Executive Summary

Background: The Palmetto-Peartree Preserve (P3), Tyrrell County, North Carolina, resulted from an agreement between the North Carolina Department of Transportation (NCDOT) and The Conservation Fund (TCF). TCF bought the tract in 1999 from Prudential Timber Investments, Inc. (Pru-Timber), a subsidiary of the Prudential Insurance Company of America, NCDOT then purchased a conservation easement on P3 from TCF in order to provide red-cockaded woodpecker (*Picoides borealis*) (RCW) mitigation credits to offset unavoidable adverse impacts to RCWs from highway projects in the North Carolina Coastal Plain. TCF manages P3 to this purpose. This management plan was written to guide RCW and other management actions at P3.

Property Description: P3 is located in northeastern coastal North Carolina and consists of approximately 9700 acres on several tracts in extreme northeastern Tyrrell County. Most of the acreage is included in 2 large parcels. The northern portion of the project site (8405 acres) borders Albemarle Sound to the north and Alligator Creek to the southeast and timber and agricultural lands to the west and south. The southern portion (1301 acres) borders Alligator Creek to the northeast, timber and agricultural lands to the east and west and US Highway 64 to the south.

The property has approximately 8.8 miles of frontage on Albemarle Sound with road access at 2 points. There are approximately 2.8 miles of frontage on the north side of Alligator Creek (1 road access) and 3.1 miles of frontage on the south side of Alligator Creek.

In 1999, the property was mostly forested with mature (50+ years old) pine, pine-hardwood and swamp hardwood forest types. Loblolly pine (*Pinus taeda*) was the dominant pine. There were approximately 6625 acres of pine dominated stands and 2645 acres of hardwoods, with small amounts of cut-over land (~217 acres), non-forested land (~123 acres) and planted pine (~125 acres). Most forest stands have dense hardwood understories and midstories, except where recent silvicultural treatments have suppressed the undergrowth. Dense pine regeneration occurs under an open canopy of mature pine on some sites.

Historically, vegetative communities occurring onsite included Nonriverine Swamp Forest, Nonriverine Wet Hardwood Forest, Estuarine Fringe Loblolly Pine Forest and Tidal Cypress-Gum Forest. Nonriverine Swamp Forest was the most widespread community type.

Currently there are large areas of Successional Wet Loblolly Pine Forest and Wet Pine Hardwood Forest. It is unknown if these are natural community types on P3 or is a result of anthropomorphic disturbances. Tidal Cypress-Gum Swamp was restricted to the shorelines along Albemarle Sound and Alligator Creek.

Soils are hydric and include both mineral soils and organic mucks. Common soil types are the Tomotley, Belhaven, Dorovan, Perquimans and Portsmouth series. Vegetation is generally hydrophytic. Wetland hydrology is presumably present on much of the property, however, ditches and canals were constructed in the past. Drainage efforts have had an unknown impact on natural hydrology.

Current Species Status:

The red-cockaded woodpecker is endemic to mature pine forests in the southeastern United States. Formerly common throughout its broad range, it was listed as endangered in 1968 (USDI 1968) as a result of widespread habitat destruction and population declines caused by the conversion of mature pine forests to short rotation forest management, agricultural and other non-forest land uses. Significant populations are scattered within the historical range, primarily on public lands. Although positive conservation efforts are being implemented in many populations, this species continues to decline in many small, isolated populations, particularly on private lands. Thirty-five (active and inactive) RCW clusters occur on P3 in Tyrrell County, North Carolina. Two other RCW clusters are known to occur on adjacent properties and have foraging habitat on P3. P3 has been designated as part of an Essential Support Population in the second revision of USFWS Draft RCW Recovery Plan (USFWS 2001).

Habitat Requirements and Limiting Factors: RCWs excavate nest and roost cavities in old (>100 years old), living pines and require large areas of mature pine for foraging habitat. RCWs live in social units called "groups" (formerly "clan"), which typically consist of a mated pair and 0 to 3 "helpers", usually male offspring from previous years. Each group occupies an aggregation of cavity trees termed a "cluster" (formerly "colony") and has a well-defined, large home range. Midstory encroachment, a shortage of old pines for cavity sites, insufficient quality cavities, loss of cavities to other species, direct and residual pine tree mortality associated with storms, habitat fragmentation and adverse genetic and demographic factors associated with

small, isolated populations are limiting factors range wide and at P3. Loss of cavity trees and foraging habitat due to outbreaks of southern pine beetles (*Dendroctonus frontalis*) (SPB) are a serious problem at P3.

Management Objectives: Management objectives will stress protection and enhancement of the existing RCW population on P3 as well as expansion into unoccupied suitable habitat. Ecosystem management will be used to further natural processes, thereby restoring and perpetuating native vegetative communities. TCF will cooperate with adjacent landowners to more effectively manage its habitats and species of concern.

Conservation Goals:

1. The long-term population goal for P3 is 33 active RCW clusters. Currently (2002), there are 25 active clusters on P3 property, however, only 24 of those 25 can be applied towards the goal due to inadequate forage. The increase in RCW clusters will result from the establishment of recruitment clusters. Recruitment clusters fall into 2 categories: existing captured, inactive or relic clusters that will be provisioned with artificial cavities and proposed new clusters that will consist entirely of artificial cavities. There are currently 5 clusters in the former category and 4 clusters in the latter category.

2. Approximately 6600 acres will be managed to provide current and future RCW habitat.

3. All management activities will be compatible with TCF's mission statement (TCF 1997):

> The Conservation Fund seeks sustainable conservation solutions for the 21st century, emphasizing the integration of economic and environmental goals. Through real estate transactions, demonstration projects, education, and community-based activities, the Fund seeks innovative long-term measures to conserve land and water.
>
> Since its inception, the Fund has forged partnerships to protect America's irreplaceable outdoor heritage on a scale that far exceeds its size – 2 million acres saved – a tangible legacy for future generations.

4. Implementation of this Management Plan will not adversely affect any other federally-listed species.

ENDANGERED SPECIES MANAGEMENT PLAN

FOR THE

RED-COCKADED WOODPECKER

(Picoides borealis)

AT

PALMETTO – PEARTREE PRESERVE, TYRRELL COUNTY, NORTH CAROLINA

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I. Introduction

A. *Purpose*. The purpose of this Endangered Species Management Plan (ESMP) is to provide management guidance for the endangered red-cockaded woodpecker (*Picoides borealis)* (RCW) and the threatened bald eagle (*Haliaeetus leucocephalus*), in addition to other habitat-related activities at the Palmetto-Peartree Preserve (P3) in Tyrrell County, North Carolina (**Figure 1**).

B. *Applicability*. The guidelines in this MP are applicable to P3, which is owned and managed by The Conservation Fund (TCF). The requirements in this MP will apply to all activities on the property.

C. *Revision*. This MP will be updated every 5 years or otherwise revised as necessary to be consistent with the latest United States Fish and Wildlife Service (USFWS) RCW Recovery Plan and to incorporate the latest and best scientific data available.

D. *Goal.* Management guidelines will be utilized that will allow TCF and the North Carolina Department of Transportation (NCDOT) to optimize the development of RCW mitigation credits while concurrently developing and implementing methods to assist in the recovery and delisting of the RCW.

II. Consultation.

TCF will comply with the requirements of Sections 7, 9 and 10 of the Endangered Species Act (ESA) and the implementing regulations at 50 CFR part 402 when taking actions that may affect the RCW pursuant to this MP.

Early entry into consultation with the USFWS is key to resolving potential problems and establishing the foundation to address them in a proactive and positive manner. If through Informal Consultation the USFWS concurs in writing that the RCW MP or other action is not likely to adversely affect any threatened or endangered species, Formal Consultation is not required. Issue resolution through Informal Consultation is the preferred method of consultation.

When consulting with the USFWS on this MP and other actions that may affect the RCW, the opinions of the USFWS will normally be consistent with these guidelines. In exceptional cases, however, USFWS opinions may require TCF to take measures inconsistent with these guidelines.

III. Policies Applicable to RCW Management.

A. *Cooperation with the U.S. Fish and Wildlife Service*. TCF/NCDOT will work closely and cooperatively with the USFWS on RCW conservation. TCF will routinely consult with the USFWS to ensure that proposed actions are consistent with ESA requirements.

B. *Ecosystem Management*. Conservation of the RCW, bald eagle and other species is part of a broader goal to conserve biological diversity on TCF lands consistent with the TCF mission. Biological diversity and the long-term survival of individual species, such as the RCW and bald eagle, ultimately depend upon the health of the sustaining ecosystem. Therefore, this ESMP will promote ecosystem integrity.

C. *Staffing and Funding*. TCF is responsible for ensuring that adequate professional personnel and funds are provided for the conservation measures prescribed by this RCW MP through 2007.

D. *Conservation on Adjacent Lands*. Necessary habitat for the RCW includes nesting and foraging areas. Both of these habitat components may be located entirely on P3 lands or there may be instances where 1 of these components is located on P3, while a portion of the other is located on adjacent non-TCF land. The USFWS and TCF will seek cooperative management efforts with these landowners if such efforts compliment property RCW conservation objectives. Some critical parcels may be purchased by TCF.

E. *Regional Conservation.* The interests of the TCF/NCDOT and the RCW are served by encouraging conservation measures in areas off P3. The USFWS and TCF will participate in promoting cooperative RCW conservation plans and efforts with other federal, state and private landowners in the surrounding area. P3, Alligator River National Wildlife Refuge (NWR), Dare County Bombing Range, Pocosin Lakes NWR and Piney Grove Preserve (owned by The Nature Conservancy) are part of the Northeast North Carolina/Southeast Virginia "Essential Support Population" in the Mid-Atlantic Coastal Plain Recovery Unit in the second revision of the USFWS Draft RCW Recovery Plan (USFWS 2001).

F. *Management Strategy*. TCF will adopt a long-term approach to RCW management consistent with TCF's mission and the ESA. First, TCF will establish an RCW population goal in consultation with the USFWS using approved methodology. Once established, TCF must designate sufficient nesting and foraging habitat to attain and sustain this goal. Next, TCF will develop and implement an MP to attain and sustain the P3 RCW population goal.

IV. Definitions.

Augmentation- relocation of an RCW, normally a juvenile female, from 1 cluster to another cluster.

Basal Area (BA)- the cross-sectional area (in square feet or meters) of trees per acre measured at approximately 4.5 feet above the ground.

Biological Diversity- the variety of life and its processes. It includes the variety of living organisms and all their genotypes and the communities and ecosystems in which they occur.

Buffer Zone (Eagle)- the zone extending outward from 750 feet (primary zone) to 750+ feet (secondary zone) from an active eagle nest.

Buffer Zone (RCW)- the zone extending outward 200 feet from a cavity tree or cavity start tree in an active or recruitment cluster.

Cavity- an excavation in a tree made by, or artificially created for, roosting and nesting by RCWs.

Cavity Restrictor- a metal plate that is placed around an RCW cavity to prevent access by larger species. A restrictor also prevents a cavity from being enlarged, or if already enlarged, shrinks the cavity entrance diameter to a size that prevents access by larger competing species.

Cavity Start or Start- an incomplete cavity excavated by, or artificially created for, RCWs.

Cavity Tree- a tree containing 1 or more active or inactive RCW cavities or cavity starts.

Cluster (formerly called "colony")- the area encompassing the aggregate of cavity trees occupied or formerly occupied by a RCW group plus a 200 foot buffer.

Conservation Credits- mitigation credits earned through active management of existing active RCW clusters.

Creation Credits- mitigation credits earned through the establishment of recruitment clusters that are occupied by new RCW groups.

Effective Breeding Pairs- RCW groups that successfully fledge young.

Essential Support Population- "those populations, identified in recovery criteria, that represent unique or important habitat types that cannot support a larger, core population" (USFWS 2001).

Group (formerly called "clan")- a social unit of 1 or more RCWs that inhabits a cluster. A group may include a solitary territorial male, a mated pair or a pair with helpers (offspring from previous years).

Population- a RCW population is the aggregate of groups which are close enough together so that the dispersal of individuals maintains genetic diversity and all the groups are capable of genetic interchange. Population delineations are made irrespective of land ownership.

Population Goal- a desired RCW population measured in number of active clusters, not number of individuals or groups.

Provisioning- the construction of artificial cavities or cavity starts.

Recovery Population- the annual occurrence of 250 or more effective breeding pairs within a population for at least 5 consecutive years.

Recruitment- the designation and management of habitat for the purpose of attracting a new breeding group to that habitat.

Recruitment Stand - a stand of trees, minimum of 10 acres in size, with sufficient suitable RCW nesting habitat to support a new RCW group. The stand and supporting foraging habitat will be located 0.37 to 0.75 mile from an existing cluster or other recruitment stand.

Recruitment Cluster- a cluster of trees provisioned with artificial cavities within a recruitment stand. Recruitment clusters usually consist of 3 cavities and 2 starts.

Relic Tree- a pine tree usually more than 100 years old having characteristics making it attractive to the RCW for cavity excavation.

Replacement Stand- a stand of trees, minimum of 10 acres in size, identified to provide suitable nesting habitat for a RCW group when its current cluster becomes unsuitable. The stand should be approximately 20-30 years younger than the active cluster. The replacement stand should be contiguous to the active cluster and never more than 0.25 mile from it unless there is no suitable alternative.

Stand- an aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, distribution and condition so as to be distinguishable from the forest in adjoining areas.

Sub-population- the aggregation of groups which are close enough together to allow for demographic interchange between groups. A sub-population does not have a significant demographic influence on adjacent sub-populations, but there is sufficient genetic interchange between the sub-populations to be considered 1 population.

Suitable Acreage- property acreage determined to be currently suitable for occupation by RCWs based upon vegetation and dominant land uses and the acreage potentially suitable for occupation by RCWs through reasonable management practices. For example, acreage with severe mid-story encroachment would be considered as potentially suitable acreage and therefore suitable acreage; however, fields and other, permanently treeless areas would not be considered suitable or potentially suitable acreage.

Translocation- the relocation of 1 or more RCWs from an active cluster to an inactive cluster or a recruitment cluster that contains artificially constructed cavities.

V. RCW Species Information

This chapter provides a description of the RCW and its distribution, habitats, life history, reasons for listing and conservation measures taken by other agencies.

A. *Description.* The adult RCW is a small black and white woodpecker measuring 8-9 inches long and weighing 42-53 grams. Linear measurements and mass vary clinally, decreasing in size from north to south (Mengel and Jackson 1977, Jackson 1994). Its black crown and nape, black and white horizontally barred back and white cheeks are diagnostic. Adult males have a small patch of red feathers (cockades) on both sides of the crown behind the eye. The cockades are not detectable on free ranging birds unless viewed with binoculars or telescopes when the bird is excited (crown feathers erect) or wet. Juvenile males lack the cockades, but have a red patch in the center of the crown that may nearly cover the crown or consist of only a few feathers. The red crown patch is gradually lost and cockades acquired in August and September following fledging. Adult and juvenile females lack any red. Juveniles can be further distinguished from adults by a faint dusky smudge on the white cheek patches and distinct small white spots on the forehead. These features are lost as feathers are molted in late summer and early fall. Jackson (1994) presents additional descriptive information. The RCW has a wide variety of vocalizations (Winkler and Short 1978), including the characteristic "sklit" call.

Similar woodpeckers in the Southeast are the hairy woodpecker (*Picoides villosus*) and the much smaller downy woodpecker (*Picoides pubescens*). Both of these species are easily separated from the RCW by black bars across their cheeks and vertically barred backs.

B. *Distribution.* Historically, the RCW was common in the old-growth pine forests from southern Maryland and southeastern Virginia, south through the Coastal Plain and eastern Piedmont to southern Florida, west to eastern Texas and southeastern Oklahoma, and north to southeastern Missouri and south-central Kentucky (Jackson 1978, Hooper et al. 1980) (**Figure 2**). It was absent from the Appalachian Highlands and the Mississippi floodplain. Today the RCW is extirpated in Kentucky, Tennessee, Maryland and Missouri, and nearly so in Virginia. The species has been reduced to mostly small, isolated populations in much of its remaining range, although several sizeable populations, mostly on federal lands, remain (James 1995).

Currently, the largest population is on the Apalachicola National Forest in the panhandle of Florida (USFWS 2001). Until Hurricane Hugo (1989) the Francis Marion National Forest

in coastal South Carolina contained the second largest population of RCWs (Watson et al. 1995). The second largest population now occurs in the North Carolina Sandhills (USFWS 2001). The nearest significant population to P3 is located on the Croatan National Forest, approximately 85 air miles to the southwest of P3. The Croatan supports 62 active clusters (ibid), which are part of the North Carolina Coastal Plain Primary Core Population (ibid).

RCW distribution on the Pamlico-Albemarle Peninsula is poorly known. Anecdotal information supports the probability that a large RCW population (>250 groups) resided in this area until the 1970s when landscape level conversions of forestland to agriculture ensued. Recent surveys have located previously unknown RCW clusters on the Alligator River and Pocosin Lakes National Wildlife Refuges (ARNWR and PLNWR) and on private lands in Hyde County (JCA unpub. data). Dare County Bombing Range supports 15 clusters, 5 of which are active (Carter et al.1997, JCA Inc., 2001).

C. *Habitat*. The RCW is a bird of mature pine forests in the Southeast. Though usually associated with longleaf (*Pinus palustris*) and loblolly pines (*P. taeda*), it also occurs to a lesser extent in slash (*P. elliottii*), pond (*P. serotina*), shortleaf (*P. echinata*), pitch (*P. rigida*) and Virginia (*P. virginiana*) pines (Jackson 1971). Typical quality habitat is described as open mature pine or pine-hardwood stands with little to no understory. Such habitats once covered millions of acres in the Southeast and were maintained by periodic (1-5 year interval), usually low intensity, fires of lightning or aboriginal origin. This species constructs roost and nest cavities in living pines, approximately 100 years old and older in longleaf and approximately 80 years old and older for other species (Jackson et al. 1979). Younger trees are used for foraging (Hooper et al. 1982), though old trees will be selected in excess of their availability (Zwicker et al. 1999).

D. *Life history.* The RCW is a cooperatively breeding species that lives in social units called groups (formerly "clan") (Walters et al. 1988, Walters 1990). A group typically consists of a mated pair and 0-3 "helpers", usually sons of the breeding male from previous years' broods. Helpers assist the breeding pair with incubating eggs, feeding young, constructing cavities and defending the group's territory. Nests are initiated from mid-April through May, occasionally earlier or later. Nests failing at the egg or small nestling stages

may be replaced. Second nests following a successful first nest are very rare (LaBranche et al. 1994). Subsequent nest attempts within a year are usually in the same cavity, but occasionally a different cavity is used. Clutch size varies from 2-5 eggs, usually 3-4 (Jackson 1994). Mean clutch size on the Croatan National Forest was 3.35 (Walters et al. 1996). Incubation begins with the last egg laid and takes 10-11 days (Jackson 1994). The nestlings hatch asynchronously and brood reduction occurs in most years (LaBranche and Walters 1994). Nest failure rates, renesting rates, number of young fledged per successful nest and percent of eggs that become fledglings are variable among years. The means of these parameters on the Croatan National Forest were 22.2 percent, 25.7 percent, 1.96, and 58.7 percent, respectively (Walters et al. 1996). Groups with helpers may fledge more young, at least in some years (Lennartz et al. 1987, Ligon 1970). Successful broods of 4 are uncommon and 5 are very rare. Most young fledge at 26-29 days old (Ligon 1971).

Nearly all juvenile females disperse prior to the next breeding season, whereas one-half or more of juvenile males remain with their natal group as helpers. In the North Carolina Sandhills, the median dispersal distance was 2.8 miles for juvenile females and 3.2 miles for juvenile males, but only 0.8 miles for adult females and 0.6 miles for adult males (mostly helpers) (Walters et al. 1988). Long distance movements (up to 178 miles) of females and males (up to 100 miles) are being documented more frequently as more RCWs are banded throughout the Southeast (Ferral 1997). Mortality is highest during the first year, but much lower and relatively constant thereafter. Males survive slightly better than females. Few adults exceed 10 years old in the wild, though a male in the North Carolina Sandhills (Fort Bragg) was 18 years old in 2001 (K. Sadler, pers. comm.).

The group inhabitants an aggregation of cavity trees (1-30+) termed a cluster (formerly "colony" or "colony site"). A typical cluster contains cavities of varying ages including start cavities, active cavities, inactive cavities (may be reused) and relict cavities (old, modified cavities unlikely to be reused). The cavity trees within a cluster are usually distributed within several acres, but occasionally may be 0.25 mile or more apart. Cluster locations may be stable for decades or gradually migrate across the landscape as old cavity trees die or are abandoned and new ones are added. Cluster ownership is passed from father to son, unless there is no heir or an outside male usurps the site. Ideally each group member has a roost cavity, which is not shared. The nest is in the breeding male's roost cavity. Cavity

excavation may take years to complete (Conner and Rudolph 1995, Walters et al. 1997), and is typically associated with the presence of red heart fungus (*Phellinus pini*). In North Carolina the average duration of excavation in loblolly pine ranged from 6-9 years and 10-13 years in longleaf pine (Harding, MS Thesis, 1997). Little information exists on cavity excavation rates in pond pine. The duration of use was similar to the time required for excavation. New clusters naturally form by budding or colonization, the former process being very slow and the latter being exceedingly rare. Provisioning sites with artificial cavities can greatly expedite new cluster and group formation.

The RCW utilizes a large home range, sometimes approaching 200 acres in size (Conner et al. 2001), potentially much larger in poor habitats. In a study of 30 groups in the North Carolina Sandhills, home range size averaged 199 acres and ranged from 139 to 318 acres (Barr, MS Thesis, 1997). The mean home range size for 7 groups in an old-growth longleaf pine forest in the Georgia Red Hills was 116 acres (Engstrom and Sanders 1997), while that for 6 groups in southeastern Virginia was 297 acres (Bradshaw 1995). The former site contains some of the best RCW habitat remaining, while the latter is an isolated population in a remnant mature loblolly community.

The primary foods taken by this species include adults, larvae and eggs of arboreal arthropods (Jackson 1994). Ants often comprise the majority of food used by adults (Hess and James 1998). Larvae of pine bark beetles are heavily utilized when available. Larger prey are fed to nestlings and fledglings. Seeds and fruits are eaten, but generally do not compose a significant part of the diet. Male RCWs tend to forage on the larger limbs and upper boles of pines, while females forage on the lower to mid-boles. Bradshaw (1995) found that RCW groups in southeastern Virginia selected larger pines to forage on in the non-breeding season; however, smaller pines were selected 5 times more often in the breeding season than in the non-breeding season. Bradshaw also found that foraging range decreases significantly in the breeding season.

E. *Reasons For decline.* The RCW has been extirpated from millions of acres of its historical range as the once widespread old-growth pine forests were converted to agriculture or short rotation forestry. Fire exclusion and suppression have degraded most of the remaining habitat. Some populations have insufficient numbers of existing and potential

cavity trees. Many populations are so isolated or fragmented that adverse genetic and demographic factors will continue to drive them towards extirpation. Fewer than 10,000 birds or 3,400 groups are believed to remain, with a regionwide population decline between the early 1980s and 1990 of more than 23% (James 1995). Intensive management (burning, cavity provisioning, translocation) have stabilized or increased some populations, however, many populations continue to be subject to further declines. Most remaining groups occur on federal lands, especially the National Forests. This species has been considered as endangered since 1968 (USDI 1968) and was formally listed as such on 13 October 1970 (35 CFR 16047).

F. *Conservation Efforts.* The USFWS has prepared 3 RCW Recovery Plans (USFWS 1979, 1985, 2001). For this MP, the draft of the second revision of the Recovery Plan (USFWS 2001) is being used. RCW management plans are being prepared and implemented for all federal properties with existing populations, as well as many state lands and some private lands. These include the Croatan National Forest, Dare County Bombing Range, Sunny Point Military Ocean Terminal, Marine Corps Base Camp Lejeune and Fort Bragg Military Reservation in North Carolina. There are 12 designated Recovery Units containing 12 Primary Core populations, with 2 in North Carolina (North Carolina Sandhills East and North Carolina Coastal Plain) (USFWS 2001) (**Table 1**). The current draft Recovery Plan (USFWS 2001) created a new management category called "Support Populations", with 3 classifications: Essential Support, Significant Support and Important Support. The northeastern North Carolina/southeastern Virginia ((NE NC/SE VA) RCW population was designated as "Essential Support". The 2001 Recovery Plan states that:

> "Essential support populations are those populations, identified in recovery criteria, that represent unique habitat types that cannot support a larger, core population. They are located on federal, state, and, in 2 cases, private lands in agreements with the U.S. Fish and Wildlife Service."

Currently, the NE NC/SE VA population, as designated by the USFWS, includes P3, ARNWR, PLNWR, Dare County Bombing Range and Piney Grove Nature Preserve, VA (**Table 1**).

Habitat Conservation Plans and Safe Harbor Agreements are being used to conserve RCW populations and habitat on private lands.

Intensive management is being employed to stabilize or increase some populations and progressive management of this species and its habitat are on the increase regionwide. Common management techniques include overstory thinning, midstory suppression, prescribed burning, cavity provisioning, translocation of juveniles, cavity competitor control and demographic monitoring.

VI. RCW History at P3

In November 1995, Environmental Timber Management (ETM), Inc. of Macon, Georgia sold approximately 9,700 acres of forest land located in Tyrrell County, North Carolina, to Prudential Timber Investments, Inc. RCWs were discovered on the property just prior to the transaction and could have restricted timber management options on some portions of the property.

In November 1995, Dr. J. H. Carter III and Associates (JCA), Inc. was contracted to conduct a RCW survey of the PruTimber tracts and potential RCW habitat within 0.5 mile of the tracts. Additionally, southern pine beetle (*Dendroctonus frontalis*) (SPB) infestations were to be assessed so that timber removals resulting from the SPB infestations would be in compliance with Section 9 of the ESA, as amended.

Between 20 December 1995 and 28 May 1996, JCA conducted a RCW cavity tree survey of the 9,700 acres and all potential RCW habitat within 0.5 mile of the PruTimber tracts. In addition, cavity tree activity was determined and limited information on group size and 1996 breeding activity was obtained. SPB buffer zones were checked to assess impacts to active RCW clusters.

Eighteen active RCW clusters (**Figure 3**) were found in the 1995-1996 survey. Approximately 100 previously unknown RCW cavity trees were discovered during the survey. Cavity data (stage, activity, direction and height) and cavity tree characteristics for these are listed in **Appendix 1**. Two potential RCW clusters, numbers 12 and 16, were not field verified. Because of access problems, Cluster 19 was not checked for breeding activity. It was difficult to get an accurate count of birds per cluster because RCWs were unbanded. Population

demography and group composition are easier to ascertain if the adults and nestlings are color banded.

In 1996, clusters 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 17 and 20 showed signs of reproductive activity. Overall nesting effort was probably higher since nest checks were minimal. Sites were not revisited once a probable nest was found. The limited information gathered showed a large percentage (83%) of the clusters with RCW nesting activity. There was no monitoring of RCW activity in 1997 and 1998.

Canal Forest Resources, Inc. (CFR) identified a total of 28 SPB spots on the PruTimber tracts in 1996. The SPB spots and related buffers were field checked to assess any impacts to active RCW clusters. Three RCW clusters (Clusters 5, 7 and 8) were affected by SPB spots within or near the clusters. There were SPB infestations within one-half mile of 11 active RCW clusters (#s 2, 3, 4, 5, 6, 7, 8, 11, 13, 14, 18 and 20). An assessment of impacts of SPB-related timber removals on the RCW was submitted to the USFWS by CFR, Inc. and was approved.

Due to the timing of acquisition of P3 by TCF, breeding season monitoring in 1999 did not begin until early May, several weeks late. As a result, it was not possible to band all RCW nestlings that hatched in 1999. A total of 14 nestlings from 7 nests were banded (**Table 2**). Nestlings were not banded at 3 nests and 1 nest failed. A total of 19 adult RCWs were banded between July and December 1999 (**Table 3**). In December 1999, 12 insert cavities were installed in 10 clusters (#s 3, 6, 7, 8, 11, 13, 14, 17, 18, and 22).

A new aerial survey of P3 was conducted from January through March 2000. Approximately 50 previously unknown cavity trees were discovered, increasing the total number of known active clusters to 25 and the total number of clusters to 36. Two clusters off property, designated as clusters TYR 40 and 41, were detected during the survey. These sites, not included in monitoring and management activities, are located off P3, adjacent to clusters TYR 16, 9 and 15 on Pine Landing Road. In March and April 2000, 13 advanced starts and 6 cavities were drilled in 8 clusters (#'s 1, 3, 7, 8, 13, 14, 18 and 22).

In spring 2000, there were 25 active clusters, 3 inactive clusters and 8 abandoned clusters on P3 (**Table 4**). Eighteen clusters were occupied by breeding groups. Two clusters were occupied by non-breeding pairs, 2 clusters were captured (this occurs when birds from a nearby group utilize cavity trees in an adjacent cluster), 1 cluster was occupied by a solitary male and 2 clusters had unknown status. Twenty-three groups was the established baseline for DOT

mitigation based on 2000 data. In addition, 10 clusters were designated as recruitment sites (TYR 10, 27, 28, 32, 34, 35, 36, 37, 38, and 39). During the 2000 breeding season, 40 nestlings were banded in the 17 breeding groups (30 fledglings were seen). Fifteen adult and 1 juvenile RCW were captured and banded between January and December 2000 (**Table 5**). No cavity provisioning was conducted in fall 2000.

During the 2001 breeding season, there were 25 active clusters on P3 (**Table 6**). Twenty-two had breeding groups and 41 nestlings were banded (38 fledglings were seen) (**Table 6**). Twenty-three of the 25 clusters were baseline clusters. Recruitment cluster TYR 10 was occupied by a non-breeding pair and cluster TYR 13 was occupied by a breeding pair. The group in cluster TYR 13 is neither part of the baseline or a mitigation credit since it has been deficient in forage since 1999. Therefore, 1 mitigation credit was earned at cluster TYR 10 for 2001. TYR 41, a non-managed, off-property cluster, had evidence of a breeding group during a brief site visit in 2001. TYR 40, also off-property, was not visited. Ten adult and 1 juvenile RCW were captured and banded between April and November 2001 (**Table 7**). Twenty-five cavity inserts, 3 drilled cavities and 10 advanced starts were constructed at P3 in 2001 in 14 baseline clusters (#s 4, 5, 6, 7, 11, 12, 15, 17, 18, 19, 21, 23, 25, and 42) and 2 recruitment clusters (# 10 and 36).

Twenty-five RCW clusters were active during the 2002 breeding season (**Table 8**). Of those 25, 20 had breeding groups and 35 nestlings were banded (28 fledglings were observed) As in 2001, 23 of those 25 clusters were baseline clusters, with the exception of clusters TYR 10 and TYR 13. Cluster TYR 10 was occupied in 2002 by a successful breeding pair, retaining the mitigation credit. Clusters TYR 40 and 41, located off the P3 property, were not visited in 2002. Six adults have been captured and banded between July and November 2002; 3 males at clusters TYR 4, 8 and 23, and 3 females at clusters TYR 1, 8 and 17 (**Table 9**).

Provisioning during 2002 occurred primarily in cavity limited baseline clusters, which resulted from a marked increase in cavity tree mortality throughout the Preserve. Establishment of recruitment clusters was postponed in response to various SPB outbreaks in 2001 and the 2002 SPB epidemic. Three inserts, 2 drilled cavities and 2 drilled starts were provisioned in 4 baseline clusters (#5, 12, 21 and 22). An artificial start was constructed at recruitment cluster TYR 37, but it is presently screened and unavailable. All cavity provisioning was ceased on the

Preserve in response to the SPB epidemic through P3 Management Committee concensus in July 2002.

RCW use of artificial cavities for roost at P3 for has steadily increased since JCA began provisioning in1999. 2002 was the first year that RCWs nested in artificial insert cavities; these included breeding groups at clusters TYR 10, 19, and 23. An RCW nest cavity in dead cavity tree #15271 was documented in 2002 at cluster TYR 16. Observations in 2001 suggest that the group may have also nested in a dead cavity tree last year, as fledglings were observed within the cluster near dead cavity trees #15271 and #15272, the only 2 known cavity trees.

Timber harvesting activities increased in 2001 which, in some circumstances, resulted in drastic habitat alterations within clusters. Emergency logging due to numerous SBP outbreaks within and adjacent to clusters occurred during the nesting season in 2002. Six potential breeding groups, which did breed in 2001, did not attempt to nest in 2002. Failure to nest may have been attributable to habitat changes or disturbance within sites, but that remains speculative as other variables influence reproduction.

VII. Conservation Goals

A. *Current population and distribution on property*. Twenty five active clusters, were documented on P3 during the 2002 breeding season (**Table 8**, **Figure 3**). There exists 27 management partitions (19 of which are occupied) and 2 relic, non-managed clusters sites located in the northern portion of the property **(Figure 3)**. The southern portion of the property contains the 6 remaining management partitions (5 occupied) and 2 relic, non-managed cluster sites **(Figure 3)**. Twenty five active clusters were again observed in 2001 **(Figure 4)**. The property baseline RCW population of 23 groups and 10 recruitment clusters was established with 2000 breeding season data (**Figure 5**). Concurrence with this baseline was provided by the USFWS in a letter dated 7 September 2000 (**Appendix 2**). A total of 187 RCWs have been banded on P3 through 2002 (**Appendix 3**).

B. *Current and potentially suitable RCW nesting and foraging habitat*. The determination of current and potentially suitable RCW habitat is based on aerial and ground surveys conducted by JCA, Inc. in fall 1999/winter 2000. A total of 195 cavity trees have been tagged on P3 through 2002 (**Appendix 4**). An additional 80 artificial cavities have been

provisioned through 2002 (**Appendix 5**). Not including recruitment cluster TYR 10, as it is already occupied, habitat exists for 9 potential new groups (5 in existing inactive or relic sites and 4 in new recruitment clusters) (**Figure 3**).

C. *TCF/NCDOT requirements*. The primary goals regarding management of P3 are creation and maintenance of RCW mitigation credits, generation of revenue through timber sales and development of an ecotourism program. On 7 September 2000, the baseline population was set at 23 groups for use as "conservation management" credits. Establishment of additional active clusters could earn 10 or more "creation credits". The projected number of potential creation credits was set at 10, based on available habitat at P3. Recruitment cluster TYR 10 was occupied by a potential breeding pair in 2001, earning 1 of those 10 credits. Nine potential creation credits remain. NCDOT RCW mitigation requirements are based on current or future highway construction projects that will impact RCW habitat. Revenue from timber sales at P3 are used to fund RCW management activities, including the establishment of new groups to be used as mitigation credits. Timber harvesting on P3 must be compatible with RCW habitat requirements and is subject to review by the USFWS. TCF is developing a sustainable, community-based ecotourism program at P3. Activities relating to ecotourism include market research, on-site infrastructure development, community relations and environmental education.

D. *RCW population goals*. The population goal determines the amount of land needed for RCW nesting and foraging and the appropriate level of management intensity. Goals are considered long-term, but are subject to change, through consultation with the USFWS, based upon changing circumstances or new scientific information. In conjunction with the 5-year review of this MP, the property will reexamine its population goal to reflect changing conditions. The goals will be established through consultation with the USFWS.

1. *Regional Recovery Goal*. RCWs on P3 and surrounding properties have been designated as an "Essential Support Population" in the draft second revision of the RCW Recovery Plan (USFWS 2001). Essential Support Populations are designated according to size and/or unique ecological characteristics, such as geographic location or habitat. RCWs on the Pamlico-Albemarle Peninsula represent a significant population occupying

a unique habitat (wet pine/hardwood communities) in a distinct geographic area separate from any designated Primary or Secondary Core Population. This population is close enough to a Primary Core Population (Croatan National Forest- Marine Corps Base Camp Lejeune-Holly Shelter Game Land) to function in support of that population.

The number of RCW groups and the amount of current or potentially suitable habitat on the Pamlico-Albemarle Peninsula are unknown. In 2002, there were 6 active clusters (of 15 known clusters) on DCR and at least 2 active clusters on the ARNWR. There have been no recent surveys within PLNWR and private lands in Hyde County, however, 1 active cluster on the PLNWR and 2-3 active clusters in Hyde County were documented in 1995. Other groups are known to exist and there are large acreages of unsurveyed potential habitat. The USFWS has set the Regional Population Goal (which is derived from the area of current or potentially suitable habitat and the amount of that land base in federal and state ownership, or in private ownership and under some type of conservation agreement) at 100 groups.

2. *P3 MP Goal.* TCF's share of the Regional Population Goal is based on the amount of current and potentially suitable habitat on the property. The USFWS management density for the Coastal Plain is 1 group per 200 acres of potential habitat. The wet habitat found on P3 hinders "normal" forest management practices and may result in a lower density per acre than would otherwise be expected.

The property (MP) goal is 33 active clusters. TCF will designate enough recruitment clusters to reach this goal and will identify and manage a minimum of 6600 acres (33 clusters x 200 acres/cluster) of suitable habitat for each existing and recruitment cluster. The projected population growth rate, measured in potential breeding groups, is between 0 and 10 percent per year. Once the MP Goal is reached, the property need only maintain that level; however, TCF will continue to encourage RCW population growth where feasible. Annually, TCF will determine the number of recruitment clusters to provision with artificial cavities, based on the optimum growth rate for the population and manage those recruitment clusters for occupation by RCWs. A cluster (existing or recruitment) that has had no RCW activity for 5 consecutive years may be dropped from active management upon concurrence by the USFWS. However, if this cluster was being

managed pursuant to the MP Goal, a new recruitment cluster must replace it. Clusters lost to SPB damage will be replaced if enough suitable habitat exists.

VIII. Surveys, Inspections, Monitoring and Reporting

A. *Five-year property wide surveys.* A typical RCW cavity tree survey is conducted in appropriate habitats using parallel foot transects spaced close enough to allow adequate inspection of all potential cavity trees. Generally, such transects are spaced 100 to 250 feet apart. The extremely dense hardwood midstory at P3 makes foot surveys impractical as the only means of detecting RCW cavity trees. Often the vegetation is so dense that cavities are not visible to an observer standing directly beneath the cavity tree and maintaining straight transects is virtually impossible. The most efficient means of surveying RCW habitat at P3 is from a small 2-person helicopter. Experienced observers using closely spaced, parallel, low aerial transects can locate nearly all multiple tree clusters and most cavity trees in a cluster.

Ideally, fly the helicopter on transects 75 to 150 feet above the tree canopy. Fly transects more than once from opposite directions, especially in stands where hardwoods are a significant component of the overstory. Conduct aerial surveys during the winter months (November through mid-March) to maximize visibility.

When a RCW cavity tree is located from the air, obtain its geographic coordinates from the helicopter with a Global Positioning System (GPS). Then use a GPS receiver to locate the cavity tree on the ground. Once a cavity tree is located on the ground, survey the surrounding area on foot. This often leads to the detection of additional cavity trees.

The most recent comprehensive survey for RCW cavity trees at P3, including adjacent properties up to 1 mile beyond P3 boundaries, was conducted between January and March 2000. Surveys will be conducted every 5 years in areas being managed for RCWs or containing RCW habitat. Due to adverse understory conditions that are likely to persist for the indefinite future, aerial (helicopter) surveys will continue to be utilized at P3.

B. *Timber stand database.* Maintain a timber stand database using data collected in association with, and prior to, on-site timber harvesting. The following stand data should be obtained: overstory type, age, height, basal area (BA), and pine and hardwood stems in 2

inch diameter classes. Also include overstory and understory species composition and a description of understory height and density.

C. *Project surveys.* No projects are anticipated at P3 that will impact RCW habitat other than timber management and pine beetle control treatments. Most of these activities are being prescribed in order to directly or indirectly benefit the RCW. Once the initial timber inventory is completed, use these data to quantify impacts on the RCW of proposed timber prescriptions. Until then, use localized stand sampling and aerial photography interpretation to prepare the necessary Biological Assessments.

Prior to conducting any activity that could result in the take of RCW nesting or foraging habitat, a biologist familiar with the life history requirements and behavior of RCWs in the Pamlico-Albemarle Peninsula will survey the project site and a 0.5 mile radius around it using guidance in the USFWS "Blue Book" (Henry 1989). If the area in question was surveyed for RCW cavity trees within the past year, these survey data will be considered valid for that Biological Assessment.

If no RCW habitat is present, no further analyses are necessary. If potential RCW habitat is present, but unoccupied by RCWs, prepare a Biological Assessment that documents what the loss of potential habitat would have on the RCW MP population goal at P3. If RCW clusters do occur within one-half mile of the project site, prepare a Biological Assessment that documents the project's effects on existing nesting and/or foraging habitat. Submit the Biological Assessments to the USFWS office in Raleigh, North Carolina, for concurrence.

D. *Cluster inspections.* Inspect managed clusters annually at the same time each year, and inspect recruitment clusters twice annually (fall and pre-breeding season dispersal periods) to document RCW occupancy. These are prescriptive inspections used to develop habitat treatments. At a minimum, inspect and record data for:

1. density and height of midstory encroachment;
2. height of RCW cavities (from existing data);
3. condition of cavities and cavity trees, including need for cavity maintenance, replacement or provisioning.
4. any site impacts or changes from timber harvesting, midstory suppression, pine beetle outbreaks, fires (prescribed or wild), etc.;
5. RCW activity for each cavity.

E. *Cavity tree and cluster marking protocols.* A cluster is defined as a convex polygon formed by the outermost cavity trees used, or once used, by a RCW group, plus a 200 foot buffer. Dense vegetation at P3 makes lateral visibility essentially impossible at any significant distance. As a result, no marking of cluster boundaries is proposed at this time. Mark each live tree containing a RCW cavity (regardless of stage or activity) with 1 band of white paint approximately 4 to 6 inches wide, approximately 4 to 6 feet above the ground. Loosely affix a uniquely numbered metal tag in the statewide series to each cavity tree with an aluminum nail (assigned number sequence = 15,001 to 15,999). Obtain the GPS coordinates for each cavity tree and plot the tree's location on an aerial photograph that depicts all cavity trees within the cluster. Maintain trails to each cluster and to each active or inactive start or cavity tree within the cluster. It is not necessary to maintain trails to trees with relic starts or cavities unless it is likely that RCWs will reactivate the cavity or construct another cavity in the tree.

Data to be collected at each cavity tree are summarized below and in the appendices. Obtain the cavity tree age, height and diameter at breast height (dbh) (4.5 feet high). Record any deformities or diseases of the cavity tree and the overstory type (species composition), overstory age (old growth, second-growth, regeneration or mixed age classes) and overstory BA (pine and hardwood stems $\geq$ 10 inches dbh, respectively). Record the understory or midstory type, average understory height, maximum height, understory density at 2 crown

widths (approximately 50 feet) and density at 5 crown widths (approximately 125 feet). Note management treatments that have been applied to clusters or cavity trees and needs for specific treatments.

Document the following parameters for each cavity: stage, shape, activity, depth of start, plate size, amount of chipping, amount of dried sap, amount of fresh sap, approach (is direct flight line to cavity clear?), height and direction of opening.

Update cavity and other pertinent data in April each year. Record data for new cavity trees, new cavities or site changes when they are first noted.

F. *Population monitoring.* Some degree of demographic monitoring is necessary to manage any animal population. RCWs are ideally suited for monitoring because their distinctive cavity trees and specific habitat preferences make inventory of nesting and roosting sites relatively easy. Their long-term use of specific cavities makes capture and marking of most or all individuals within a population possible, including adults and nestlings. This is true for few other avian species. Managing RCW populations for stabilization or growth requires detailed information on available and potential nesting and foraging habitat, cavity tree and cluster locations, numbers and status of cavities and the numbers of active clusters, potential breeding groups, adults, nests and young fledged (annual productivity). Therefore, monitor all cavity trees and clusters at P3 annually and mark all RCWs with a unique combination of colored leg bands. Such monitoring and marking allows the manager to plot population trends and prescribe such measures as necessary to enhance population stability and growth. After a baseline habitat survey has located all clusters and cavity trees, capture and band all adults with colored leg bands, and band all nestlings annually thereafter. If all nestlings are banded, only the occasional unbanded immigrant or adult that has eluded capture need be targeted for banding. This monitoring effort allows accurate annual censuses of adults and fledglings and makes possible the tracking of individual birds as they disperse to other monitored clusters. The regular occurrence of unbanded birds in a marked population indicates undetected clusters within the population or around its periphery.

The capture and marking of nestling and adult RCWs require the following permits and authorizations.

- Federal (USFWS) Endangered Species Permit
- Federal (USGS) Bird Banding Permit with authorization to use mist nets
- Federal (USGS) Auxiliary Marking Permit
- State Endangered Species Permit
- State Bird Banding Permit

The capture of nestling RCWs with nooses (pullers) and adult RCWs with pole nets requires considerable expertise. Both capture techniques can injure or kill RCWs if not applied correctly.

Following is a step-down list of monitoring procedures to be followed.

1. Visit all clusters between mid-March and late-April to determine site activity. Inactive clusters do not require rechecking during the breeding season.

2. During these initial cluster checks, update cavity data, acquire data on new starts or cavities, update habitat data and note habitat and needed cavity treatments (restrictors, provisioning) needed (see VIII. D. *Cluster inspections*).

3. Begin nest checks in active clusters during the last full week in April or first week of May. Use a pole mounted "Peeper" (camera) to check the cavity contents of each active cavity. Continue nest checks in all active clusters every 9 to 11 days until a nest is found or the end of nest checks (mid-July). Occasionally RCWs will nest in cavities that do not appear to be highly active and rarely in reactivated relic cavities or recently dead cavity trees. This normally occurs when the primary cavities in a cluster are occupied by other species. Record the following data for each cluster: cluster number, tree number, cavity number, date, time, number of eggs (0 if none), number of nestlings, age of nestlings (see below), number of fledglings, sex of nestlings or fledglings and number of adults. Note if an adult RCW is flushed from a cavity or if another species occupies a cavity.

4. Resume nest checks in clusters where there has been a nest failure, especially failure at the egg or small nestling stages. Note that groups that have suffered a nest

failure may renest in a different cavity in the same tree, a different cavity tree, or rarely, a different cluster.

5. Check clusters with possibly active cavities at the beginning, mid-point and end of breeding season, unless the cavity or cavities become inactive (no more checks) or active (add to regular nest check cycle).

6. Nestlings must be banded between 5 and 10 days of age. Nestlings younger than 5 days have legs too small to accept 3 color bands and nestlings older than 10 days can suffer unacceptable feather losses or other injuries due to their size and difficulty of capture. Always age nestlings in the cavity using a drop light and mirror prior to capturing them for banding. Age birds using the "Ligon Age Chart" (see **Appendix 6**). The Ligon Age Chart is imprecise, but is the best tool available for determining nestling age. If a nestling is pink all over and has no visible feather tracts, it is too young (small) to band. If a nestling has pin feathers longer than 0.5 inch (remiges and retrices) or if feathers are erupting from the quills, it is too old (large) to band safely. Nestlings can be sexed by the color of their crown patch (red = male, black = female) once they reach an age of approximately 13 days old. Cavities can be rechecked in order to obtain sex ratios of nestlings, however, it is often impossible to associate a sex determination with a bird's color band identity unless all nestlings are the same sex or there is only 1 nestling. Record the following data for each nestling banded: cluster number, cavity tree number, cavity number, date, time, color band sequence, USFWS band number, age, sex (if determined) and weight. Note any injuries, abnormalities or ectoparasites.

7. Nestlings will leave the cavity (fledge) at approximately 26 days of age. Schedule a "fledge check" between 3 and 10 days after the projected fledging date, the earlier the better. Fledglings are difficult to find and sex immediately after fledging and post-fledging mortality becomes a major factor beyond 3 weeks. If a fledgling is not found in the first check, conduct a second check. Fledge checks are best accomplished in early to mid-morning and should be at least 1 hour long unless all adults and fledglings are identified in less time. Fledglings must be sexed during these checks unless sexes were

determined as nestlings. This requires a clear view in good light of the crown of the fledgling. A male fledgling has a red crown patch (may only have a few red feathers) and the female will have an all black crown. Record the following data for each fledgling: cluster (group) number, date, time observed (beginning and end), color band sequence, sex, activity and locations observed (UTM coordinates, nearest square hectare).

8. Census (count) and identify adults during nest checks and again during fledgling checks. These data are critical for population determination. Do not assume that adults seen at a nest are the same ones tending fledglings. Unbanded adults and those with dirty or missing bands must be scheduled for capture. RCWs too wary for color band identification must be scheduled either for capture or additional observations. In the latter case, observations at roost cavities in the evening are most productive. Record the following data for each adult: cluster (group) number, cavity tree number (if applicable), cavity number (if applicable), date, time, color band sequence, USFWS band number (if captured), age and sex (if captured), activity and locations (UTM coordinates, nearest square hectare). Note any injuries, abnormalities or ectoparasites and stage of molt.

G. *Records.* Create and maintain foraging habitat-per-cluster database, showing acres of available habitat, total BA and pine stems ≥ 10 inches dbh, and any removals (**Appendix 7**). Record and permanently retain all survey and monitoring data (**Appendices 8a-c)**.

H. *Reporting and notification*. TCF will submit an annual report to USFWS detailing RCW population data, management actions taken and those proposed for the coming year (**Appendix 9)**. Immediately notify the USFWS in the event of incidental take. Notify the USFWS within 30 days of documenting a 5% population decrease. A separate annual report will also be submitted to the USFWS RCW Recovery Coordinator and an annual RCW banding report (banding schedule) will be submitted to the USGS bird banding lab in Maryland. Annual reports on permitted activities such as banding and cavity provisioning must also be submitted to the U.S. Fish and Wildlife Service (Permits Office in Atlanta) and the Nongame Section of the N.C. Wildlife Resources Commission.

I. *RCW maps*. Maintain a current property map depicting all cavity trees and clusters (existing and recruitment). Update maps annually.

J. *Research*. TCF will cooperate with the USFWS or other resource agencies concerning research to better understand the distribution, demography, habitat use and management of RCWs on the Pamlico-Albemarle Peninsula.

IX. Natural vegetative communities found within P3

There are 4 formally classified natural community types that occur on Palmetto-Peartree Preserve: Nonriverine Wet Hardwood Forest, Estuarine Fringe Loblolly Pine Forest, Nonriverine Swamp Forest and Tidal Cypress-Gum Swamp. However, due to past disturbances, much of P3 defies formal classification and should be considered Successional Wet Loblolly Pine Forest (M. Schafale, pers. comm.). These communities occur in a shifting mosaic across the landscape of Tyrrell County depending upon several interrelated factors, including water flow patterns, soil type, soil hydrology, fire history and anthropomorphic disturbance.

A mosaic of mineral and organic soils (histosols) dominate in the area. All the communities in this area are palustrine, being seasonally flooded or saturated, and some sites may be saturated year round.

The 2 most common soil series that occur on P3 are Dorovan and Tomotley. Both are nearly level, very poorly drained soils found on broad flats. Dorovan is a very poorly drained muck to a depth of more than 90 inches. It is subject to frequent flooding. Tomotley is a poorly drained fine sandy loam with a very dark gray surface layer. It is rarely flooded. Other soils found on P3 are Perquimans loam, Portsmouth loam and Belhaven muck, very poorly to poorly drained soils.

Man has exploited the forests of Tyrrell County since the colonial period. Timber cutting and clearing do not necessarily entail a permanent alteration of vegetative communities. Vegetative communities in the area have retained considerable integrity of composition despite repeated logging. Logging does change the age class structure and promote the presence of some

species that respond to disturbance or removal of competitors. Recovery after cutting is most complete in communities where extensive ditches have not been constructed.

The 5 community types are described below. A majority of the information included in these descriptions was taken from Schafale and Weakley (1990) and personal communications with M. Schafale (2002).

ESTUARINE FRINGE LOBLOLLY PINE FOREST

The Estuarine Fringe Loblolly Pine Forest community type occurs on the margins of estuaries between marsh and upland or peatland communities. It occurs on wet organic or mineral soils that are permanently or near permanently saturated and probably rarely flooded.

Vegetation in Estuarine Fringe Loblolly Pine Forest consists of a canopy dominated by loblolly pine (*Pinus taeda*) with a lesser component of red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*) or swamp blackgum (*Nyssa biflora*). Understory density is moderate unless burned regularly. Common understory species include wax myrtle (*Myrica cerifera*), switchcane (*Arundinaria gigantea*) and low gallberry holly (*Ilex glabra*). Vines, particularly greenbriars (*Smilax* spp.), are prominent. The sparse herb layer contains netted chain-fern (*Woodwardia areolata*), cinnamon fern (*Osmunda cinnamomea*) and royal fern (*O. regalis* var. *spectabilis*). Marsh species may occur in low areas.

This community type could be subject to occasional flooding, salt water intrusion and/or severe fires. However, the infrequent nature of these occurrences allows the forest to mature. Human activities such as ditching, road building and logging have altered the natural dynamics of this community type throughout much of P3.

NONRIVERINE SWAMP FOREST

Nonriverine Swamp Forest occurs on wet, very poorly drained flats and peat deposits with rare mineral influx from overland or tidal flooding. This community type is seasonally or frequently saturated or shallowly flooded by a high water table.

The canopy contains varying mixtures of bald cypress (*Taxodium distichum*), swamp blackgum, pond pine (*Pinus serotina*), loblolly pine, Atlantic white cedar (*Chamaecyparis thyoides*), tulip poplar (*Liriodendron tulipifera*) and red maple. The understory consists of open to dense sweet bay (*Magnolia virginiana*), redbay (*Persea palustris*), titi (*Cyrilla racemiflora*),

fetterbush (*Lyonia lucida*), sweet pepperbush (*Clethra alnifolia*) and greenbriar. Typical herbs include Virginia chain-fern (*Woodwardia virginica*), netted chain-fern, various sedges (*Carex* spp.) and sphagnum moss (*Sphagnum* spp.).

Natural fires are probably rare, but may occur during periods of drought. Stand killing fires under certain circumstances may lead to development of a Pond Pine Woodland or Atlantic White Cedar Forest. Areas susceptible to more frequent fire probably support pocosin communities rather than swamp. Nonriverine Swamp Forest and Atlantic White Cedar Forest may have existed in a shifting mosaic of fire-determined patches on some large peatlands; however, it seems more likely that most Nonriverine Swamp Forests occurred primarily in environments which had more nutrient influx or were more permanently wet and protected from fire.

NONRIVERINE WET HARDWOOD FOREST

Nonriverine Wet Hardwood Forest occurs on poorly drained interstream flats with fine-textured mineral soils, not associated with rivers or estuaries. It is typically found on the margins of large peatland areas.

The canopy was dominated by various bottomland hardwoods, including swamp chestnut oak (*Quercus michauxii*), swamp laurel oak (*Quercus laurifolia*), tulip poplar, red maple and swamp blackgum, often with a substantial loblolly pine component. The understory ranges from sparse to dense and includes such species as redbay, wax myrtle, switchcane, and sweet pepperbush. The herb layer may include various sedges and ferns.

This community type was historically common throughout the Coastal Plain of North Carolina. It is now rare because of widespread conversion to farmland. This community type is subject to seasonal flooding and is unlikely to carry fire, even in periods of drought.

"SUCCESSIONAL WET LOBLOLLY PINE FOREST"
variant "WET PINE-HARDWOOD FOREST"

This is not a formally classified community type. However, it is probably the most important community to RCWs on P3. There is much uncertainty regarding classification and interpretation of this community type.

Successional Wet Loblolly Pine Forest develops in the wake of landscape altering activities such as logging, farming and ditching. These activities, when conducted over a long period of time, can result in permanent or semi-permanent changes in the dynamics and components of the historic community (probably Nonriverine Wet Hardwood Forest or Nonriverine Swamp Forest). On P3, past logging and ditching have significantly impacted the landscape. Logging, in particular, has led to a conversion of many sites from a hardwood or mixed pine-hardwood canopy to almost pure pine. These pine stands make up the bulk of the Successional Wet Loblolly Pine Forest sites on P3. However, it should be noted that Wet Loblolly Pine Forest may be a natural, fire maintained community type.

Successional Wet Loblolly Pine Forest on P3 is characterized by an open to nearly closed canopy of loblolly pine, sometimes with a significant hardwood sub-canopy. Sub-canopy hardwoods include red maple, swamp blackgum, sweet bay and sweetgum. The understory is often composed of dense loblolly pine regeneration, especially in sites that have been logged to seed-tree or shelterwood density within the past 20 years. Other understory components include red maple, sweet bay, wax myrtle, switchcane and various blueberries (*Vaccinium* spp.). In recently disturbed sites, a significant herb layer dominated by grasses (*Andropogon* spp., Schizachyrium spp.) is present. The herb layer becomes less important as shrubs, small hardwoods and pine regeneration return to dominance through time.

A related community type, "Wet Pine- Hardwood Forest", occur on wetter sites than the previously described community. Swamp hardwoods share the canopy with loblolly pine.

These sites, especially those that support significant switchcane understories, would be able to carry fire in dry periods. Those sites with an important hardwood component appear less likely to carry fire. This "community type", like the rest of P3, is subject to seasonal flooding.

TIDAL CYPRESS-GUM SWAMP

Tidal Cypress-Gum Swamp occurs along the margins of freshwater sounds and mouths of blackwater or brownwater rivers. It is subject to regular or irregular freshwater tides. It is generally associated with organic soils such as Dorovan and Hobonny, although it can occur on mineral soils.

The canopy is dominated by combinations of bald cypress, water tupelo (*Nyssa aquatica*), swamp blackgum, sometimes mixed with loblolly pine and red maple. A sub-canopy consisting of red maple, sweet bay, red cedar (*Juniperus virginiana*) and other small trees may be present. Understory density can be open to dense and includes wax myrtle, titi and highbush blueberry (*Vaccinium corymbosum*). The herb layer generally sparse and dominated by ferns and sedges.

As would be expected, these communities are subject to salt water intrusion during storms. These communities will be replaced by marsh as sea levels continue to rise.

X. Designation of RCW Habitat

This MP designates adequate nesting and foraging habitat within P3 to attain and maintain the population goal. All active and recruitment clusters, replacement stands and foraging habitat necessary to attain the MP population goal are included. All RCW habitat on P3 will be managed according to the guidance in this MP.

Current and potentially suitable RCW habitat occurs primarily in the Successional Wet Loblolly Pine Forest community type at P3. The RCW population density has been set at 1 group per 200 acres of this habitat and the population goal is 33 active clusters. There were 25 active clusters on P3 during the 2002 breeding season, however, insufficient forage invalidates cluster TYR 13 as a credit. Two of these clusters, TYR 10 and 13, were not included in the original baseline number, however TYR 10 is a conservation management credit. Therefore, occupation of 9 additional recruitment clusters rather than 8, is necessary to reach the desired goal of 33.

Recruitment clusters will be placed in the best quality habitat. New clusters will be spaced approximately 0.33 to 0.50 mile from existing clusters and each other. The location of pine trees old enough to accept artificial cavities will ultimately determine the exact location of new clusters. Provisioning of some recruitment clusters will be delayed until trees reach sufficient size or age to accept artificial cavities.

Because of the unique habitat found on P3, foraging habitat standards may vary from the Recovery Plan guidelines. Foraging habitat standards are derived from those in the draft second revision of the USFWS RCW Recovery Plan (USFWS 2001). The guidelines are as follows:

a. Maintain 18 or more pine stems/acre that are $\geq$ 60 years in age *and* $\geq$ 14 inches dbh. Minimum BA for these pines is 20 ft²/acre.

b. BA of pines 10-14 inches dbh is between 0 and 40 ft²/acre.

c. BA of pines < 10 dbh is below 10 ft²/acre *and* below 20 stems/acre.

d. BA of all pines $\geq$ 10 inches dbh is at least 40 ft²/acre. That is, the minimum BA for pines in categories (a) and (b) above is 40 ft²/acre.

e. Groundcovers of native bunchgrass and/or other native, fire-tolerant, fire-dependent herbs total 40 percent or more of ground and midstory plants and are dense enough to carry growing season fire at least once every 5 years.

f. No hardwood midstory exists, or if a hardwood midstory is present, it is sparse and less than 7ft. in height.

g. Canopy hardwoods are absent or less than 10 percent of the number of canopy trees in longleaf forests and less than 30 percent of the number of canopy trees in loblolly and shortleaf forests. Xeric and sub-xeric oak inclusions that are naturally existing and likely to have been present prior to fire suppression may be retained, but are not counted in the total area dedicated to foraging habitat.

h. All of this habitat is within 0.5 miles of the center of the cluster, and preferably, 50 percent or more is within 0.25 of the cluster center.

i. Foraging habitat may not be separated by more than 200 feet of non-forested land.

Some of these standards (e, f, g, i) are unrealistic for the habitat found on P3. However, deviation requires at least informal consultation with the USFWS, NCDOT and TCF (USFWS and JCA agreed on revised foraging guidelines for P3 on 1 November 2000)(**Appendix 10**). These standards could be replaced by a regional foraging standard if such is ever available.

Each managed cluster on P3 is allotted foraging habitat by drawing a 1/2 mile radius circle from the cluster center. Overlapping circles are modified using the Territorial Partitioning Method (Carter and Associates 1995). Territorial Partitioning better approximates individual RCW territories where multiple foraging circles overlap one another. This method of analysis establishes an axis between the center of each overlapping cluster and extends a perpendicular line from the mid-point of that axis to the perimeter of the one-half mile radius foraging circle or an intervening partition line.

RCW clusters and designated recruitment clusters that are documented as continuously inactive for 5 consecutive years may be deleted from management upon consultation with the USFWS (or sooner if all the cavity trees in a cluster are dead). However, if deleted clusters were part of the MP population goal, they must be replaced elsewhere on P3.

XI. P3 Management Practices

Section XI provides an overview of techniques and recommendations regarding RCW management. Cluster management prescriptions are found in Section XII.

A. *Management of clusters and recruitment stands*. Clusters require a higher management intensity level than other areas on P3. Give management priority to active and recently active (within the last 2 years) clusters over inactive clusters and recruitment stands. Overstory and midstory management in clusters and cavity management are discussed in separate sections below.

B. *Midstory management.* RCWs prefer open pine forests with minimal understory and midstory growth, particularly in clusters. Therefore, understory and midstory suppression is a priority throughout all areas being managed for the RCW at P3. Midstory encroachment at P3 is a critical issue because nearly everywhere the midstory has reached the lower limbs of the canopy pines and in many cases has surpassed RCW cavities. Additionally, some clusters in P3 occur in hardwood stands with just a few scattered pines.

The concept of an open understory relative to RCW habitat needs modification at P3. Understories in the pine dominated communities at P3 are naturally composed of shrubs and switchcane (*Arundinaria gigantea*) that range in height from less than 3, to more than 12 feet tall. The goal for midstory management at P3 is to maintain as much open bole on pine trees as possible in order to allow for RCW cavity sites and foraging requirements. Other goals are to manage the forest to allow for sufficient pine regeneration and to minimize the risk of catastrophic fire. Management will shift areas dominated by a swamp hardwood midstory species such as red maple (*Acer rubrum*), swamp red bay (*Persea palustris*) and swamp black gum *(Nyssa biflora*) to a shrub community and existing shrub communities to switchcane. Even with an aggressive and successful midstory control program, occasional

midstory cutting around cavity trees and within clusters will be necessary. Evaluate that need on an annual basis.

Midstory suppression within 50 feet of cavity trees or within the entire cluster is normally recommended. However, anecdotal evidence suggests that such clearing at P3 may lead to unacceptable cavity losses due to gross enlargement by pileated woodpeckers (*Dryocopus pileatus*). Pileated woodpeckers may be attracted to RCW cavity trees in the open versus those imbedded in dense midstories. Clearing around cavity trees should nevertheless be implemented and cavity trees should be diligently monitored for signs of enlargement. If excessive losses of cavity trees occur, the policy of clearing around cavity trees should be reviewed and modified. Remove all understory or midstory vegetation, including pine regeneration, that inhibits direct access by a RCW to a quality start or cavity (see Cavity Management section). This is not a requirement around cavity trees containing relic cavities that in a RCW biologist's opinion are no longer of existing or potential use to RCWs.

Mechanical suppression of midstory vegetation through mowing, shearing, chopping or crushing is relatively inexpensive when compared to hand clearing of large areas, but still may be cost prohibitive when applied to the large amount of existing and potential RCW habitat at P3 unless conducted concurrently with logging operations. Mechanical clearing of large areas creates a compressed and highly combustible fuel source that, if ignited, could lead to a catastrophic fire. Further, mechanical clearing within clusters can lead to unacceptable tree mortality through soil compaction, lateral root damage and/or incidental tree scarring. These events could attract lethal numbers of pine beetles. Cutting overstory and midstory hardwoods as part of pine thinning operations will be the most cost effective means of initially controlling the midstory.

Limited application of systemic herbicides, certified for use in wetlands, may have utility in clusters to prevent sprouting from stumps. However, the use of herbicides on the scale necessary to suppress the midstory on large acreages of RCW habitat could have unacceptable environmental impacts.

The only economically feasible and natural way to control the hardwood midstory over time at P3 is the reintroduction of fire throughout the habitat to be managed for RCWs. Fire may be difficult to implement because of decades of fire exclusion and suppression, which

have allowed unnaturally high fuel loads to accumulate in most forest stands, as well as the formation of the dense midstory that can carry fire to the crowns of the tallest pines. Many sites may be too wet to burn at intervals and intensities capable of controlling the midstory. Reestablishing a semi-natural fire regime using prescribed fire at P3 without incurring unacceptable losses of existing mature pines is a serious challenge that will require multiple agencies working closely together to successfully achieve. Realistically, some mortality is unavoidable. Without reintroduction of fire at a landscape level at P3, the ability to maintain the existing RCW population will be limited and significant population growth will be constrained. Without fire, pine dominated communities will continue to shift towards hardwood dominance as pines are cut or die, a process that is well underway in forest lands throughout the Pamlico-Albemarle Peninsula.

Implement the initial burns during late winter (February) or early spring (March) on limited acreages using specific burn plans (detailed burn plans are beyond the scope of this MP). Schedule subsequent burns during the growing season (March through July) in order to simulate natural processes and achieve the maximum control on the midstory. Once the midstory on a site is brought under control, schedule the next prescribed burn within 5 years. If for whatever reason, the subsequent burn does not adequately control the regenerating midstory, implement another burn as soon as possible. Remove fuel by raking around all cavity trees at least 10-15 feet. Spread raked fuel beyond the edge of the raked line.

C. *Overstory management.* The management goal at P3 is an open, self-perpetuating, pine forest with scattered individual and clumps of old trees interspersed within an multi-aged forest, which generally will be represented by even-aged patches. The foraging guidelines outlined in Section IX will perpetuate a relatively open forest and depending on the management regime, could be composed of even-aged mature trees or uneven-age classes.

Little is known of the natural dynamics of the "Successional Wet Loblolly Pine Forest" community type as well as the "Wet Pine Hardwood Forest". Rotation age in RCW habitat should be at least 100 years, except in clusters, replacement stands and recruitment

stands (10 acre minimums), where no rotation age is set. Retain all old-growth pine trees currently existing. Old-growth herein is defined as pine trees more than 100 years old.

Thin pine stands to residual BAs of 40 to 80 sq. ft. of pine per acre (approximately 60 pines per acre), with an average spacing of 20 to 30 feet between trees, but retaining some clumps of trees. The immediate cluster area should retain a higher BA of 60 to 80 sq. ft. of pine per acre (approximately 70 pines per acre). Retain all cavity trees (live and dead), old-growth pines and the largest diameter pines. Allow for subsequent mortality caused by thinning or midstory management (especially fire). Remove most overstory hardwoods and treat the stumps with an approved systemic herbicide certified for use in wetlands in order to reduce sprouting. The retention of occasional non-pine species, particularly swamp black gum, as well as an occasional loblolly bay (*Gordonia lasianthus*), sweet bay (*Magnolia virginiana*), oaks, bald cypress or Atlantic white cedar, is permissible in foraging habitat and within RCW clusters, but generally do not allow the non-pine component in the stand to exceed 10 percent of the canopy basal area. In stands where swamp hardwoods (blackgum-red maple) form a major portion of the overstory, retain all pines and most of the hardwood overstory component. Review stands for thinning at least once every 10 years.

For regeneration cuts, retain 6 to 20 of the largest pines per acre, including all cavity trees and old-growth pines. Allow for subsequent mortality caused by the harvesting or midstory management. Retain all "leave" trees until they die naturally. Limit regeneration cuts to no more than 20 acres in size in occupied RCW habitat and 40 acres in potential RCW habitat. Incorporate patch clear-cuts associated with harvested pine beetle spots and hardwood midstory suppression into regeneration plans wherever possible. Conduct at least 1 intermediate thinning in heavily stocked stands (>80 sq. ft. basal area). Regeneration cuts in healthy pine stands with >80 sq. ft. of pine BA are not recommended due to the dynamic situation represented by the reintroduction of fire into the ecosystem and the ongoing problem with southern pine beetles.

Obtainment of an ESA Section 10(a) 1(A) permit may be desired to harvest within clusters where foraging substrate would most likely be taken to below USFWS standard. A Section 10(a) 1(A) permit allows activities that would "enhance the propagation or survival of the affected species". In this case, the thinning that would take nominal foraging levels

below standard would in fact be beneficial to RCWs on P3 by improving habitat in the long run. The USFWS has indicated a willingness to issue such a permit on a case-by-case basis.

D. *Pine beetle control and management.* There have been recent outbreaks of southern pine beetles (SPB) at P3. Though the current outbreaks may be part of a normal SPB population cycle, it is most likely the result of deteriorating and stressful stand conditions in pine stands at P3 caused by salt water intrusion, damage from recent hurricanes, overstocking, midstory encroachment and fluctuations in the seasonal high water table. The SPB is a major concern for future management decisions because logging, the use of prescribed fire and other management treatments are likely to lead to some collateral mortality of pine trees of all age and size classes. This could unintentionally fuel a continuing problem with SPBs, further complicating management decisions for the RCW and the forest management program at P3. See **Appendix 11** for SPB policy specific to P3.

During the summer of 2002, numerous pine stands throughout the Preserve experienced unprecedented mortality as a result of an SPB epidemic. Substantial loss of foraging habitat and cavity trees occurred within several RCW clusters. The rapid eruption of SPB on the landscape dictated emergency logging throughout the Preserve. **Appendix 12** outlines management strategy SPB control with respect to RCW clusters implemented during the 2002 outbreak.

Follow guidelines in the U.S. Forest Service's *Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle* (USFS 1987) when prescribing SPB control efforts. Locate and map SPB spots at P3 using both aerial and ground surveys conducted by the Property Forester. Determine the size of each SPB spot and the location of active heads. Obtain data on the stand characteristics of trees within and surrounding SPB spots, in particular, the average pine age, BA and dbh, and the number of infested trees. Mark a buffer of green uninfested trees around active heads that is no wider than the average height of trees in the spot.

The Property Forester and an RCW biologist will visit each spot to prescribe treatment. The primary options available for management of SPB populations are:

(1) cut and remove infested trees and uninfested trees in the green buffer;

(2) cut and leave infested trees and uninfested trees in the green buffer;

(3) cut and hand spray with an approved pesticide (lindane or chlorpyrifos) the infested trees only;

(4) pile and burn infested trees towards the middle of the spot.

When using the cut and leave method, fell trees towards the center of the spot. The latter 2 methods do not require treatment of a green buffer. None of these methods requires cutting or treatment of dead trees vacated by the SPB. If salvage of dead trees is attempted, retain at least 6 large snags per acre for use by cavity dependent species.

Some SPB spots may not be accessible by road and significant amounts of uninfested timber could be cut or disturbed by logging equipment in order to gain access for removal. Use the cut and leave method where economics or unacceptable impacts to RCW habitat do not support the cut and remove method. Cut and spray (with a pesticide) is another alternative, however, do not use this method in habitat occupied by RCWs. RCWs forage heavily on pines infested with pine beetles, including felled trees and logging slash, and could be harmed by pesticides.

Regenerate all SPB spots that exceed 1 acre in size to pine by hand planting, direct seeding or natural regeneration. Replace non-relic RCW starts and cavities in trees killed by SPBs immediately with drilled starts or cavities or cavity inserts (see below) in trees near those killed, but not immediately adjacent to the beetle spot.

Prepare a Biological Assessment for each SPB treatment proposed within 0.5 mile of active RCW clusters or potential RCW habitat and forward it to the USFWS office in Raleigh, North Carolina, for concurrence. Several SPB spots may be treated in a Biological Assessment. Address impacts on RCW nesting, foraging and/or potential habitat, and discuss remedial actions in the Biological Assessment.

E. *Cavity management*. RCWs take an average of 6-9 years to complete a cavity in loblolly pine (Harding 1997). Cavities provide roost and nest sites and shelter from inclement weather and predators. Only 1 RCW roosts in a cavity at a time, and ideally, each RCW in a group has its own quality cavity. A shortage of quality cavities leads to increased mortality, dispersal of females or helpers to other sites, failure to nest or nest loss and cluster abandonment. A typical "healthy" group with a breeding pair and 1 to 2 helpers has at least 3 to 4 quality cavities. In addition, there should be at least 2 cavities that provide alternative

roost sites to adults temporarily displaced from their cavities by cavity kleptoparasites, adults who have lost a roost cavity (such as from wind-throw) or for fledged young of the year. Such extra cavities may be inactive much of the year and provide shelter and nesting sites to a variety of other birds, mammals, reptiles and insects. Although relic cavities (very old, usually enlarged) may provide RCWs shelter in emergency situations, do not count such cavities as being generally available to RCWs. However, relic cavities provide a valuable resource for other cavity-using species. Each cluster should have several start (or incomplete) cavities in varying stages of completion so that new cavities can be brought on line as existing cavities age or are lost. At least 2 to 3 of these starts should be "advanced", with an entrance tunnel breaching into the heartwood. Considering the above, a healthy cluster contains more than a dozen starts and cavities, excluding relics, located close enough together for an RCW group to defend them from rival RCW groups, unaffiliated RCWs and cavity kleptoparasites. Generally, 10 acres is the minimum cluster size, though many existing RCW clusters extend over much larger areas.

Manage all clusters for a minimum of 4 quality completed cavities and 2 advanced starts. A quality cavity has a single, unenlarged entrance, solid bottom and no chronic parasite problem. Control understory encroachment around cavity trees as described above.

1. *Cavity Restrictors.* Cavity restrictors are stainless steel plates that are placed over RCW starts/cavities to prevent damage from cavity enlarging species such as the pileated woodpecker and red-bellied woodpecker (*Melanerpes carolinus*). They can also be used to repair damage to cavities that are being enlarged and to prevent usurpation by some species, especially red-bellied woodpeckers, red-headed woodpeckers (*Melanerpes erythrocephalus*) and European starlings (*Sturnus vulgaris*). Restrictors will not prevent cavity access by eastern bluebirds (*Sialia sialis*) or southern flying squirrels (*Glaucomys volans*).

Restrictors are made in several sizes and 2 major designs. One design is a plate with an opening in the shape of an upside down "U" that extends upward from the bottom of the plate. This model provides protection on both sides and at the top of a RCW cavity, and with careful positioning, the cavity entrance can be "restricted" to prevent entry by some competing species. This model allows the RCW to perch on

the tree trunk and access the cavity without having to perch on the restrictor itself, which some RCWs are reluctant to do.

The other model is a plate with a 2-inch diameter hole in the center. All sides of the cavity are protected, but the plate beneath the opening must be roughened to allow the RCW sure footing. This is critical because RCWs spend considerable time perched at the cavity entrance while inspecting the cavity, working on resin wells and feeding young.

Both models require application of non-toxic wood putty around the restrictor to fill any gaps between the tree and restrictor. Cover the restrictor and putty with a non-toxic brown spray paint. Attach restrictors with wood screws (3/8 x 1/2 inch) at all 4 corners, not nails. Screws make repositioning easier and damage to the restrictor from hammering is avoided. Sharp edges must be avoided, especially around the inner rim where RCWs will be in regular contact, but also on the outer rim and screw heads.

Although restrictors are a valuable tool in RCW cavity management, do not use them unless loss of cavities to enlargement or kleptoparasitism is a serious and ongoing problem, and unless the restrictors can be monitored for damage and the need for repositioning. There is no need to place restrictors on relic cavities or on cavities enlarged to the point that the entrance tunnel is mostly or completely obliterated ("blown-out"). Placing restrictors on active cavities requires evening checks following application to ensure that RCWs can freely enter and exit cavities. This is especially critical when the restrictor has been "tightly" applied to prevent access by another species. Other woodpeckers can damage restrictors by bending them, excavating 1 or more screws, and/or excavating around the edges of the restrictor. Such damage may require a new restrictor, additional screws and wood putty or repositioning of the old restrictor. Check restrictors at least every 6 months for signs of damage. Improperly applied restrictors can trap and kill RCWs. State and USFWS endangered species permits are required to place restrictors on RCW cavities.

2. *Artificial Cavities*. Artificial cavities are a critical tool in the management of RCW populations. They allow a manager to quickly replace RCW cavities (within certain limits, see below), add cavities to clusters with insufficient cavities, rehabilitate inactive clusters or create entirely new clusters. Artificial cavities are of 2 types, drilled (Copeyon 1990) and inserts (Allen 1991). All cavity starts must be drilled.

Each method has its pluses and minuses. Drilled cavities require at least 6 inches of heartwood to hold a cavity. In addition, there can be no more than 3 to 4 inches of sapwood, ideally less. Such characteristics are normally found only in pines more than 80 years old, usually much older. Because the amount of heartwood decreases with height, the height at which a complete cavity can be drilled is usually less than 25 feet, often much less. A drilled cavity is more "natural" than an insert, and after a RCW has rounded out the inside to its satisfaction and dressed the resin wells, it is virtually indistinguishable from a natural RCW cavity. A drilled cavity does not physiologically or structurally stress a pine as much as an insert and is less likely to be damaged by other woodpeckers.

Insert cavities are useful when potential cavity trees contain too much sapwood and/or too little heartwood for a drilled cavity. However, an insert requires a tree diameter at cavity height of at least 15 inches, which restricts the number of trees than can be used and the height at which inserts can be placed. Inserts require removal of a substantial portion of the trunk of a tree and can stress the recipient pine, both physiologically and structurally, more than a drilled cavity. Because an insert is a prefabricated wood box, it is subject to damage by other woodpeckers and requires use of a full frontal restrictor plate. A crack in an insert can lead to leakage of sap from the surrounding sapwood and RCW mortality.

Drilled starts are relatively quick and easy to create. Though substantial heartwood must be present, the width of sapwood is not as limiting as with a drilled cavity. Therefore trees that are unusable for drilled cavities can be used for drilled starts. Drilled starts can also be placed higher in a given tree than a cavity. RCWs can complete a drilled start within a few months.

As in the case for drilled cavities, drilled starts must be screened to prevent RCW access until all internal sap leakage has ceased, usually 4 to 8 weeks if drilled during the non-growing season. The use of a thin wood veneer called "wiggle board" to line the entrance tunnel significantly reduces the time needed for sap flow cessation in drilled starts. Conduct at least 1 or 2 monthly checks after unscreening to ensure that the entrance tunnel has no sap leakage.

Resin wells are normally cut or drilled around provisioned cavities to stimulate sap flow; however, do not drill or cut resin wells around artificial cavities if SPB populations are high. Resin flow can attract fatal concentrations of SPBs. Instead, simulate resin flow with streaks of non-toxic wood putty and scrape loose bark off of the tree.

Construction of drilled starts and cavities and provisioning of cavity inserts require considerable experience and authorization by both state and USFWS endangered species permits. These activities are potentially dangerous to conduct, and if improperly done, can lead to injury or death of RCWs.

F. ***Augmentation and Translocation*.** Augmentation is a useful tool to expand the RCW population and also provides a means to maintain genetic and demographic viability in populations with fewer than 250 effective breeding pairs. The small number of RCWgroups on P3 and adjacent lands makes augmentation and translocation both necessary and very difficult. Currently there are no excess birds identified in this population or elsewhere in the North Carolina Coastal Plain. Further, nesting and foraging habitat conditions are sub-optimal. Augmentation and translocation should be postponed until habitat and quality cavity availability can be improved. However, if an opportunity to augment solitary male clusters arises, it should be done. Augment all solitary male groups and create new groups in inactive or provisioned recruitment clusters by translocating male and female RCWs, as appropriate, to the site. Carry out habitat improvements and provision cavities as specified in this MP prior to moving any RCWs. Use only juvenile RCWs of known age and sex for augmentation and translocation. Move birds between August and December. Capture birds in the evening or in the morning from roost cavities using approved techniques. If captured in the evening, place the bird in a holding cage and transport it to the release site. Put the

bird in a quality unoccupied cavity and block the entrance tunnel to keep the bird from flushing (be sure to maintain adequate air flow into the cavity). Unblock the cavity approximately 30 to 60 minutes after sunrise after any resident bird has exited its cavity, but before it has left the cluster. If captured in the morning, transport the RCW to the recipient cluster and release it before the resident bird (if any) departs the site. Although periodic checks on group composition are useful, disturbance of the group must be minimized.

Do not undertake augmentation or translocation without prior approval from, and close coordination with, the USFWS. TCF must obtain an ESA Section 10 permit (scientific purposes) or an incidental take statement pursuant to ESA Section 7, and possess all applicable marking, banding and handling permits prior to moving any RCW through augmentation or translocation.

G. *Scheduling.* Do not conduct timber harvesting or other habitat management activities, with the exception of prescribed burning, in active clusters during the RCW breeding season (April through July). If an experienced RCW biologist determines that the proposed activity, exclusive of timber harvesting, will have no effect on the RCW, and the USFWS concurs, the activity may be conducted at any time.

XII. P3 Cluster descriptions and Management strategies.

Note: Cavities determined to be "quality cavities" were unenlarged to slightly enlarged natural and artificial cavity (starts not included). These data were derived from 2002 cavity tree cavity updates and recent cavity provisioning.

TYR 01

The Natural community type was most likely Estuarine Fringe Loblolly Pine Forest, although past logging practices and ditching have altered the site considerably (**Figure 6a)**. Soil type within this cluster is a fine-silty, hydric Perquimans loam. Cluster TYR 1 is now classified as "Successional Wet Loblolly Pine Forest". This cluster has a sparse to moderately dense overstory of loblolly pine with dense loblolly pine regeneration in the understory. Additional understory species include sweetgum , groundsel tree (*Baccharus halimifolia*), wax-myrtle, sweetbay and red maple. This site is adjacent to the Albemarle Sound and vulnerable to storm damage and salt-water intrusion from storms and hurricanes and associated flooding. A southern pine beetle (SPB) infestation occurred due east of the cluster in 2000 and an emergency logging operation (Timber Sale #15) was conducted to halt the active SPB front that was advancing towards the cavity trees. There have been no SPB outbreaks in this area since that time.

This cluster contained a breeding group from 1999 to 2002. TYR 01 includes 10 cavity trees (#s 15100-102, 15104-106, 15158, 15202, 15205 and 24A) and 4 quality cavities (#s 15100, 15102, 15202 and 24A) (**Attachment A**).

Proposed Management Strategy

The understory should be reduced around the existing cavity trees and throughout the cluster. Mechanical understory control is recommended; however, do not conduct when soils are saturated. No reduction of pine basal area should occur within the cluster because this site is vulnerable to further loss of pines from storms or SPB. Provisioning of additional cavities is not necessary at this time.

TYR 02

Soil survey data suggests that this site was historically a pine-dominated community type. It is the only cluster on P3 that occurs in a soil type classified as Hyde, a fine-silty organic soil. Logging practices have altered the site considerably. Presently, this is classed as a "Successional Wet Loblolly Pine Forest". The loblolly pine overstory in Cluster TYR 2 was thinned to a basal area of ~ 40 sq ft/acre in October 2001. This operation simultaneously eliminated the midstory that was 30+ feet in parts of the cluster (Timber Sale # 11) (**Figure 6b)**. The loblolly pine overstory is sparse to moderately dense, the mid-story is absent and the understory is comprised of sweet bay, red maple, tulip poplar, sweetgum, switchcane, greenbriar, grape (*Vitus spp.)* and *Panicum spp.*

This cluster contained a breeding group from 1999 to 2002. TYR 02 contains 10 cavity trees (#s 15148, 15150-152, 15159, 15165, 15208, 15268, 15279 and 15295) and 6 quality cavities (#s 15150(2), 15151, 15152, 15165 and 15208)(**Attachment B).**

Proposed Management Strategy

Maintenance of the open stand conditions created by Timber Sale #11 should be a priority. The mid-story has been eliminated, however, if not controlled, fast growing, mesic hardwoods such as red maple and sweetgum will reestablish dominance. A regimen of prescribed fire should be implemented, which will maintain the open understory and promote desirable species such as switchcane. Prescribed burning should initially be employed during the non-growing season. This will significantly reduce the residual fuel on the ground from the logging operation.

TYR 03

Dorovan and Tomotley soil are interspersed throughout this cluster- with cavity trees found primarily in the rarely flooded Tomotley series. The natural community type of Nonriverine Swamp Forest, a palustrine habitat characterized by Dorovan muck, is relatively intact in stands situated east and north of cavity trees. The mid-story component has been eliminated in the immediate vicinity of the artificial cavity trees (**Figure 7**), which are imbedded in a Wet Pine -Hardwood Forest. Other stands supporting satellite cavity trees have a moderately dense overstory of loblolly pine with a dense sub-canopy of red maple and swamp hardwoods. The moderately dense understory includes red bay, wax myrtle, fetterbush and blueberry.

Cluster TYR 03 has not been occupied by a breeding group since JCA began intensive monitoring in 1999. Birds occupying adjacent cluster TYR 17 have been observed roosting in TYR 3 cavity trees, commonly during the fall and spring. A cluster that provides a roost site for an adjacent group is termed a captured cluster. Based on these data, the cluster was not assigned a foraging habitat partition in 2000. Cavity provisioning, however, had occurred in 1999 and early 2000 prior to the establishment of baseline clusters. TYR 03 contains 6 cavity trees (#s 15099, 15107, 15233, 15276, 10A and 21A), 3 of which are quality cavities (#s 15099, 15107 and 10A) (**Attachment C**).

Proposed Management Strategy

Cluster TYR 3 is a combined management unit with cluster TYR 17 as it falls within the foraging partition for cluster TYR 17. The cluster, however, is monitored for breeding activity during the nesting season as past cavity management has increased the potential for 2 groups to occupy clusters TYR 3 and TYR 17. An appropriate management strategy, as determined by the P3 Management Committee, will be implemented should a separate group be established at TYR 3.

TYR 04

The natural community type within this cluster, which was most likely pine-dominated in the northern portion, sloped into Nonriverine Swamp or Nonriverine Wet Hardwood Forest (Tomotley soil replaced by the prevalence of Dorovan muck). Past human disturbance has altered the northern part of the cluster considerably. The northern part of the cluster has a sparse overstory of loblolly pine and a dense understory of loblolly pine regeneration. Understory species consist of wax myrtle, switchcane, sweetbay and various mesic and swamp hardwoods. This part of the cluster is "Successional Wet Loblolly Pine Forest", which differs from the less disturbed southern portion of the cluster, which is more characteristic of Nonriverine Wet-Hardwood Forest. Here, cavity trees occur within a moderately dense to dense overstory of loblolly pine, with swamp hardwoods in the sub-canopy. Swamp chestnut oak and swamp red bay are found in the midstory with wax-myrtle, switchcane and sedges beneath.

This cluster contained a potential breeding group from 1999 to 2002. A drilled start placed in existing cavity tree #15282 in January 2001 was completed by RCWs by July 2001, however, this cavity tree died in late 2001 from SBP infestation. Only 1 other loblolly pine tree in the cluster showed signs of SPB infestation. This was a mature, flattop loblolly pine that would have been a suitable recruitment tree. Although the SPB did not spread to other portions of the cluster, a few pines within the cluster have died from causes other than SPB. It appeared these pine trees declined from extensive periods of soil saturation, possibly a result of prolonged flooding from Hurricane Floyd in 1999. TYR 04 contains 6 cavity trees (#s 15162-63, 15190, 15274, 15278, and 37A) and 3 quality cavities (15162-163 and 37A) (**Attachment D)**.

Proposed Management Strategy

Cluster TYR 4 needs to be inspected periodically for signs of SPB infestation. A drilled cavity and start should be provisioned as soon as JCA staff is able to resume these activities, although this site is not severely cavity limited. If SPB outbreaks and/or widespread pine tree mortality threaten the small stand that the cluster occupies, a suitable replacement stand will need to be identified. Removing hardwoods adjacent to cavity trees by chainsaw is recommended over the use of heavy logging equipment or prescribed fire due to the permanent saturation of the site.

TYR 05

Similar to cluster TYR 4, the soil profile is a combination of Tomotley loam and Dorovan muck. Historically, rarely flooded stands supported a larger pine component than the adjacent Nonriverine Swamp Forest and Nonriverine Wet Hardwood Forest. Presently, the majority of the cavity trees are located in what is considered a "Wet Pine-Hardwood Forest" (**Figure 8a)**. This cluster has a moderately dense canopy of loblolly pine, codominant with mesic hardwoods such as swamp black gum and red maple in the overstory . The understory is comprised of sapling mesic hardwoods, wax myrtle, red bay, sweet bay and switchcane. Pine mortality from SPB prompted the removal of 11.8 acres of timber near this cluster in 2002. The stand east of Pledger Harbor Road adjacent to the cluster was thinned in April 2002 (Timber Sale #13) and both midstory and understory were eliminated (**Figure 8b**).

This cluster contained a potential breeding group from 1999 to 2002. TYR 05 contains 13 cavity trees (#s 15120-123, 15125, 15126, 15191, 15192, 15269-270, 32A, 42A and 51A, 72A) and 3 of those contain quality cavities (32A, 51A, 72A)(**Attachment D)**.

Proposed Management Strategy

Additional provisioning of artificial cavities should occur in the stand where cavity tree 72A is situated, east of Pledger Harbor Road. The pine basal area was significantly reduced in this part of the cluster, recommended timber management to reduce potential of future stand-wide SBP outbreaks. This is the designated replacement stand if the portion of the cluster containing the majority of cavity trees experiences future SPB infestation. Understory maintenance should be implemented within the replacement stand in a manner similar to that described for cluster TYR 02. Loss of habitat in 2002 to various SPB emergency harvests may limit timber management in the "Wet Pine-Hardwood Forest", despite the need to reduce the pine basal area within the cluster. This cluster needs to be inspected routinely for signs of SPB infestation.

TYR 06

The natural community type within the permanently saturated areas of this cluster was probably Nonriverine Swamp Forest and Nonriverine Wet Hardwood Forest, although past logging practices have altered the site considerably. Soil series are a combination of Tomotley and Dorovan. Presently, this cluster is located in both "Successional Wet Loblolly Pine Forest" and "Wet Pine Hardwood Forest". Portions of the cluster have been thinned prior to the creation of P3 and are characterized by a sparse overstory of loblolly pine and dense pine regeneration in the understory. The remainder of the cluster lies within a stand of dense loblolly pine with a dense understory of red maple, red bay, sweetgum, wax myrtle, and switchcane. Ten acres were removed within cluster TYR 6 by an emergency SBP timber harvest in 2002.

This cluster contained a potential breeding group in 1999- 2002. TYR 06 contains 10 cavity trees (#s 15127-128, 15242, 15250, 15161, 15266, 15273, 15296 and 34A) and 4 quality cavities (#s 15250, 15266, 15267 and 34A) (**Attachment E**).

Proposed Management Strategy

Deficiencies in foraging habitat as a result of SPB harvest may limit future timber management within this cluster, although certain stands would benefit by a reduction in the pine basal area. This cluster needs to be checked periodically for signs of active SPB infestation. Hand clearing of understory/ midstory adjacent to cavity trees is recommended.

TYR 07

Portions of cluster TYR 7 are relatively intact Estuarine Fringe Loblolly Pine Forest, although past human and natural disturbances have altered the site considerably. The overstory is moderately dense loblolly pine with co-dominant hardwoods of swamp black gum, sweetgum and red maple and a few scattered bald cypress (*Taxodium distichum).* Switchcane, arrowleaf tearthumb (*Polygonum sagittatum*), camphorweed (*Pluchea sp.*), sedges and common reed *(Phragmites communis)* are found in the understory (**Figure 9a**). This site lies adjacent to Little Alligator Creek and pine stands within the cluster have been severely impacted by storms and SPB infestations in the recent past. Timber management was not conducted within this site to control SPB. Rising sea level might also be gradually altering the natural composition of this site from a forested area to a marsh system.

This cluster contained a breeding group in 1999, was occupied by a solitary male in 2000 and again occupied by a breeding group in 2001 and 2002. All 7 artificial cavity starts and cavities that have been provisioned in this cluster are dead or dying from SPB infestation. TYR 7 contains 18 dead cavity trees (#s 15131-132, 15154-157, 15200, 15209-212, 3A-5A, 17-18A and 58-59A) and 1 remaining live cavity tree that has 2 quality cavities (# 15281) **(Attachment F)**. Many of these cavity trees have died in the last 6 -12 months from various causes (SPB, flooding, salt water intrusion, etc.). Potential exists for additional undetected cavity trees in the cluster that cannot be readily seen from the road.

Proposed Management Strategy

It is uncertain whether this group will persist even with intensive management, because available nesting and foraging habitat has been reduced drastically by the aforementioned loss of pines. Routine provisioning had been conducted to mitigate for periodic cavity tree loss, however, SPB infested cavity trees quickly exceeded live cavity trees in the absence of replacement efforts. A suitable replacement stand will need to be identified (if one exists) and the new cluster center will dictate the reconfiguration of the foraging partition. Due to the extensive loss of pine trees that have occurred within the foraging partition for TYR 7, a shift from the present configuration will affect adjacent cluster TYR 8. Adequate levels of foraging habitat need to remain allocated to TYR 8, otherwise the viability of TYR 8 will be compromised.

TYR 08

Natural community type within this cluster was a pine dominated community, with pockets of Nonriverine Swamp Forest, although recent logging practices have altered the site considerably. "Successional Wet Loblolly Pine Forest" with a moderately dense loblolly pine canopy is now prevalent throughout the cluster. The hardwood midstory within the western portion of the cluster has been eliminated. The dense pine basal area within this cluster was reduced to moderate levels through Timber Sale #12, recommended timber management to reduce potential of large scale SBP kills (**Figure 9b**). The eastern portion was similarly thinned, however, sparse pockets of hardwoods were retained in the midstory. Approximately 25 acres were clear-cut within the partition for TYR 8 due to SPB emergency harvests in 2002.

This cluster was occupied by a breeding group from 1999 to 2002. TYR 08 contains 16 cavity trees (#s 15136, 15153, 15160, 15178-180, 15185, 15196, 15198, 15213, 15243-244, 15265, 2A and 14-15A) and 4 quality cavities (#s 15180, 15244, 2A and 14A)(**Attachment F**).

Proposed Management Strategy

The location of an active bald eagle nest within the northeastern portion of the foraging partition for this cluster affects RCW management. It is necessary to restrict logging operations within a 750ft buffer from an active eagle nest during their designated breeding season from December to June. The understory has been eliminated by the recent logging; however, if not controlled, the understory will quickly return and be dominated by undesirable species such as sweetgum and red maple. A regime of prescribed fire should be implemented, which will maintain the open understory and promote desirable species such as switchcane.

TYR 09

There are significant portions of this cluster that are vegetated with relatively intact Nonriverine Swamp Forest and Nonriverine Wet Hardwood Forest, although past disturbances have altered other portions of the site considerably. Soil type throughout the cluster is Portsmouth, a poorly drained, hydric loam with clay subsoil. The stand east of Pine Landing Road has a moderately dense canopy of loblolly pine, swamp black gum and bald cypress with a moderately dense understory of wax myrtle, sweet bay, titi and red bay characteristic of Nonriverine Swamp Forest. Nonriverine Wet Hardwood Forest, with swamp chestnut oak prevalent, occurs in the southwestern part of the cluster. Cavity trees located west of Pine Landing Road lie within Successional Wet Loblolly Pine Forest with a sparse overstory of loblolly pine and an impenetrable understory of loblolly pine regeneration, greenbriar and wax-myrtle (**Figure 10)**.

This cluster had a breeding group from 1999 to 2002. Four cavity trees were lost to SPB infestation in 2002, however, the outbreak was limited to several other pines and did not infest the entire cluster. TYR 09 contains 12 cavity trees (#s 15093-95, 15097, 15201, 15216-218) and 3 quality cavities (15093, 15097 and 15201) (**Attachment G**).

Proposed Management Strategy

Understory control should be limited to hand clearing in the immediate area of existing cavity trees within the Nonriverine Wet Hardwood Forest and Nonriverine Swamp Forest communities. The use of heavy machinery for timber management or midstory control should be avoided as the site is semi-permanently saturated and irreparable site damage could occur. The cavity trees on the west side of Pine Landing Road possess weakening crowns, most likely attributable to residual damage (soil compaction, root damage) from past logging activities. Sites that are stressed from past management or environmental factors such as this cluster, need to be inspected routinely for potential SPB outbreaks.

TYR 10

Past disturbances make determination of historic community type difficult, although Tomotley and Dorovan soil series present in the cluster suggests upland pine stands mixed with Nonriverine Swamp Forest. Presently, the cluster lies within a "Wet Pine-Hardwood Forest". However, the stand where artificial cavities were provisioned is a ~3 acre, sparsely stocked, loblolly stand with a switchcane understory. Most of the site has a moderate to dense overstory of loblolly pine mixed with swamp chestnut oak, other oaks, swamp black gum, sweetgum and swamp red maple (*Acer drummondii*). A moderately dense midstory component is dominated by similar hardwood species with an understory of switchcane, red bay, blueberries and titi.

TYR 10 was captured by cluster TYR 18 in 1999 and 2000. A potential breeding pair occupied the cluster in 2001 and 2002. This group represents the first recruitment mitigation credit on P3. TYR 10 contains 9 cavity trees (#s 15181, 15186, 15193-194, 15275, 44A and 47-49A) and 3 quality cavities (47-49A) (**Attachment H**). This group nested in an artificial insert cavity in 2002.

Proposed Management Strategy

The pine canopy throughout the site, with exception to several acres where artificial cavity trees were placed, would benefit from a reduction in basal area. If a thinning is not possible at this time, the understory should be controlled by hand clearing or prescribed fire. This site has an abundance of switchcane in the understory that would promote a productive fire regime.

TYR 11

This cluster is located in a Successional Wet Loblolly Pine Forest. Soil profile (Tomotley) suggests that this upland stand was historically forested with pine. Cluster TYR 11 had a moderately dense overstory of loblolly pine and a variety of species (many disturbance related) in the understory. These include red maple, wax-myrtle, green-briar, sweet pepperbush, winged sumac (*Rhus copallina*), switch grass and bluestems. Timber Sale #21, conducted in the spring of 2002, resulted in the suppression of the red maple, sweetgum, red bay, switchcane and titi midstory (**Figure 11**).

This cluster contained a breeding group from 1999 to 2001, however, the group did not attempt to nest in 2002. This cluster contains 9 cavity trees (#s 15142, 15144-147, 15207, 6A, 39A and 41A) and 4 quality cavities (15142, 15146, 6A and 39A) (**Attachment B**).

Proposed Management Strategy

A similar management strategy as was proposed in cluster TYR 2 should be applied within this site. Post-thinning understory maintenance, either by prescribed fire or herbicide applications, should be conducted.

TYR 12

Soil type throughout cluster TYR 12 is Portsmouth, a hydric loam with occasional clay subsoil. Historic natural community type is undetermined, as SPB outbreaks and a ~3 acre clear cut have altered the cluster site drastically (**Figure 12)**. The majority of the pine canopy within the cluster is dead, although several, small patches of live pines remain scattered throughout the stand. Cluster TYR 12 had a dense loblolly pine overstory with moderate to dense sub-canopy of primarily red maple and a moderately dense understory dominated by wax myrtle, red bay, sedge and common reed. Closer to Little Alligator River, bald cypress and swamp black gum become a more significant component of the overstory and midstory. Timber Sale #19, conducted in the spring 2002, removed several acres adjacent to the cavity trees and resulted in excessive soil disturbance.

This cluster was occupied by a breeding group from 1999 to 2001. The group did not attempt to nest in 2002. Cluster TYR 12 has 3 live artificial cavity trees (68-70A) and 2 quality cavities (67A and 70A) (**Attachment H**).

Proposed Management Strategy

Additional cavities need to be provisioned within this cluster immediately. The remaining pines available to this cluster will undoubtedly be insufficient for effective management, however, a replacement stand will be selected (if one exists) and efforts to maintain a breeding group at TYR 12 will continue, however, this cluster may not be viable due to the extensive loss of nesting and foraging habitat.

TYR 13

This cluster lies within a "Wet Pine-Hardwood Forest" with a moderately dense overstory of loblolly pine, sweet gum and swamp red maple. American holly (*Ilex opaca*), sweetbay, swamp red maple, and loblolly pine regeneration occur in the midstory. Understory species include fetterbush, blueberries, greenbriar and wild grape. Past disturbances make determination of historic natural community type within this cluster difficult, however it was most likely a pine dominated community. Soil type is Tomotley, a poorly drained loam with a dark gray surface layer found on uplands.

Group status in 1999 was unknown, the site was captured in 2000 by TYR 22 and occupied by breeding group in 2001 and 2002. TYR 13 contains 5 cavity trees (#s 15109-15111, 11A and 25A) and 4 quality cavities (#s 15109, 15111, 11A and 25A) (**Attachment A**).

Proposed Management Strategy

Long-term management strategy for cluster TYR 13 is uncertain at this time. Cluster TYR 13 was designated a captured cluster when the baseline credits were established in 2000 and was not assigned foraging habitat. This cluster is bordered to the east and south by large, off-property clear-cuts. The lack of foraging habitat in cluster TYR 13 partition supported omitting this cluster from management. Habitat could be assigned if this cluster continues to support a breeding group, however, insufficient foraging habitat for clusters TYR 22 and TYR 23 may result. The P3 Management Committee in consultation with the USFSW must determine the future management of this cluster and associated foraging habitat.

TYR 14

This site is located in Nonriverine Swamp Forest and provides the best example of this community type that supports a cluster on P3 (**Figures 13 and 14)**. One to several pine trees occur on hummocks scattered throughout the cluster. The habitat within Cluster TYR 14 has remained relatively intact, however natural disturbances such as hurricanes and windstorms have caused cavity tree loss and damage. This cluster has a dense hardwood-pine overstory of loblolly pine, swamp black gum, red maple, bald cypress and sweetgum. The moderately dense understory is comprised of wax myrtle, red bay, green-briar, and swamp loosestrife (*Decodon verticillatus*).

This cluster was occupied by a potential breeding group from 1999 to 2002. TYR 14 contains 10 cavity trees (#s 15114, 15116, 15204, 15232, 15249, 9A, 19A, 20A, 22A and 23A) and 4 quality cavities (#s 15204, 9A, 19A and 23A) (**Attachment I).**

Proposed Management Strategy

The location of an active bald eagle nest east of this cluster affects RCW management. It is necessary to restrict logging operations within a 750 ft buffer from an active eagle nest during their designated breeding season from December to June.

Timber management and mechanical understory control options are limited by extremely wet soils. Understory control should be implemented by hand in the immediate vicinity of existing cavity trees. Reduction in the pine basal area will not be permitted if foraging habitat is insufficient within this cluster partition due to the sparse pine canopy. The cluster is not cavity limited, however, the available artificial cavities have been overlooked by the RCW group for 3 years. If roosts are not active within the next year, it may be necessary to place the artificial cavities higher in the trees or re-drill these cavities in an adjacent replacement stand.

TYR 15

The natural community type within the cluster east of Pine Landing Road is Nonriverine Swamp Forest. This area has a dense pine-hardwood canopy of loblolly pine, occasional cypress, swamp black gum, red maple and sweetgum, with a dense understory dominated by wax myrtle, red bay, switch cane and titi. Wet Pine-Hardwood Forest is found in drier stands west of Pine Landing Road. This stand has a dense loblolly pine canopy co-dominant with sweetgum, red maple and a dense understory of switchcane and wax myrtle, with mesic hardwoods in the mid-story (**Figure 15**). Approximately 13 acres were removed in 2002 due to a SPB outbreak southwest of the cluster. Past logging practices have altered the site, as cavity trees on the west side of Pine Landing Road occur within Successional Wet Loblolly Pine Forest.

This cluster was occupied by a potential breeding pair from 1999 to 2002. TYR 15 contains 8 cavity trees (#s 15168-169, 15176-178, 15197, 15215, 15264 and 50A) and has 3 quality cavities (15197, 15215 and 50A) (**Attachment J**).

Proposed Management Strategy

Permanently saturated soils within the eastern portion of the cluster restrict timber management. The existing basal area near cavity trees should be maintained, however, thinning the area between the cluster and recent SPB removal would be beneficial to reduce the likelihood of potential SPB outbreaks. Hand clearing of the understory adjacent to existing cavity trees should be implemented.

Suitable habitat within the southern portion of P3 is declining due to the widespread pine mortality within clusters TYR 12, TYR 16 and TYR 19 during the last year. Bounded by the Little Alligator River to the north, management for these clusters will shift south, affecting the foraging partition for TYR 9 and TYR 15 and recruitment cluster TYR 34. Timber management must optimize existing and potential habitat to maintain the baseline clusters; effects of habitat removals may require additional analyses.

TYR 16

The natural community type within cluster TYR 16 is Nonriverine Swamp Forest with Dorovan muck the exclusive soil type. There has been extensive pine mortality within this cluster, the result of a combination of flooding and SPB infestations (**Figure 16a**). The predominantly hardwood canopy, with varying amounts of dead and dying loblolly pines, includes swamp black gum, red maple and sweetgum. There is a moderate understory of red bay, swamp red maple, wax myrtle, sedge and *Juncus spp*.

Both known cavity trees (#s 15271-272) within this cluster are dead (**Attachment G**). Activity status for this group was undetermined in 2001, however fledglings were observed within the cluster near the dead cavity trees. An RCW nest cavity in dead cavity tree #15271 was documented in 2002 (**Figure 16b)**.

Proposed Management Strategy

It is uncertain whether or not this baseline cluster can persist. The birds have demonstrated resilience to their altered habitat utilizing dead trees for roosting and nesting, however, the loss of pines may ultimately result in cluster abandonment. Further aerial survey work needs to be conducted to look for previously unknown cavity trees and to identify a suitable replacement stand, if one exists. If possible, a stand needs to be selected that will not significantly shift the foraging partition, otherwise deficiencies in foraging habitat may result for adjacent clusters TYR 12 or TYR 9. The remote location of this cluster prevents effective timber management avoid the use of heavy machinery within this extremely wet site.

TYR 17

This cluster occurs in a Successional Wet Loblolly Pine Forest that was highly disturbed by past logging practices. Based on the presence of Tomotley soil type throughout this cluster, the stand was probably a pine-dominated, upland community. This cluster has a sparse to moderately dense canopy of loblolly pine with a dense understory of loblolly pine regeneration and lesser amounts of wax myrtle, sweet gum and red maple.

This cluster contained a breeding group from 1999 to 2002. This group, which occupies cluster TYR 17, has periodically roosted in the cavity trees at cluster TYR 3. TYR 17 contains 6 cavity trees (#s 15118, 15195, 15203, 15227, 7A and 38A) and has 4 quality cavities (15195, 15203, 7A and 38A) (**Attachment C**). Insert cavity tree 38A was infested with SPB and dying during the fall of 2002. This cavity tree, however, was roost active and the only cavity or non-cavity tree affected within the immediate cluster.

Proposed Management Strategy

The location of an active bald eagle nest northwest of this cluster may affect RCW management. Logging operations are restricted within a 750 ft buffer around an active eagle nest during their designated breeding season from December to June.

Mid-story removal and understory control should be the priority within this cluster. Hand clearing of the understory, extending beyond the present 12-foot radius around cavity trees, should be implemented within the cluster. The dense pine mid-story in the cluster area should be thinned mechanically. Prescribed fire is not recommended in this cluster due to the heavy and volatile fuel load. Additional cavities may be warranted in the future due to the inevitable loss of insert cavity 38A. Provisioning at this site is not critical, however, if limitations arise in the near future, quality cavity trees are available at adjacent cluster TYR 13

TYR 18

This cluster was probably historically a pine-dominated, upland community, characterized by the prevalence of Tomotley soils found throughout the site. Community type is "Wet Pine-Hardwood Forest", although the southwest portion of the cluster has experienced a drastic reduction in basal area. Timber Sale #17, conducted in Fall 2001 to contain a SPB outbreak , resulted in a sparse loblolly pine canopy and eliminated the hardwood canopy and midstory in that respective stand. "Wet Pine-Hardwood Forest" in the northern part of the cluster contains most of TYR 18 cavity trees and has a dense pine-hardwood canopy of loblolly pine, swamp black gum, swamp chestnut oak and red maple. The dense understory is mostly switchcane, hardwood saplings, red bay and wax myrtle.

TYR 18 contained a potential breeding group from 1999 to 2002. TYR 18 has lost 10 cavity trees (#s 15133-135, 15137, 15182-184 and 27-29A) to SPBs and other causes since 1999. TYR 18 contains 7 live cavity trees (#s 15199, 15234, 15275, 8A, 57A, 62A) and has 5 quality cavities (#s 15199, 15234, 15275, 8A, 57A) (**Attachment H**).

Proposed Management Strategy

Regular inspections for SPBs need to be conducted to ensure that measures conducted in Fall 2001, although it appears that the emergency logging operation stopped the spread of pine beetles in this area. Otherwise, understory maintenance should be the priority here. In wetter portions of the cluster, understory maintenance should be done by hand. Additional thinning of pines in the eastern part of the cluster should be considered to guard against future SPB outbreaks and provide understory control. Provisioning of additional cavities is not necessary at this time.

TYR 19

This permanently saturated site experienced an abnormally high influx of water from Hurricane Floyd in the fall and winter of 1999. Mature pines in the stand possessed weak crowns, an indication of prolonged wet site conditions (**Figure 17a**). A SPB outbreak that emerged in 2001 and peaked in the summer of 2002 dictated emergency timber harvests totaling 35.7 acres (**Figure 17b**). Harvesting was conducted during July and August 2002. Pine mortality within the cluster from the SPB kill has increased pine basal area deficiencies in the surrounding foraging habitat.

All natural cavity trees within this cluster occur within a Nonriverine Swamp Forest which extends north to the Little Alligator River. Most of the cluster has a hardwood-pine overstory consisting primarily of swamp blackgum, red maple, sweetgum and remnant live loblolly pines. Wax myrtle, fetterbush, red bay and hardwood saplings dominated the moderately dense understory.

Group status for cluster TYR 19 was unknown in 1999; the cluster was occupied by a breeding group from 2000 to 2002. The death of cavity trees within the historic cluster site necessitated selection of a replacement stand. Three insert cavities and 1 drilled start were provisioned in late 2001 within Successional Wet Loblolly Pine Forest south to southwest of the cluster. SPB and other causes of mortality have resulted in the loss of 10 cavity trees (#s 15171-173, 15187-189, 15219-220, 15221, 15223 and 45A). TYR 19 contains 8 live cavity trees (#s 15170, 15174, 15222, 46A, 60-61A and 63-64A) and has 3 quality cavities (60-61A and 64A) (**Attachment K**). The group nested in an artificial insert cavity in 2002.

Proposed Management Strategy

Cavities will be provisioned in the replacement stand(s) to offset the loss of natural cavities. It is unknown at this time if timber management, unless an emergency harvest, can be conducted. This activity will be dictated by the amount of foraging habitat that remains following the SPB epidemic. A repartition south of the ½ mile foraging circle for cluster TYR 19 will most likely reduce allocated habitat for recruitment cluster TYR 34. Deletion or maintenance of recruitment sites will be decided by P3 Management Committee consensus.

TYR 20

The presence of Tomotley and Portsmouth loam within cluster TYR 20 indicates this site has historically supported an upland community. Presently, the habitat type within the cluster would be considered "Successional Wet Loblolly Pine Forest". The overstory throughout most of the cluster was sparse to moderately dense loblolly pine with a dense, at times impenetrable, understory of loblolly pine regeneration, switch cane, red maple, sweetgum, red bay and greenbriar. The understory surrounding the cavity trees within the cluster was suppressed as a result of Timber Sale #21 in the spring of 2002 (**Figure 18)**.

Cluster TYR 20 contained a breeding group from 1999 through 2001. TYR 20 contains 9 cavity trees (#s15138-141, 15166-167 and 15258-260) and has 5 quality cavities (#s 15140-141 and 15258-260) (**Attachment B**). Newly tagged cavity tree 15287 is dead.

Proposed Management Strategy

Suppression of the understory, extending beyond the area cleared adjacent to the cavity trees, should be implemented as soon as possible. Post-thinning understory maintenance, either by prescribed fire or herbicide applications, should be conducted. Provisioning of additional cavities is not necessary at this time.

TYR 21

Cluster TYR 20 has historically supported an upland community, suggested by the occurrence of Tomotley loam throughout the site. The habitat type within the cluster would be considered "Successional Wet Loblolly Pine Forest". The overstory is sparse to moderately dense loblolly pine with a dense understory of loblolly pine regeneration, switchcane, red maple, sweetgum, red bay and greenbriar **(Figure 19).**

TYR 21 contained a breeding group from 2000 to 2002. Cavity trees 43A, 15252, 15280 and 15288 are dead. The loss of these cavity trees appeared to be due to nearly permanent soil saturation within the site, combined with a mature, declining loblolly canopy. TYR 21 contains 4 cavity trees (#s15226, 35-36A, and 74A) and all 4 have quality cavities (#s 15226 and 35-36A, 74A) **(Attachment L)**.

Proposed Management Strategy

Timber management options are limited due to the sparse overstory within this cluster. If there is enough pine basal area, a thinning operation could be combined with understory control. However, if this is not practical, understory control should be implemented by hand or machine in the immediate cluster area.

TYR 24

Habitat within this cluster is identical to cluster TYR 21. This cluster was captured by the group at cluster TYR 21 in 1999. Cavities in the cavity trees became enlarged and inactive by 2000. For management purposes, these trees are now included with TYR 21. TYR 24 contains 2 cavity trees (#s 15239-240) and no quality cavities (**Attachment L**)

Proposed Management Strategy

This "cluster" is managed solely to maintain the group at cluster TYR 21.

TYR 22

Tomotley soils, poorly drained, loams indicative of an upland area, are found at this site. This suggests a pine-dominated community had been present historically. Presently, this cluster would be considered a Successional Wet Loblolly Pine Forest. The overstory is sparse to moderately dense loblolly pine with a dense understory of loblolly pine regeneration, switchcane, red maple, sweetgum and red bay and fetterbush.

TYR 22 was not detected until 2000. It has contained a potential breeding group during 2000 -2002. Many trees in this cluster appear to be stressed, similar to cluster TYR 21. Cavity tree 15229 showed signs of SPB infestation in February 2002, probably resulting from a lightning strike. The SPB did not spread to any other nearby pines. TYR 22 contains 10 cavity trees (#s15226, 15280, 15288, 35-36A, 43A and 73A) and has 5 quality cavities (#s 15226, 15280, 35-36A and 73A) (**Attachment A**).

Proposed Management Strategy

Timber and understory management should be the priorities here. Proposed Timber Sale #5 was put on hold pending final determination of the cluster status of TYR 13, formerly considered captured by TYR 22, but subsequently containing a breeding group. If it is determined that TYR 13 should be managed as an active cluster, timber management options would be limited because current amount of forage allotted to TYR 22 would be reduced by the repartitioning with TYR 13. The pine basal area in the stand south of cluster TYR 22 should be significantly reduced. Other than timber management, maintaining quality cavities as needed and understory maintenance are needed. Mechanized understory control is feasible within this cluster, although in the short-term understory maintenance by hand should be sufficient.

TYR 23

Cluster TYR 20 has historically supported an upland community, suggested by the occurrence of Tomotley loam throughout the site. The habitat type within the cluster would be considered "Successional Wet Loblolly Pine Forest". The overstory is sparse to moderately dense loblolly pine with an extremely dense understory of loblolly pine regeneration, switchcane, red maple, sweetgum and red bay. A few pines within the cluster exhibit thin crowns, probably a result of prolonged soil saturation. Insert cavities were provisioned in 2001 north of the existing natural cavity trees in a dense stand of Successional Wet Loblolly Pine Forest.

Cluster TYR 23 was not detected until 2000 and was occupied by a potential breeding group from 2000-2002. TYR 23 was 1 of 3 groups on P3 to nest in an artificial insert cavity in 2002. TYR 23 contains 7 cavity trees (#s 15236-237, 15283-284 and 53-54A) and has 3 quality cavities (#s 15236 and 53-54A) (**Attachment A)**.

Proposed Management Strategy

Wet conditions near the natural cavity trees within the cluster may limit access of certain equipment and timber management activities. However, in the vicinity of the artificial cavity trees, a reduction in the pine basal area is recommended to prevent future stand-killing SBP outbreaks. Timber Sale #7 , completed in Fall 2000 removed 25? acres adjacent to the Albemarle Sound. This cluster should be inspected routinely for signs of SPB infestation due to its proximity to the Sound.

TYR 25

The natural community type for this cluster was most likely Nonriverine Wet Hardwood Forest. Past logging practices have drastically altered the site and it would be classified now as Successional Wet Loblolly Pine Forest. A sparse overstory of loblolly pines and a dense understory of loblolly pine regeneration, various oak species, wax-myrtle, red maple, red bay, groundsel-tree, switchcane and sedges are found throughout the cluster. Standing water surrounds scattered hummocks. A SPB outbreak occurred within this cluster during 2002. Heavy rains in August and September, combined with the remote location of this cluster prevented SPB control through timber harvest.

Cluster TYR 25 was not detected until the aerial survey conducted in 2000. A breeding group occupied this cluster during 2000- 2002. TYR 25 contains 7 cavity trees (15251, 15253-257 and 52A) and has 4 quality cavities (#s 15251, 15253, 15255 and 52A) (**Attachment M**).

Proposed Management Strategy

Cavity trees are widely distributed within this cluster. Two cavity trees, 52 A and 15251, located a distance from the nest cavities of 2000-2002, need to be monitored for breeding activity. Difficult access limits management options within this cluster. Current pine density within the partition, low prior to the SPB kill, may limit timber management once remaining foraging habitat is recalculated. Provisioning of additional cavities is not necessary at this time.

TYR 26

The natural community type for this cluster was most likely Nonriverine Wet Hardwood Forest, mixed with upland stands of Tomotley soils supporting pines. Past logging practices have drastically altered the site and it is now "Successional Wet Loblolly Pine Forest". A sparse overstory of loblolly pines with a dense understory of loblolly pine regeneration, various oak species, red maple, red bay, sweetgum groundsel-tree, blueberries and switchcane are found throughout the cluster. Standing water surrounds scattered hummocks.

Cluster TYR 26 was not detected until the 2000 aerial survey. It was occupied by a potential breeding pair from 2000 to 2002. The nest tree for 2002 died as a result of SPB infestation, however, the SPB outbreak was contained to a small portion of the cluster. TYR 26 contains 5 cavity trees (#s 15245, 15247-248 and 15285) and has 3 quality cavities (#s 15245, 15247 and 15285) (**Attachment N**).

Proposed Management Strategy

Many of the pine trees within cluster TYR 26 possess weak crowns and appear stressed. Selection of a replacement stand should be pursued in the event other cavity trees begin to decline. Sparse pine density throughout this cluster does not allow a reduction in the pine basal area.

TYR 42

Remote portions of this cluster, encircled by deep swales, occur in Nonriverine Wet Hardwood Forest, which grade into Nonriverine Swamp Forest. This area has a dense loblolly pine overstory with a hardwood sub-canopy. Midstory species include swamp hardwoods, red bay and sweet bay. Swamp loosestrife is abundant in shallow, flooded areas. Fetterbush, sweet pepperbush and greenbriar occur in the understory. Insert cavities were provisioned in a stand west of the natural cavity trees that would be typed as Wet Pine-Hardwood Forest. Twenty-one acres were removed in 2002 to control various SPB outbreaks adjacent to this cluster.

This cluster was not detected and determined to be a separate group until 2000. A breeding group occupied the cluster in 2001-2002. TYR 42 contains 4 cavity trees (#s 15262, 55-56A and an untagged tree) and has 4 quality cavities (#s 15262(2), 55A and 56A)(**Attachment M**).

Proposed Management Strategy

Timber management options are limited as much of the allotted forage for this cluster lies off-property. Understory control in the immediate area of the cavity trees should be implemented by hand. The existing basal area should be maintained near the cavity trees, however, thinning the area between the cluster and recent SPB removal may reduce potential SPB outbreaks. Adequate foraging habitat may not be present to allow for removal of additional pines.

Recruitment Clusters

The 9 recruitment clusters are classed into 2 categories. The first are clusters that possess inactive or relic cavity trees within their foraging partition (TYR 27, 28, 32 and 35). Provisioning may occur near these natural cavity trees or within suitable recruitment stands if logistical constraints prevent the former. The second are clusters that when, based on adequate habitat, were allocated as recruitment or "experimental" clusters (TYR 34, 36, 37, 38 and 39).

TYR 27

TYR 27 contains 4 relic cavity trees identified in aerial surveys and 1 inactive tree found to contain a great-crested flycatcher (*Myiarchus crinitus*) nest in 2000 (**Attachment C**).

Proposed Management Strategy

TYR 27 has been assigned foraging habitat and will be managed as a recruitment cluster. Management strategies will be developed for this cluster prior to undertaking any proactive measures (such as provisioning) for RCW recruitment.

TYR 28

This is a relic cluster in which a recruitment stand has yet to be identified. Cluster TYR 28 contains 6 relic cavity trees identified in aerial surveys (**Attachment I**).

Proposed Management Strategy

TYR 28 has been assigned foraging habitat and will be managed as a recruitment cluster. Management strategies will be developed for this cluster once a recruitment stand is identified.

TYR 32

This is a relic cluster which a recruitment stand has yet to be identified. TYR 32 contains 2 relic cavity trees identified in aerial surveys (**Attachment B**).

Proposed Management Strategy

TYR 32 has been assigned foraging habitat and will be managed as a recruitment cluster. Management prescriptions for this cluster will be developed once the recruitment stand is selected.

TYR 34

Cluster TYR 34 is a proposed recruitment cluster with no existing natural cavities (**Attachment K**).

Proposed Management Strategy

TYR 34 has been assigned foraging habitat and will be managed as a recruitment cluster. Management strategies will be developed once the recruitment stand is selected.

TYR 35

TYR 35 is a relic cluster that contains 1 relic cavity tree identified in aerial surveys (**Attachment N**).

Proposed Management Strategy

TYR 35 has been assigned foraging habitat and will be managed as a recruitment cluster. Management strategies will be developed once the recruitment stand is selected.

TYR 36

TYR 36 is a recruitment cluster with no existing natural cavities. Natural community type is altered Wet Pine-Hardwood Forest. TYR 36 has a moderately dense loblolly pine overstory with a moderately dense hardwood midstory. The dense understory is mostly switchcane, red bay and hardwood saplings. Two insert cavities (65A and 66A) were provisioned in recruitment Cluster TYR 36 in November 2001 (**Attachment N**). Additional cavities will be provisioned in older pines north of the insert cavities that will support drilled cavities.

Proposed Management Strategy

Midstory and understory management should be the priority here. Hand clearing of midstory hardwoods should be sufficient for the establishment of the recruitment cluster. Emergency SPB harvest cleared 29 acres northeast of the cavity trees in 2002; inadequacies in foraging habitat may prevent future timber management.

TYR 37

This recruitment cluster is situated within a stand thinned during 2001 (Timber Sale # 9). The habitat within the cluster has been drastically altered and would be categorized as Wet Successional Loblolly Forest. Present is a moderately dense overstory of loblolly pine with no midstory and a variety of disturbance related species in the understory. The area north of the cluster center has been burned within the last 10 years, which significantly suppressed the understory. Cavity tree 71A was provisioned in February 2002, however, it remains screened. **(Attachment E).**

Proposed Management Strategy

Sufficient amounts of old-growth pines exist here to allow for construction of drilled cavities and starts. Maintenance of understory should be a priority. A regime of prescribed fire every 3-5 years would be the preferred method of understory suppression. Proximity to the Albemarle Sound make this cluster especially vulnerable to SPB infestation, as there have been recent SPB outbreaks in areas near this cluster. Although the recent pine thinning should reduce the SPB risk, periodic surveys for infestations should be conducted.

TYR 38

TYR 38 is a proposed recruitment cluster with no existing natural cavities **(Attachment L)**.

Proposed Management Strategy

TYR 38 has been assigned foraging habitat and it is questionable if it can support a recruitment cluster. 71 acres were cut for SBP emergency harvest in summer 2002. If provisioning occurs within a selected recruitment stand, management prescriptions for this cluster will be developed.

TYR 39

This is a relic cluster for which habitat information is not available. TYR 39 contains 1 relic cavity tree identified in aerial surveys **(Attachment O)**.

Proposed Management Strategy

Cluster TYR 39 has been allotted foraging habitat and will be managed as a recruitment cluster. Management prescriptions for this cluster will be developed once the recruitment stand is selected

Relic (historic) clusters

TYR 29

TYR 29 contains 5 relic cavity trees identified in aerial surveys. TYR 29 is not being managed and hence has no allocation of foraging habitat.

TYR 30

This is a relic cluster for that contains 2 relic cavity trees identified in aerial surveys. TYR 30 is not being managed and hence has no allocation of foraging habitat **(Attachment F)**.

TYR 31

This is a relic cluster that contains 1 relic cavity tree identified in aerial surveys. TYR 31 is not being managed and hence has no allocation of foraging habitat **(Attachment K)**.

TYR 33

This is a relic cluster that 33 contains 1 relic cavity tree identified in aerial surveys. TYR 33 is not being managed and hence has no allocation of foraging habitat **(Attachment K)**.

Off-Property Clusters

TYR 40

Cluster TYR 40 is not on P3 property and has not been monitored or managed as part of the P3 population. Cluster and group status during the period from 1999 to 2002 is unknown. TYR 40 contains 5 known cavity trees **(Attachment J)**.

Proposed Management Strategy

Physical acquisition of the property should be pursued by the P3 Management Committee. If acquisition is not feasible, a cooperative agreement should be proposed to the landowner that would allow the cluster to be monitored and managed. The cluster may then be used as a mitigation credit by NCDOT and could be applied towards the P3 population goal, as well as contribute to the recovery effort in northeastern North Carolina.

TYR 41

This cluster is not located on P3 property and subsequently has not been managed as part of the P3 population. Based on observations obtained in 2001 by JCA personnel, TYR 41 contained a breeding group. Cluster and group status in 1999, 2000 or 2002 was unknown. TYR 41 contains 4 known cavity trees; data on the number of quality cavities is lacking **(Attachment J).**

Proposed Management Strategy

Physical acquisition of the property should be pursued by the P3 Management Committee. If acquisition is not possible, development of a cooperative agreement with the current landowner should be initiated. The agreement should propose the cluster to be monitored and managed, which might provide to NCDOT a potential mitigation credit.

XIII. Impacts of management on other species of concern. All management activities and practices will be consistent with the conservation of other federal candidate and listed species. The 3 animal species listed below occur or are likely to occur on P3 and could be affected by RCW management activities. Effects on State-listed species are not evaluated at this time.

1. **American alligator** (*Alligator mississippiensis*).

   Status- Threatened by Similarity of Appearance.

The American alligator inhabits freshwater swamps, ponds, lakes, marshes and backwaters of large rivers (Martof et al. 1980). The range of the American alligator covers the coastal states from North Carolina to Texas, occasionally north to Arkansas and Oklahoma. Nests are built on the ground by mounding vegetation (Strawn 1997). Alligators feed on crustaceans, birds, fish, mammals, turtles and snakes (Mount 1975).

This species has been reported in the waterways within P3 and along the Alligator River. Habitat alterations caused by RCW management activities will not adversely affect the alligator. Burning and thinning will increase populations of small mammals and white-tailed deer (*Odocoileus virginianus)*, which will increase the prey base available to this species. Likely alligator nesting sites are outside intensive management areas on P3.

2. **Bald eagle** (*Haliaeetus leucocephalus*).

   Status –Threatened.

The bald eagle occurs throughout the lower 48 United States, and in Alaska and Canada, inhabiting mature conifer forests close to clean bodies of water populated by fish, most often along coasts, rivers and large lakes. During migration it may occur anywhere, but is most often found around large bodies of water.

Bald eagles usually first breed at age 4-5 years and may mate for life. Nesting season for the species in the southeast United States is usually from mid-December through June. A typical nest consists of large sticks lined with softer materials such as weeds, grasses and sod. A nest may be reused and added to for years and can become quite large, measuring 6 to 8 feet across and up to 11 feet deep. Eagle nests are normally built in tall conifers that tower above the surrounding forest and are located near water.

Typically the nest trees are dominant live pines or cypress trees that provide a good view and clear flight path. Eagles usually lay 2 eggs (1-3) and incubation typically takes 34-38 days. The young fledge approximately 9 to 14 weeks after hatching. Eagles may live up to 30+ years in the wild and often return to within 100 miles of their birthplace to nest. Its diet consists mainly of fish, but it also feeds on birds, mammals and carrion (Kaufman 1996).

Ideal habitat exists for bald eagles on P3 due to its proximity to vast expanses of water such as the Albemarle Sound and the Little Alligator River. Two known active eagle nests were documented in 2002 (**Figure 3**).

RCW management on P3 could affect eagle nesting habitat. Pursuant to Section 9 of the Endangered Species Act (ESA), certain disturbances could qualify as harassment and may result in the potential incidental taking of the nest and eagles. The *Habitat Management Guidelines for the Bald Eagle in the Southeast Region* recommends that no logging, road building or use of toxic chemicals occur within a 750 foot buffer (primary zone) around an active eagle nest (USFWS 1987). The "secondary zone" is defined as a protected area extending from the boundary of the primary zone. Year-round restricted activities in the secondary zone include new commercial and industrial sites and high density housing developments. These activities are not factors at P3, nor are they likely to be in the future. More likely to occur would be recreational activities such as fishing, camping, picnicking, hunting, off-road vehicle use, hiking and bird watching. These are permitted year round in the secondary zone. Other construction activities may take place within the secondary zone during the non-nesting season (USFWS 1987).

To avoid any disturbance of eagle nesting, all eagle nests on P3 will be located and mapped. Nest sites will be protected and logging within 750 feet of known nests will not be conducted between 1 December and 30 June.

3. **Red wolf** (*Canis rufus*).

Status- Endangered.

The red wolf is a large canid measuring 4.5 to 5.5 feet in length and weighing 35 to 90 pounds (Webster et al. 1985). It requires large amounts of habitat and occurs in swamps, marshes and uplands. It was historically extirpated in North Carolina, but has been successfully reintroduced on lands around the Alligator River.

The red wolf is known to inhabit Alligator River National Wildlife Refuge across the Alligator River from P3 and has been reported on the southern portion of P3 (Karen Beck, pers. comm.). No wolves are thought to currently reside on P3 (ibid). Due to the transitory nature of occurrence on P3, the red wolf will not be affected by the implementation of RCW management activities.

4. **Endangered or Threatened Flora**

No federally listed plants are known to occur within Tyrrell County, however, a comprehensive survey has not been conducted on the Preserve. A number of significantly rare plants have been documented in Tyrrell County, designated by the North Carolina Natural Heritage Program.

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