birds originally hatched at this site (YE/DB/YE, AL/YE). Only 2 of the 4 fledglings were detected during winter surveys. Both of them remained in C-8.

Cluster 10 – A new breeding male (WH/RE/WH, AL/WH ) assumed reproductive duties for the first time since 2008. The breeding female (DG/YE/DG, OR/AL) remained the same since 2008. A new nest cavity was established and used this season (tree 157). The first egg was detected on 29 April and a full clutch of 4 eggs was discovered on 3 May. A helper (OR/OR/OR, AL/YE) was observed incubating the nest on one occasion. Only 3 of the 4 eggs were hatched with 3 4-day old chicks detected on 16 May. Two of the nestlings were banded on 19 May and estimated to be 7 days old, and the last nestling was banded on 24 May and estimated to be 11 days old. All three birds successfully fledged and were identified as 2 females and 1 male. Only 1 male and 1 female fledgling was detected during winter surveys. Both were still occupying C-10.

Cluster 13 – This was only the second year this site was occupied with a potential breeding pair and the second consecutive year young birds were successfully produced. The breeding pair remained the same as in 2010 with male (WH/RE/WH, AL/DB) being a C-7 hatched bird from 2007 that began using C-13 in 2008. The breeding female (WH/WH/WH, RE/AL) was hatched at C-10 in 2008 and was first observed roosting at C-13 in the winter of 2009. A new tree was used for nesting this year (#119). The nest tree from 2010 (#126) had died between seasons. Three eggs were detected on 10 May and this clutch was expected to be initiated sometime after a 6 May nest check that revealed an empty nest. Only 2 of the eggs were observed to hatch and nestlings were banded on 24 May. Both nestlings successfully fledged and were identified as 2 males on 10 June. Only one of these hatch year males were detected during the winter survey.

Cluster 15 – This was the first year birds at this site attempted to breed. Birds have occupied C-15 since 2008 but have previously not been more than a spatial extension of C-8. Prior to 2011, the birds occupying this site regularly foraged and interacted with C-8 and even helped in breeding duties there. The breeding events at C-15 might be the first example of “budding” at Piney Grove. Budding is typically defined as the splitting of two clans into separate breeding clusters where no additional space is used. Budding is considered different from “pioneering” where birds move into a new space to initiate a new breeding cluster (e.g., C-13 in 2010). The breeding male at C-15 (YE/DB/YE, AL/PU) was originally hatched at C-8 in 2008 and had occupied C-15 since 2009. There were only two other birds that occupied C-15 during the breeding term in 2011. One bird was a male (AL/LB, YE/DB/YE) hatched in C-8 in 2010 and the other was an unbanded bird. The unbanded bird was presumed to originate from C-3 from a 2010 cohort. The 2010 C-3 cohort was comprised of 2 males and 1 female where only 1 male was ever captured and banded. Therefore, the unbanded birds was presumed to be that leftover female from C-3. All three birds incubated and helped to feed nestlings and fledglings. The first time breeding was detected at this site was on 24 May when 3 nestlings were detected and estimated to be 4-5 days of age. All three nestlings were banded on 30 May. All 3 birds successfully fledged and were identified as 2 females and 1 male on 23 June. One female fledge was detected at C-15 during winter surveys, and the other female and a male fledgling were detected at the newly established C-19 during winter. The two hatch year birds using C-19 continued to forage with C-15 birds and observed on two occasions flying immediately to C-15 upon morning roost departure.

**Table 3.** Red-cockaded Woodpecker nestlings recorded during banding activities at the Piney Grove Preserve in 2011.

Cluster	Date	USGS	Left	Right	Age	Mass (g)	Sex
C-1	5/16/11	821 70922	LG/YE/LG	AL/LB	6-7	27.5	F
C-1	5/16/11	821 70923	LG/YE/LG	AL/WH	7	27.0	M
C-1	5/16/11	821 70924	LG/YE/LG	AL/DB	6-7	23.5	F
C-1	5/16/11	821 70925	LG/YE/LG	AL/OR	6	19.5	F
C-3		Not banded					M
C-3		Not banded					M
C-3	1/12/12	821-70941	AL/OR	DB/RE/DB			F
C-5	5/24/11	821 70931	WH/LB/WH	WH/AL	8	26.0	F
C-5	5/24/11	821 70932	WH/LB/WH	OR/AL	8	29.0	F
C-5	5/24/11	821 70933	WH/LB/WH	PU/AL	8	30.5	F
C-6	5/30/11	821 70937	PU/YE/PU	AL/WH	8	34.5	M
C-6	5/30/11	821 70938	PU/YE/PU	AL/OR	8	32.0	M
C-6	5/30/11	821 70939	PU/YE/PU	AL/LG	8	25.5	M
C-8	5/10/10	821 70918	YE/DB/YE	YE/AL	8-9	32.5	M
C-8	5/10/10	821 70919	YE/DB/YE	LB/AL	9-10	34.5	M
C-8	5/10/10	821 70920	YE/DB/YE	OR/AL	9-10	37.0	M
C-8	5/10/10	821 70921	YE/DB/YE	RE/AL	8-9	25.5	F
C-10	5/19/11	821 70926	OR/OR/OR	AL/PU	7	26.5	F
C-10	5/19/11	821 70927	OR/OR/OR	AL/DB	7	25.0	M
C-10	5/24/11	821 70930	OR/OR/OR	AL/LG	11	35.5	F
C-13	5/24/11	821 70928	YE/OR/YE	AL/OR	10	32.5	M
C-13	5/24/11	821 70928	YE/OR/YE	AL/WH	10-11	34.5	M
C-15	5/30/11	821 70934	OR/DB/OR	AL/YE	9-10	36.5	F
C-15	5/30/11	821 70935	OR/DB/OR	AL/DB	9	36.0	F
C-15	5/30/11	821 70936	OR/DB/OR	AL/LG	9	35.0	M

## **Translocations**

No translocations of birds into Piney Grove have been conducted since 2005.

## **Cavity Trees**

In 2011, Piney Grove contained 169 cavities in live trees including 49 start cavities, 57 completed cavities, and 63 artificial inserts. Sixteen new cavities or new cavity starts were added to the number of known cavities this past year. Seven trees died between January and December 2011 resulting in a loss of ten cavities or starts. Four of these trees, including the nest tree for C5 (tree 23), were broken during Hurricane Irene which passed through the area on August 27<sup>th</sup>. The 2010 nest tree at C13 (tree 126) was dead prior to the 2011 nesting season. Fourteen trees were found in 2011 containing three newly completed natural cavities and twelve cavity starts. One start was discovered in previously tagged cavity tree. Sixty of the 120 (50 percent) available natural cavities or inserts had fresh or recent chipping and sap flow from resin wells in spring 2011. Of the 63 inserts in live trees, 23 (37%) had fresh or recent resin work. Of the 57 natural cavities, 37 (65%) had fresh or recent resin work.

## **Cavity competitor inspection and removal**

There were 38 instances of cavity competitors or nest material in RCW cavities during the April, May and June 2011. Multiple cavity competitor species occurring simultaneously in a cavity were counted as separate occurrences. Multiple individuals of one species found together in a cavity were counted as one occurrence. Southern flying squirrels accounted for 11 of the 38 occurrences. A total of 17 individual flying squirrels were removed on 11 occasions from nine of the 120 available cavity trees. Nine bird nests, with eggs or nestlings (not including RCW nests), and one wasp nest were also found in cavities.

## **ACKNOWLEDGEMENTS**

This project received assistance from many individuals during 2011. 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. This report was also completed 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.

Appendix 1: Status of Red-cockaded Woodpecker cavity trees at the Piney Grove Preserve.

CLUSTER	Tree	Cavity	Species	Condition	Cavity	2011 Status	2011 Condition	2011 Entrance	2011 Plate	2011 Resin Work
1	31		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
1	32		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
1	34		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
1	35		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
1	36		Loblolly	Live	Artificial	Relic	Insert	Normal	>15 cm	Old/None
1	37		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
1	38		Shortleaf	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	39		Loblolly	Live	Natural	Inactive	Complete	<2X	> 45 cm	Old/None
1	40		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	41		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	42		Loblolly	Live	Natural	Relic	Start	Healing	Unavailable	Unavailable
1	43		Loblolly	Live	Natural	Relic	Complete	>4X	15-30 cm	Old/None
1	44	a	Loblolly	Live	Natural	Relic	Complete	<2X	Unstarted	Old/None
1	44	b	Loblolly	Live	Natural	Relic	Complete	>4X	15-30 cm	Old/None
1	45	a	Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	45	b	Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	46		Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None
1	47		Loblolly	Dead	Natural	Relic	Start (Ad)	Restrictor	Unstarted	Old/None
1	48		Loblolly	Live	Natural	Active	Complete	Normal	> 45 cm	Recent
1	49		Loblolly	Live	Natural	Relic	Complete	>4X	15-30 cm	Old/None
1	50		Shortleaf	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
1	51		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
1	52		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
1	53		Loblolly	Live	Natural	Active	Complete	Normal	30-45 cm	Fresh
1	54		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
1	55		Loblolly	Live	Natural	Active	Complete	<2X	Unstarted	Fresh
1	57		Loblolly	Live	Natural	Active	Complete	Normal	30-45 cm	Fresh
1	58	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
1	58	b	Loblolly	Live	Natural	Active	Complete	Normal	15-30 cm	Fresh
1	59	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Recent
1	59	b	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
1	102		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
1	117	a	Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
1	117	b	Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
1	164		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
2	60		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
2	61		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
2	62		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
2	63		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
3	1		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None

3	2		Loblolly	Live	Artificial	Inactive	Insert	Restrictor	>15 cm	Old/None
3	3	a	Loblolly	Dead	Natural	Inactive	Complete	Restrictor	> 45 cm	Old/None
3	3	b	Loblolly	Dead	Natural	Inactive	Start	Normal	Unstarted	Old/None
3	4	a	Loblolly	Live	Natural	Active	Complete (New)	<2X	Unstarted	Fresh
3	4	b	Loblolly	Live	Natural	Active	Complete	Restrictor	30-45 cm	Fresh
3	5		Loblolly	Live	Natural	Relic	Start	Normal	Unstarted	Old/None
3	6		Loblolly	Live	Natural	Active	Complete	Normal	Unstarted	Recent
3	7	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Recent
3	7	b	Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Recent
3	8		Loblolly	Live	Natural	Active	Complete	Normal	> 45 cm	Fresh
3	9	a	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
3	9	b	Loblolly	Live	Natural	Active	Complete	Normal	30-45 cm	Fresh
3	9	c	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
3	71		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
3	72		Loblolly	Live	Natural	Relic	Complete	>4X	>15 cm	Old/None
3	74		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
3	75		Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None
3	76		Loblolly	Live	Artificial	Relic	Insert	Normal	>15 cm	Old/None
3	77		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
3	79	a	Loblolly	Live	Natural	Relic	Complete	>2X	30-45 cm	Old/None
3	79	b	Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
3	79	c	Loblolly	Live	Natural	Relic	Start	Restrictor	Unstarted	Old/None
3	80		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
3	177		Loblolly	Live	Artificial	Relic	Insert	Normal	>15 cm	Old/None
3	178		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
3	179		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
3	180		Loblolly	Live	Natural	Active	Complete (New)	Normal	Unstarted	Fresh
3	NT		Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
4	81		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
4	82		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
4	83		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
4	84		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
4	186		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
5	18	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
5	18	b	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
5	19		Loblolly	Live	Natural	Active	Complete	Normal	15-30 cm	Fresh
5	20		Loblolly	Live	Natural	Relic	Complete	Restrictor	> 45 cm	Old/None
5	21		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	22		Loblolly	Live	Natural	Relic	Complete	Restrictor	> 45 cm	Old/None
5	23	a	Loblolly	Live	Natural	Active	Complete	Restrictor	>15 cm	Fresh
5	23	b	Loblolly	Live	Natural	Active	Complete	Restrictor	> 45 cm	Fresh
5	24		Loblolly	Live	Natural	Active	Complete	Restrictor	30-45 cm	Fresh
5	25		Loblolly	Live	Natural	Active	Complete	<2X	> 45 cm	Fresh

5	26		Loblolly	Live	Natural	Active	Complete	Restrictor	15-30 cm	Fresh
5	27		Loblolly	Live	Natural	Active	Complete	Restrictor	15-30 cm	Recent
5	28		Loblolly	Live	Natural	Inactive	Complete	Restrictor	>15 cm	Old/None
5	29		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	30		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Recent
5	92		Loblolly	Live	Natural	Relic	Start	Healing	Unavailable	Unavailable
5	93		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	94		Loblolly	Live	Natural	Relic	Complete	Restrictor	Unstarted	Old/None
5	95		Loblolly	Live	Natural	Relic	Complete	Restrictor	15-30 cm	Old/None
5	96		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	97		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	98		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	99		Loblolly	Dead	Natural	Unavailable	Complete	Unavailable	Unavailable	Unavailable
5	127		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
5	138		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
5	191		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
5	NT1		Unknown	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
5	NT2		Unknown	Live	Natural	Active	Complete (New)	Normal	Unstarted	Fresh
5	NT3		Unknown	Live	Natural	Active	Start	Normal	Unstarted	Fresh
5	NT4		Unknown	Live	Natural	Active	Start	Normal	Unstarted	Fresh
5	NT5		Unknown	Live	Natural	Active	Complete	<2X	Unstarted	Fresh
6	10		Loblolly	Live	Artificial	Inactive	Insert	Normal	>15 cm	Old/None
6	11		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
6	12		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
6	13		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
6	116		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
6	135	a	Loblolly	Live	Natural	Active	Complete	<2X	Unstarted	Fresh
6	135	b	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
6	135	c	Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
6	136	a	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
6	136	b	Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
6	137		Loblolly	Live	Artificial	Poss. Active	Insert	Normal	Unstarted	Recent
6	139		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
6	NT	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Recent
6	NT	b	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
7	105		Loblolly	Live	Artificial	Active	Insert	Normal	15-30 cm	Recent
7	106	a	Loblolly	Live	Natural	Active	Complete	<2X	30-45 cm	Fresh
7	106	b	Loblolly	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
7	107		Loblolly	Live	Natural	Active	Complete	Restrictor	30-45 cm	Fresh
7	108		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
7	109		Loblolly	Live	Natural	Active	Start (Ad)	Normal	Unstarted	Fresh
7	110		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
7	111		Loblolly	Live	Artificial	Inactive	Insert	Normal	>15 cm	Old/None

7	112		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
7	113		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
7	114		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
7	115		Loblolly	Live	Natural	Inactive	Complete	>2X	30-45 cm	Old/None
7	190		Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Recent
7	192	a	Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
7	192	b	Loblolly	Live	Natural	Active	Complete	Normal	15-30 cm	Fresh
7	194	a	Loblolly	Dead	Natural	Inactive	Sub-start	Normal	Unstarted	Old/None
7	194	b	Loblolly	Dead	Natural	Inactive	Complete	Normal	30-45 cm	Old/None
7	195		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
7	NT		Unknown	Live	Natural	Inactive	Start	Normal	Unstarted	Old/None
8	129		Loblolly	Live	Natural	Active	Complete	Normal	>15 cm	Fresh
8	155		Loblolly	Live	Natural	Active	Complete	Normal	Unstarted	Fresh
8	170		Loblolly	Live	Artificial	Inactive	Insert	Normal	15-30 cm	Old/None
8	171		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
8	172		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
8	173		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
8	174	a	Loblolly	Live	Natural	Active	Complete	Restrictor	Unstarted	Old/None
8	174	b	Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
8	174	c	Loblolly	Live	Natural	Inactive	Start	<2X	Unstarted	Old/None
8	175		Loblolly	Live	Natural	Active	Complete	Normal	Unstarted	Fresh
8	176	a	Loblolly	Live	Natural	Inactive	Start (Ad)	<2X	Unstarted	Old/None
8	176	b	Loblolly	Live	Natural	Relic	Complete	>4X	Unstarted	Old/None
8	176	c	Loblolly	Live	Natural	Relic	Start	<2X	Unstarted	Old/None
8	176	d	Loblolly	Live	Natural	Relic	Complete	>2X	Unstarted	Old/None
8	176	e	Loblolly	Live	Natural	Relic	Start	Normal	Unstarted	Old/None
8	176	f	Loblolly	Live	Natural	Relic	Start	Normal	Unstarted	Old/None
8	NT1		Unknown	Live	Natural	Active	Complete (New)	Normal	Unstarted	Fresh
8	NT2		Unknown	Live	Natural	Active	Start	Normal	Unstarted	Fresh
8	NT3		Unknown	Live	Natural	Active	Start	Normal	Unstarted	Fresh
9	85		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
9	86		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
9	87		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
9	88		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
10	64		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
10	65		Loblolly	Live	Artificial	Active	Insert	Normal	30-45 cm	Fresh
10	66		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
10	67		Loblolly	Live	Natural	Relic	Complete	>4X	Unstarted	Old/None
10	68		Loblolly	Live	Natural	Active	Complete	<2X	Unstarted	Old/None
10	150		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
10	151		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
10	152		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
10	153		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable

10	154		Loblolly	Live	Natural	Active	Complete	Normal	Unstarted	Fresh
10	156		Loblolly	Live	Natural	Active	Complete	Normal	15-30 cm	Fresh
10	157		Unknown	Live	Natural	Active	Complete (New)	Normal	Unstarted	Fresh
10	NT		Unknown	Live	Natural	Active	Start	<2X	Unstarted	Fresh
11	140		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
11	141		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
11	142		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
11	143		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
12	130		Loblolly	Dead	Artificial	Unavailable	Insert	Unavailable	Unavailable	Unavailable
12	131		Loblolly	Live	Artificial	Inactive	Insert	<2X	Unstarted	Old/None
12	132		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
12	133		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
12	189		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
13	118		Loblolly	Dead	Artificial	Inactive	Insert	Normal	>15 cm	Old/None
13	119		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
13	120		Loblolly	Live	Artificial	Active	Insert	Normal	>15 cm	Fresh
13	121		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
13	122		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
13	123		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Recent
13	124		Loblolly	Live	Artificial	Relic	Insert	Normal	Unstarted	Old/None
13	126		Loblolly	Dead	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
13	144		Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Fresh
13	145		Unknown	Live	Natural	Active	Start	Normal	Unstarted	Fresh
14	88		Loblolly	Live	Natural	Inactive	Start (Ad)	Normal	Unstarted	Old/None
14	89		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
14	90		Loblolly	Dead	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
14	91		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
14	100		Loblolly	Live	Natural	Inactive	Start (Ad)	<2X	Unstarted	Old/None
14	101		Loblolly	Live	Natural	Active	Complete	>2X	Unstarted	Recent
15	160		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
15	161		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Recent
15	162		Loblolly	Live	Artificial	Active	Insert	Normal	15-30 cm	Fresh
15	163		Loblolly	Live	Artificial	Active	Insert	Normal	Unstarted	Fresh
16	165		Loblolly	Live	Natural	Active	Start	Normal	Unstarted	Recent
16	166		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
16	167		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	146		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
17	147		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
18	181		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
18	182		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
18	183		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None
18	184		Loblolly	Live	Artificial	Inactive	Insert	Normal	Unstarted	Old/None