SERPPAS RED-COCKADED WOODPECKER TRANSLOCATION PROJECT
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Introduction

Translocations have been part of the recovery effort for the federally endangered red-cockaded woodpecker (RCW) since the late 1980s (Costa and Kennedy 1994, Hess and Costa 1995). This management tool involves moving RCWs, typically subadult birds, to new locations within or between populations for the purpose of augmenting a single bird group or establishing a new group. Inter-population translocations (hereafter "translocations") are conducted between donor populations and recipient populations using criteria presented in the Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: *Second Revision* (Recovery Plan) (U.S. Fish and Wildlife Service 2003).

According to the Recovery Plan, populations qualify as donors when they satisfy one or more of the following criteria: (1) populations that have reached the size for delisting and are growing or stable, (2) stable or increasing populations of 100+ active clusters, (3) populations of 50+ active clusters growing at 3% annually and within 75% of their population goal, or (4) populations that have met their property goals. Recipient populations must have a population goal of at least 10 active clusters, have fewer than 30 potential breeding groups (PBGs), and satisfy specific habitat criteria. The importance of translocations in saving small, fragmented, and at-risk populations from extirpation has been clearly demonstrated (Rudolph et al. 1992, Haig et al. 1993, Brown and Simpkins 2004, Hedman et al. 2004, Morris and Werner 2004, Stober and Jack 2004) as well as its effectiveness in reintroducing RCWs into new habitats within its historic range (Hagan and Costa 2001, Hagan et al. 2004). However, the demand for birds from recipient populations has remained higher than the supply from donor populations (Saenz et al. 2002, Costa and DeLotelle 2006).

In 1998, the Southern Range Translocation Cooperative (SRTC) was created to coordinate the distribution of the limited number of RCWs available for translocation in the southeastern portion of the species range. An annual SRTC meeting in Tallahassee, Florida allocates available RCWs in a modified version of the alternating model described by Saenz et al. (2002). Birds are translocated

in groups of 3-5 unrelated, subadult pairs to recipient properties on an alternate year schedule. Although this system may not be the most efficient model for attaining the largest number of RCW groups over the least amount of time, it is one of the better models for balancing population recovery with the prevention of local extirpation (Saenz at al. 2002). This system also allows land managers a predictable schedule in which to prepare recruitment clusters and foraging habitat for anticipated birds.

The SRTC originally consisted of RCW populations from Florida, Georgia, Alabama, and Mississippi. In 2008, with funding from the Southeast Regional Partnership for Planning and Sustainability (SERPPAS), the SRTC expanded to include North Carolina and South Carolina. The original SERPPAS translocation partnership was formed with the Department of Defense (DoD), U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), Clemson University (CU), University of Georgia Athens (UGA), and state agencies and organizations from Florida, Georgia, Alabama, North Carolina and South Carolina (see Table 1). The goal of the SERPPAS biologist positions is to speed up recovery efforts at recipient properties by providing additional RCWs to the SRTC and ultimately bring the RCW closer to delisting. Along with the regional expansion of SRTC, three translocation biologist positions have been established. The new SRTC donor sites are the Osceola National Forest (ONF) in Baker and Columbia County, Florida, the Francis Marion National Forest (FMNF) in Charleston and Berkeley County, South Carolina and, in 2010, Eglin Air Force Base (EAFB) in Okaloosa, Walton, and Santa Rosa County, Florida.

Table 1. Partners in the 2008 - 2010 SERPPAS red-cockaded woodpecker translocation project.

Agencies
Federal
Department of Defense[1]
U.S. Army[1, 2]
Eglin Air Force Base[2]
U.S. Forest Service
U.S. Fish and Wildlife Service
State
South Carolina Department of Natural Resources
Florida Fish and Wildlife Conservation Commission[1]
Georgia Department of Natural Resources[1]
Alabama Department of Conservation and Natural Resources[1]
North Carolina Wildlife Resources Commission
University of Georgia Athens
Clemson University

[1] Provided biologist funding
[2] Became involved in 2010

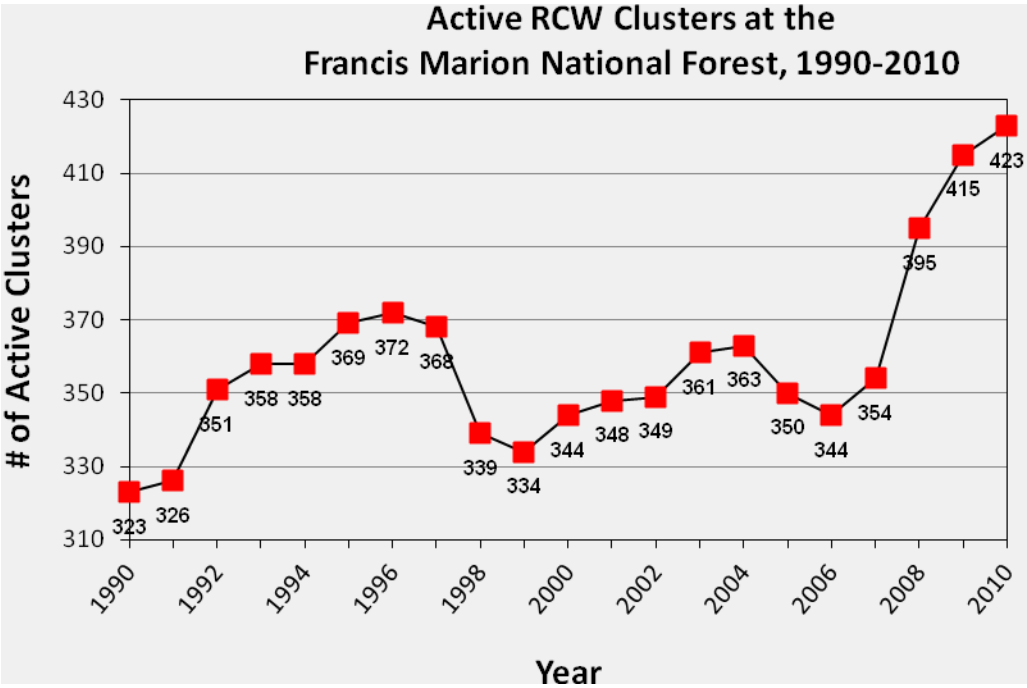
Donor Sites

Francis Marion National Forest

The FMNF is located in the Mid-Atlantic Coastal Plain Recovery Unit (N33 7', W79 41'). This 104,813 ha (259,000 ac) property is managed by the USFS, with 65,508 ha (161,875 ac) currently under RCW management. The forest supports the third largest RCW population in the United States and is one of 13 designated primary core recovery populations (USFWS 2003). Prior to 1989, the RCW population exceeded 475 groups and was expanding. During the 1970's and 80's, the FMNF supported the second largest and only documented naturally increasing population of RCWs (Hooper et al. 1991). However, when hurricane Hugo made landfall on the South Carolina coast in 1989, approximately 63% of the population was lost. The hurricane destroyed 87% of the cavity trees and 59% of the foraging habitat across the forest. Approximately 59% of pine trees greater than or equal to 25 cm (10 in) diameter at breast height were destroyed by Hugo (Hooper et al. 1990, Watson et al. 1995).

Due to aggressive habitat management, more frequent prescribed fires and installation of over 2,700 artificial cavities, the RCW population has rebounded dramatically and, in 2008, surpassed its recovery goal of 350 PBGs. The population goal is to maintain 450 active clusters; currently there are 423 active clusters (see Figure 1).

Figure 1. Population trend (number of active red-cockaded woodpecker clusters) on the Francis Marion National Forest from 1990-2010.



A third of all clusters on the FMNF are monitored annually as part of a separate forest-wide project. Based on this annual monitoring data, the RCW population has shown a marked increase since 2006

(see Figure 1). As of January 2011, there were approximately 411 PBGs, 12 solitary groups and 61 inactive clusters on the FMNF.

Although systematic surveying of suitable habitat is not possible at this time, pioneer clusters are regularly located by timber cruisers, the fire crew or biologists during the course of their normal field activities. The rate of increase has slowed but the increase is expected to continue as habitat management practices are consistently implemented. Artificial recruitment clusters are routinely installed where possible. However, the limitation for recruitment cluster establishment is locating large enough cavity trees within suitable habitat to fill gaps in the landscape unoccupied by RCWs.

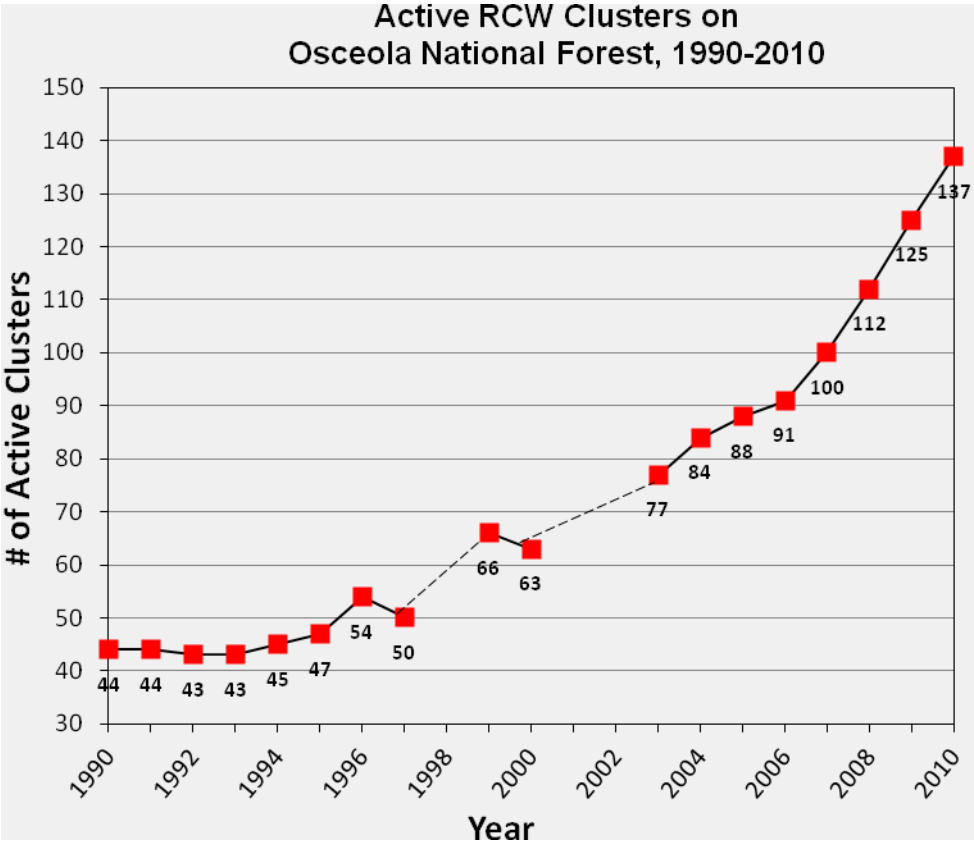
Prescribed burning is likely the single most important cultural treatment utilized on the FMNF. Since 1997, the FMNF has burned approximately 12,995 ha (32,000 ac) annually with 13,682 ha (33,795 ac) burned in 2010 alone. Since Hurricane Hugo, most timber harvesting has consisted of biomass removal and small timber thinning. The FMNF typically masticates approximately 150 acres of biomass and selectively thins approximately 1,215-1,619 ha (3-4,000 ac) annually in order to improve habitat for the RCW and other threatened and endangered species. However, during 2010, approximately 263 ha (650 ac) were masticated on the FMNF, significantly improving RCW habitat.

Osceola National Forest

The ONF is located in the South Atlantic Coastal Plain Recovery Unit (N30 20', W82 25'), 10 miles east of Lake City, Florida. This 95,641 ha (236,334 ac) property is managed by the USFS, with 37,393 ha (92,400 ac) currently under RCW management. RCW management consists of prescribed burning, understory vegetation mowing and an aggressive program of installing 10-20 recruitment clusters annually to provide a constant supply of 30-40 available territories for dispersing birds. The size of the ONF RCW population allows complete monitoring of all known clusters.

From 1980 through the 1990's the ONF RCW population showed a relatively stable trend with little growth as the number of active clusters fluctuated between 43 and 66 (Engstrom et al. 2000). Since 2000, the population has been rapidly increasing (see Figure 2), but there has been an inconsistent history of population monitoring and banding. For several years prior to 2000, population monitoring including some banding was conducted. However, these activities were discontinued after the 2000 breeding season. Monitoring RCW breeding without banding was then resumed in 2005. In 2007, the ONF reached 100 active clusters (97 PBGs) making it eligible as a donor population with an objective of contributing 20 birds to the SRTC annually. With the establishment of the SERPPAS biologist position in 2008, RCW banding and more extensive monitoring began for the purpose of translocation. In the 2008 breeding season, the ONF had 112 active clusters, of which 103 were PBGs. By the 2010 breeding season, the ONF grew to 137 active clusters (117 PBGs), and contained an additional 26 inactive clusters/recruitment clusters, for a total of 163 RCW clusters. From 2005 to 2010, this population grew at an average annual rate of 11%. The ONF has a projected carrying capacity of 462 active clusters and will be considered recovered when the Osceola/Okefenokee Primary Core Recovery population reaches 350 PBGs (USFWS 2003).

Figure 2. Population trend (number of active red-cockaded woodpecker clusters) on the Osceola National Forest from 1990-2010.



As part of the ONF's RCW habitat management plan the USFS has a prescribed burning goal of 11,330 ha (28,000 ac) annually. Burning in recent years has fallen short of the goal with only 7,618 ha (18, 824 ac) burned in 2008 and 6,074 ha (15, 010 ac) burned in 2009. However, in 2010 the annual goal was exceeded with a total of 13,952 ha (34,475 ac) receiving prescribed fire. One of the challenges facing the ONF is burning along a major interstate (I-10) which transects the forest. Areas along the I-10 corridor have a very dense understory after decades of fire suppression and lack of prescribed fire. Mowing is being used to manage some of these areas and restore them for fire application. In 2009 and 2010, 642 ha (1,586 ac) and 2,656 ha (6,562 ac) of RCW habitat were mowed, some of which has since been burned.

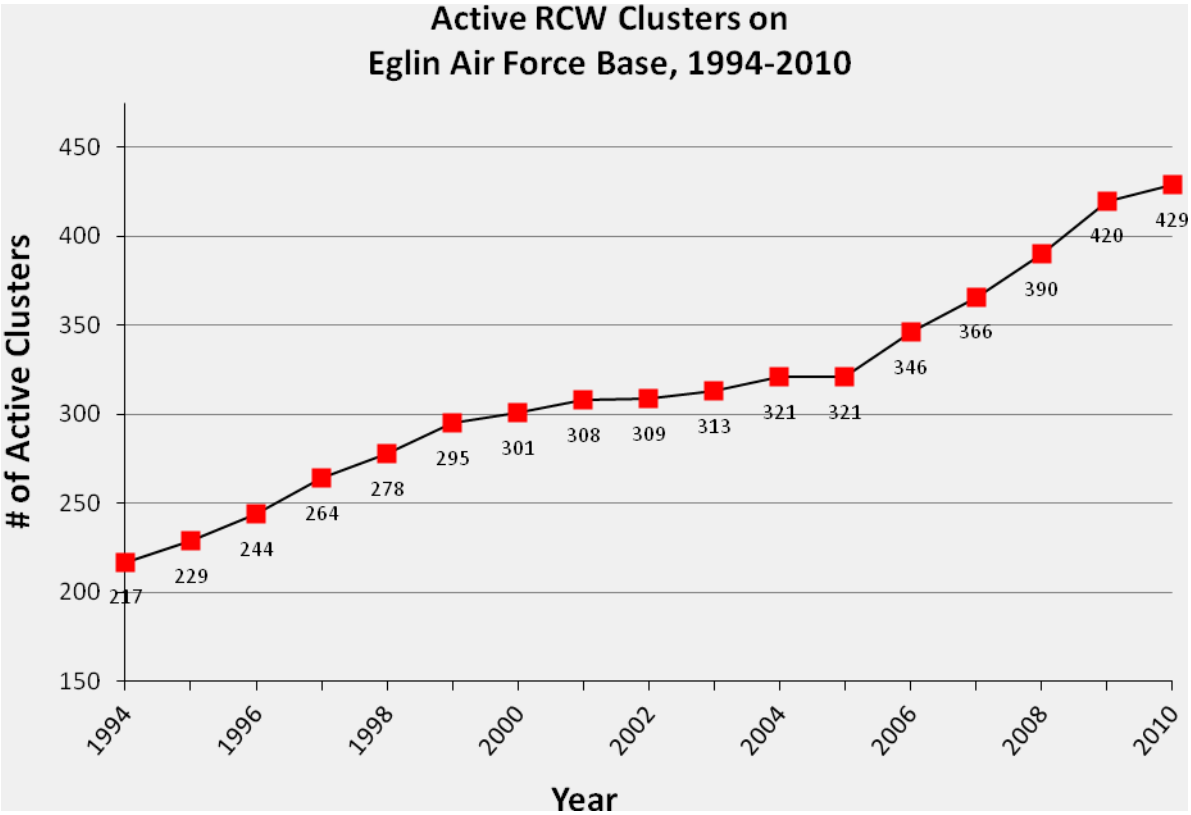
Eglin Air Force Base

EAFB is an 187,515 ha (485,000ac) installation located in the East Gulf Coastal Plain Recovery Unit. The RCW population is split into eastern and western sub-populations by two major highways with the higher concentration of clusters located on the western side of the installation (319 of their 392 PBGs). The installation boasts one of the most successful and intensive fire management programs in the southeastern U.S. with an annual goal of applying prescribed fire to

90,000 acres. EAFB's Fire Management Department exceeded this goal each of the past three years including over 120,000 acres of fire-dependant uplands burned in 2010 (B. Williams, pers. comm.).

EAFB is a primary core recovery population (USFWS 2003) and, in 2008, reached its established recovery goal of 350 PBGs. EAFB expects to reach its installation population goal of 450 PBGs by 2014 (K. Gault, pers. comm.). This large and stable population has experienced steady growth since 1994 with an increase of 33% over the past 6 years (see Figure 3). This year, the population experienced a lower average percent growth (2%) as it approaches carrying capacity, reaching 429 clusters and 392 PBGs in 2010.

Figure 3. Population trend (number of active red-cockaded woodpecker clusters) on Eglin Air Force Base from 1994 – 2010.



EAFBs Jackson Guard began surveying its RCW population in 1992. Since that time, monitoring strategies have changed based on changes in management and monitoring needs. Due to staff limitations, in 1995 EAFB contracted Virginia Tech University (VT) to conduct the field monitoring work for the RCW population, including banding nestlings and adults in designated plots (areas) on the installation (K. Gault, pers. comm.). Upon reaching recovery in 2008, EAFB's Jackson Guard (including the VT component) shifted focus away from intense RCW population monitoring to concentrate on other areas of wildlife and habitat management. Currently, Jackson Guard conducts annual activity checks on all active clusters, vacant recruitment clusters, and

recently inactive clusters. One-fourth of the clusters not being monitored by either VT or the new SERPPAS biologist will be visited annually to determine group composition (K. Gault, pers. comm.).

EAFB is mandated by the USFWS to maintain a minimum of 3 suitable cavities in each active cluster. However, unlike the FMNF, EAFB does not routinely install artificial cavities to enhance existing clusters outside of this requirement. Like the FMNF and the ONF, EAFB installs artificial recruitment clusters where possible but they do so only to augment their smaller, eastern subpopulation. In order to augment the smaller eastern subpopulation and ensure that it remains stable in the case of stochastic events and military mission impacts, Eglin will continue to conduct intra-population translocations to available recruitment clusters on that side. VT field technicians working on EAFB continue to band a subset of approximately 40 clusters annually in order to facilitate these translocations (K. Gault, pers. comm.).

Although EAFB contributed 1-3 pair of RCW on average to the SRTC annually over the past decade, neither Jackson Guard nor VT staff will continue to directly facilitate inter-population translocations. With the expansion of the SRTC donor program (via SERPPAS) to EAFB in 2010, 115 clusters were identified in the large, stable western subpopulation for banding and monitoring by the new SERPPAS biologist to initiate the translocation of 10 pair of birds annually.

Project Objectives

The duties of the SERPPAS biologists are to monitor and identify surplus RCWs for the translocation effort. Specifically, at each donor population the following are conducted:

a) Monitor 100+ RCW groups during the nesting season
b) Band all nestlings of the 100+ groups producing nestlings
c) Conduct roost cavity checks for all eligible subadults fledgling from 100+ groups
d) Trap and translocate 20 subadult RCWs from the pool of 100+ groups monitored

Project Update 2010

Methods

Monitoring for RCW breeding in pre-selected groups began in mid-April for all three donor populations. Active clusters were visited weekly to inspect cavity trees for evidence of a nest or nest preparation. Active cavities were determined by fresh chipping on the bark of the tree and recent resin flow (Hooper et al. 1980). Evidence of nesting included fresh wood chips lining the bottom of the cavity or the presence of eggs or nestlings. Nest searching on the ONF and EAFB was conducted using a Tree Top Peeper IV ™ wireless video inspection system (by Sandpiper Technologies, Inc.) on a 15 m (50 ft) Hastings fiberglass extension pole. Nest searching on the FMNF was conducted using a Cavity Spy video inspection system (designed and manufactured by Wildlife Investigations, LLC). These pole-mounted video camera systems allowed remote visual examination of the interior of the cavity to assess nest cavity contents.

When a nest was located, it was visited weekly to determine clutch size and age of chicks. Banding was scheduled when chicks were 7-10 days old. Swedish climbing ladders were used to access the nest cavity and chicks were extracted using a noose made of pliable tubing fitted with monofilament loops (Jackson 1982). Chicks were banded with a U.S. Geological Survey aluminum band and a unique color band combination (5 bands; 2 on one leg w/USGS band, 3 on the other leg) to allow later identification with a spotting scope. Nests were revisited when chicks were approximately 21 days old to determine sex of nestlings (pre-fledge checks) using the video cameras. In the event of nest predation or a complete nest failure, nest searching resumed until the birds re-nested or until July 1 (ONF and EAFB only; see FMNF below).

RCW groups were followed post-fledging to obtain data on the number of chicks successfully fledged, the sex of individual fledglings and group composition. Selected groups were revisited during dawn and/or dusk to determine the roosting cavity of subadult RCWs. All female subadults found roosting in their natal territory were considered suitable candidates for translocation. Since male RCWs may remain in their natal territories as helpers and increase fledgling success (Lennartz et al. 1987, Walters 1990), subadult males were not translocated from their cluster unless at least one additional non-breeding male was present, in addition to the breeding male.

Translocations were conducted in the fall within the recommended window of September 15-January 1 (USFWS 2003). In most cases, staff and equipment from recipient populations arrived several days in advance of the capture to assist with the translocations. The SERPPAS biologist supplied information on forest orientation, roosting locations of candidate subadults, RCW cluster maps, RCW group composition, and additional equipment and volunteers. All captures were conducted during evening roosting. After a targeted RCW entered its roost cavity, a net on a pole was placed over the cavity entrance. Once the bird flushed into the net it was removed and placed in a transport box. The birds were transported at night and secured in recipient cavities on the evening of their capture. However, birds travelling an extended distance by vehicle were transported the day after capture, hand-fed during the daytime and placed in recipient cavities approximately 24 hours after their capture. All birds were released at sunrise the morning following their placement.

Francis Marion National Forest

Of the over 400 clusters on the FMNF, the SERPPAS biologist has attempted to routinely monitor the same 102 clusters annually for the purpose of translocation. These clusters were selected based on several factors including previous years' breeding results, ease of access, number of suitable cavities, past breeding history, group size, and spatial location within the forest. The clusters chosen were distributed evenly across the forest so that all quadrants of the forest contained numerous clusters to monitor. As the breeding season progressed, clusters that had a nest depredated or did not nest by approximately mid-May were dropped from monitoring while other clusters were added (from a different forest-wide cluster monitoring project) to ensure that a minimum of 100 RCW nests had their nestlings banded.

Osceola National Forest

In the 2010 breeding season, the status of 158 of the 163 clusters on the ONF was evaluated in late March and early April to determine activity; 5 were not checked due to issues with accessibility or known inactivity. Of the 158 clusters checked, a subset of 115 was selected by the SERPPAS biologist for breeding season monitoring. Two of the clusters produced new groups via budding resulting in an additional two groups in the subset (for a total of 117 groups monitored). The remaining 46 clusters were periodically visited by the USFS biologist. Although the nesting data for the 117 groups is not reflective of the entire Osceola RCW population, only 2 of the 46 groups checked by the USFS had PBGs, one of which bred but had issues with accessibility.

Eglin Air Force Base

This season (2010) marked the first for RCW monitoring at EAFB in support of this project. Prior to project initiation, the lead wildlife biologist for EAFB's Natural Resources Department (Jackson Guard) selected 115 active RCW clusters for monitoring by the SERPPAS translocation biologist. The SERPPAS biologist did not have any input into the 115 clusters chosen in 2010. Selection was based on ease of access in relationship to regularly scheduled military training missions. The initial pre-breeding season survey of the clusters (conducted in March) quickly highlighted significant differences between the Eglin population and other donor populations in the southeast. Five clusters were immediately eliminated for logistical reasons including inaccessibility by foot or issues due to unmanageable size and additional access limitations. One cluster was added to the sample and the remaining 111 clusters were monitored for translocation purposes. During initial cluster checks, 3 clusters became inactive and 6 were determined to be captured by a neighboring group. The remaining 102 groups contained PBGs and were monitored for nesting. Due to complications experienced during the translocation events in 2010, a number of the monitored clusters were determined to be unsuitable from a translocation perspective. Therefore, the SERPPAS biologist will work closely with Jackson Guard to decide on a more appropriate and manageable sample of clusters for monitoring in 2011.

Results

Francis Marion National Forest

Following a severe winter, the translocation clusters had slightly smaller group and brood sizes, with a higher percentage of females fledging than in previous years (see below; 57% vs. 52% in 2009). During 2009, only one of the translocation clusters did not have at least one helper. However, in 2010 at least 7 clusters did not have a helper. Several groups initiated nests earlier than in previous seasons with the earliest banding dates being 3-4 days earlier than in the past years. Also, the peak banding dates were not as clearly defined as in previous breeding seasons with the daily number of nests scheduled to band being spaced more evenly throughout May rather than most banding taking place the third week of May.

A total of 186 RCW nestlings were banded in 101 nesting attempts from 102 groups that were monitored. For the 102 groups monitored an average group size of 3.27 (N=50) was estimated. Within these 102 RCW groups, 7 initial nest attempts failed, 9 groups did not attempt a nest and 5

groups had clutches that did not hatch. The nestlings of 3 re-nests were successfully banded while 4 groups had nests that failed during the second attempt. Of all nestlings, 184 reached 21 days old and these were assumed to have fledged. For groups that fledged young, an average of 2.1 nestlings fledged/nest (n=88). For fledglings that were able to be sexed, 57.1 % were females (n=101) and 42.9% (n=76) were males). During pre-fledge nest checks, 32 nests had either a lone nestling of known sex or all nestlings were the same sex. These clusters were not re-visited for post-fledge checks. The remaining clusters were re-visited post-fledge to assign a sex to the band combination of the banded birds.

During the fall translocation period 1-3 clusters were re-visited most mornings and evenings from September through October. During this period 52 banded fledglings were re-sighted in 49 clusters. Of these 52 fledglings, 37 were found to have a roost cavity and were listed as potential candidates for translocation.

For the 2010 translocation season, 10 male and 10 female subadult RCWs were removed from the FMNF. The U.S. Army Garrison Fort Jackson (Richland County, SC) received 4 pairs on October 6 and 2 pairs on October 21. The USDA Forest Service (Aiken, Barnwell and Allendale counties) received 2 pairs on the U.S. Department of Energy-Savannah River Site on October 21. On the final move for 2010, the U.S. Air Force's Poinsett Electronic Combat Range (Sumter County, SC) received 2 pair on November 1. Recipient biologists reported successful release of all 20 RCWs.

Osceola National Forest

In 2010, 115 of the monitored groups were PBGs and 2 were single bird groups. One hundred ten groups bred and 99 reared chicks to banding age. Two groups lost chicks after banding (a combined loss of 4 chicks). One of these groups successfully re-nested, producing two fledglings. A total of 98 groups produced 198 chicks by the post-fledge check. Of the 198 pre-fledge nestlings, 44% were males (n=87), 51% were females (n=101) and 5% were of unknown sex (n=10). A total of 143 fledglings from 82 groups were observed during post-fledge checks.

The ONF population had a mean group size of 2.4 adult RCWs/active cluster in 2008. In 2009 this average went down slightly to 2.3 adults/active cluster. The population's group size continued to decrease in 2010 to 2 adults/active cluster. However, group size of the monitored subset remained at 2.3 adults. Groups which successfully nested (nestlings present at pre-fledge check) produced 2.0 nestlings/nest in 2010. This was the same nestling success as last year but the number of groups that successfully nested was notably higher in 2010 than in the last two years (n_{2008}=92; n_{2009}=85; n_{2010}=99).

During the 2010 translocation season, 24 subadult RCWs were removed from 21 groups on the ONF representing 12% of the population's annual recruitment. The first of three translocations began in early October. The Nature Conservancy's Disney Wilderness Preserve (Osceola and Polk Counties, FL) received 4 pairs of RCWs on October 8. Conecuh National Forest (Escambia and Covington Counties, AL) received 4 pairs on October 20 and a final 4 pairs were moved to St. Mark's National Wildlife Refuge (Wakulla, Jefferson and Taylor Counties, FL) on November 4. Recipient biologists reported successful releases of all 24 RCWs.

Eglin AFB

Of the 102 PBGs monitored in 2010, 71 nests with 141 nestlings were banded for an average of 1.99 nestlings banded per nest. One group was apparently infertile; 14 groups attempted to nest but their nests failed prior to nestling banding age and an additional 12 groups either did not attempt to nest or nested and failed undetected (likely between monitoring visits). Nest monitoring was suspended for 4 groups from late May to mid-September as the result of an unexploded ordinance (UXO) safety hazard; therefore, nesting status of these groups was undetermined. Only two groups experienced complete brood loss after banding and only one of those groups attempted to re-nest. Due to the UXO issue, the fate of the unmonitored nest was unknown.

Pre- and post-fledge checks yielded a total of 54 males, 64 females. The sex was undetermined on the remaining 23 banded individuals (due to absence at pre- or post-fledge check). Considering the numbers of adults present in each group and assuming a third adult in each group represents a male helper, only 33 males were potentially available for translocations in 2010. Due to the small number of males available for translocation and the logistical complications involved with roosting and capturing juvenile RCWs on EAFB (assuming a 25% success rate - typical results as described by Jackson Guard biologists given previous years' experience), the 2010 donation to the SRTC was reduced from the originally proposed 10 pair to 8 pair. However, five single females were available for translocation for a potential total of 21 birds.

The capture and translocation events were conducted on 3 consecutive Thursday evenings in October. Silver Lake Wildlife Management Area (Georgia Department of Natural Resources, Decatur County, GA) was allocated 3 pair plus 5 single females but complications during capture night resulted in a move of 4 pair and 3 single females. Conecuh National Forest (Covington County, AL and Escambia County, FL) was scheduled to receive 3 pair but only two pair was moved from EAFB. In anticipation of this predicted shortcoming, the SERPPAS biologist from Eglin coordinated with the SERPPAS biologist at ONF and arranged for ONF to send one more pair than originally allocated from the ONF to Conecuh NF on the same evening. Therefore, Conecuh NF received all birds promised by the SRTC's expanded donor program. Finally, two pair were successfully captured and translocated to Tall Timbers Research Plantation (Leon County, FL) as planned. In summary, 19 sub-adult RCWs (8 males and 11 females) were successfully captured at EAFB and moved to 3 recipient populations in 2010.

Table 2. Population and monitoring demographics of the new SRTC red-cockaded woodpecker donor sites 2010.

Population Demographics	Osceola NF	Francis Marion NF	Eglin AFB
Active Clusters	125	423	429
PBGs[1]	112	411	392
Average % growth (2006-2010)	6.7%	3.95%	3.9%
Monitored Clusters	115	102	111
Monitored PBGs	110	102	102
Birds translocated in 2010	24	20	19

[1]Potential breeding groups

Discussion

SRTC Contribution

FMNF and ONF have supplied a third of the RCWs to SRTC for the last two translocation years: 32% (20 of 63 pair) in 2008, 33% (22 of 69 pair) in 2009. With the addition of EAFB, the SERPPAS donor properties collectively contributed 63 RCWs (30 pairs and three single females) to SRTC in 2010, which represents 38% of the total birds donated (30 of 79 pair). These additional birds for SRTC recipient properties went a long way toward alleviating the supply shortage and even created the opportunity for new populations in the cooperative to receive birds. The influx of donor birds also allowed recipient properties that were not slated to receive birds to be allocated pairs while still remaining on the proposed list of recipients for the next year. These recipient populations who were able to receive birds during "off" years especially benefit from the SERPPAS donors since the accelerated rate of augmentation should bring them to 30 PBGs (and off the recipient list) ahead of schedule.

Translocation Success

The typical success rate of translocated RCWs varies depending on how "success" is defined, the type of translocation, and age of birds moved (Costa and Kennedy 1994, Franzreb 1999, Edwards and Costa 2004). Costa and Kennedy (1994) summarized 143 RCW translocations and reported a 50% overall success rate (n=71) using a wide range of terms for success (from translocated birds fledging offspring to remaining on site). The criterion for success most commonly used by the SRTC is the presence of the translocated bird on the property through the first breeding season after its release as either a breeder or potential breeder, solitary male or a helper (McDearman 2011). A recent report by McDearman (2011) summarizing SRTC RCW translocations from 2007-2009, including birds moved by SERPPAS biologists in 2008 and 2009, showed an average success rate of 59% (n=49). Using the criterion of success used by McDearman (2011) for this report, we can evaluate the first two years of SERPPAS translocations. However, the success of the 2010 translocation will not be discussed since evaluation of these birds will not occur until the breeding season of 2011. The results of the first translocations from EAFB and the third year of translocations from FMNF and ONF will be presented in next year's annual report.

The FMNF translocated 49 RCWs between 2008 and 2009. Of the 20 birds translocated in 2008, 60% were successful, which exceeded the regional (SRTC) 2008 success rate of 53% (McDearman 2011). In 2009, the FMNF birds experienced a lower-than-average success rate of 46%; the STRC average success rate for 2009 was 51% (McDearman 2011). Yearly variation is normal and both years were within reasonable range of the SRTC overall average.

The birds from the first year (2008) of ONF translocations experienced much lower success than the regional average (25% success rate versus the regional average of 53%). Goethe State Forest-North and Babcock/Webb Wildlife Management Area reported 0% and 16% retention respectively from the 2008 translocations. The Goethe SF-North subpopulation may have had poor retention due to habitat issues, recruitment cluster placement, and displacement of translocated birds by local RCWs (C. Pedersen, per. comm.). After the 2008 translocations, Babcock/Webb WMA had 4 of their 6 recruitment clusters occupied by local birds which may have displaced newly translocated birds (W.

Wilsdon, per. comm.). Despite poor retention of these ONF birds, the Babcock/Webb WMA RCW population showed continued growth in 2009. The other two recipients of ONF birds in 2008 (Ocala NF and Bull Creek/Triple N Ranch) experienced 50% retention which is on par with the SRTC average.

In 2009, results were unavailable for the Picayune Strand State Forest population and therefore ONF's average success rate for the year is undetermined until Picayune data is obtained. However, ONF birds experienced higher-than-average success at Goethe State Forest-South with reports of an 83% retention in birds (up from 0% reported in the 2008 translocations to their northern population). The 3 pairs translocated in 2009 were moved to Goethe's southern subpopulation which has shown better response to habitat management and has a better recruitment cluster structure (C. Pedersen, per. comm.). Of the 4 birds moved to Conecuh in 2009, 1 became part of a PBG and the fate of 3 was unknown (a 25% success rate). Averaging the outcome of Goethe and Conecuh (without Picayune) results in a 54% success rate for ONF in 2009 which is a slightly higher success rate than the 2009 SRTC average.

Looking at the combined translocations of the FMNF and the ONF, 17 of the 40 RCWs translocated in 2008 were successful (42.5%). The SRTC average success rate for the 19 populations receiving birds in 2008 was notably higher at 53%. In 2009, 18 SRTC populations (or subpopulations) received a total of 145 birds. Of these, 72 were documented to be successful during the 2010 breeding season; a 52% overall SRTC success rate (if you remove the 6 birds translocated to Picayune since post-translocation monitoring data is still needed). The SERPPAS donors translocated 45 birds of these birds. After removing Picayune data, 19 of the 39 birds translocated from the FMNF and ONF were successful (a 49% success rate). The success of SERPPAS RCW translocations in 2008 and 2009 are lower than the SRTC average. However, the difference may not be significant and the results for 2009 could be in the range of 42% to 56% success rate depending on the fate of Picayune birds. This range overlaps the overall success rate of SRTC so it may be too early to speculate on why the 2009 SERPPAS translocations were not more successful (when in fact they may have been more successful than the SRTC average).

The results from 2008 show the lower success rate originates from poor retention of ONF birds. Although some explanations have been given for the 0% success at Goethe State Forest-North and Babcock/Webb WMA and there seems to be no cause for concern at Babcock/Webb WMA given the positive growth despite low retention, the low success rate in 2008 at ONF deserves further comment. Goethe SF biologist, Charlie Pedersen, recognized the issues of habitat quality and recruitment cluster placement in their northern subpopulation could be the cause of the poor translocation success in 2008. Despite Goethe SF-North being eligible to receive birds from the SRTC again in 2010, Goethe declined their forest's allocation on the grounds that they did not feel confident this was the best use of available birds (C. Pedersen, per. comm.). Because of the habitat quality problems, some different understory restoration techniques are being implemented in this subpopulation. Until Goethe can see some positive trends in habitat response to their management practices or growth of the RCW subpopulation in the north from internal recruitment, justification for translocations to that area are not there and nor was Goethe willing to make the argument (C. Pedersen, per. comm.). Although recipient properties are always eager to grow their RCW population and translocations provide the only method of boosting the annual recruitment to these small populations, underlying issues with the habitat will undermine the good intentions of

translocations. Goethe State Forest did well to reevaluate their recipient needs and allow the birds to find better homes.

Although it is beneficial to review SERPPAS RCW translocation success, it is important to keep in mind the success rates may not fully reflect actual bird retention since not all monitoring efforts at recipient forests are equal. If a bird is not observed in the following breeding season this may not mean the bird has not successfully remained on the property. Sighting banded birds and getting confirmation on full band combinations is time consuming and often staffing is not available to collect full group composition in every cluster by August and have results prepared for the annual SRTC meeting. However, if a bird has successfully remained in the recipient population, its presence will generally be detected by the second year if the required monitoring is conducted and birds that were floating the first year have time to settle into groups or new clusters. It is not uncommon for translocated birds to be located two or more years post-translocation. Therefore these results of SERPPAS translocations are helpful in gauging the success of the project but should be considered preliminary.

Translocation Challenges and Opportunities

Although all are qualified to be donor populations, differences in the recovery status and population demographics reveal the strengths and challenges of each SERPPAS donor population. One of the most obvious differences is that EAFB is an active military base with frequent live-fire training missions which prevent access to areas of the installation for various lengths of time ranging from a few hours to a few months. This obstacle not only presents a safety hazard, it necessitates close coordination with the Range Control office and can make meeting specific time sensitive goals, such as banding nestlings, a challenge. Live fire operations also limit the active clusters that can be safely and efficiently monitored on the installation. In addition, the lack of (and often unpredictable) access makes coordinating multiple persons and activities, especially during translocation events, difficult. Both the Francis Marion and Osceola populations exist on national forests where access is not limited by military training.

The dynamics of the populations themselves also present individual challenges and benefits. It is beneficial for the SERPPAS biologist in each population to monitor the same groups each year. This allows the biologist to develop a history of behavioral characteristics associated with each group which increases the biologist's success in future years. The FMNF population is a large, stable and recovered population that continues to exhibit growth. Within the entire forest of over 423 active clusters and 411 PBGs, the SERPPAS biologist is able to hand-pick a subset of RCW groups most suited to produce fledglings for translocation; i.e., PBGs with large group size. The addition of recruitment clusters and the discovery of pioneer clusters continue to increase the number of clusters available to the FMNF SERPPAS biologist annually. Therefore, the biologist may alter the monitoring sample at will when necessary.

Although EAFB also boasts a large and recovered population with 392 PBGs, not all clusters are available to the SERPPAS biologist for monitoring. The clusters monitored for translocation were selected by Jackson Guard's resident lead wildlife biologist. Although the SERPPAS biologist will make suggestions and requests to Jackson Guard regarding cluster selection based on the challenges and success previously experienced, the selection will remain entirely at the discretion of Jackson

Guard. SERPPAS cluster selection is primarily based on military access conflicts and, in addition, must not overlap with the clusters monitored by VT for internal translocation purposes. These issues limit the clusters available for monitoring by the SERPPAS biologist. Additionally, the feasibility (i.e., usability) of individual clusters due to large size and distance from access points also presents a challenge.

In contrast to both of these large populations, the emerging Osceola/Okefenokee population is not projected to achieve its recovery goal (350 PBGs) until 2030 or later (USFWS 2003). In order to accomplish the same goal of contributing 20 birds to the SRTC, nearly all PBGs at the ONF need to be monitored, leaving little choice in cluster selection. As the population continues to grow and stabilize, it is expected to attain a higher level of predictability in group size and behavior, allowing the SERPASS biologist to select the most suitable clusters to focus on for future translocations. As previously discussed, group size impacts the availability of birds for translocation and can be an indicator of population growth rate and density. The demographics of the preselected RCW groups on the FMNF show notably larger group size and greater reproductive success on average than the ONF or EAFB groups monitored. A sub-sample of translocation groups on the FMNF averaged 3.37 adults/group (n=60) in 2009. The ONF, on the other hand had an average of 2.3 adults/active cluster in 2009 and this average remained the same for the subset of groups in 2010. This smaller group size is expected due to the rapid growth and filling of recruitment clusters observed on the small ONF in comparison to the larger and more dense FMNF. The average number of adults per group at EAFB, in the SERPPAS monitored clusters for which this information was collected in 2010 (n=76), was just 2.33 adults per group. This average is lower than the average for the entire population, which was determined to be 2.6 adults per group in 2010, 2.9 in 2009 and 3.2 in 2008 (K. Gault, pers. comm.). The discrepancy is not unexpected, as the SERPPAS biologist was primarily concerned with determining simply the presence or absence of a helper in the groups which fledged young.

In comparison to the FMNF and ONF, EAFB experienced a high number of nest failures this season and an even higher number of groups that did not produce a nest. Although it is assumed that these groups did not attempt to nest, it is possible that some nests were simply not located despite intensive searches; primarily due to the biologist's lack of historical knowledge for the majority of the monitored groups. Future monitoring should provide an increased success rate. Additionally, 11 clusters became inaccessible due to the UXO issue; prohibiting access to a large area of the base for monitoring. Of the 109 active clusters, 7 were captured. That finding was not unexpected due to this population's large size and widespread distribution of cavity trees. Because of the large number of old growth pine scattered across the installation, territories often overlap and extra-territorial roosting is fairly common. As a result, EAFB wildlife biologists feel that their population may more closely mimic an historical situation than populations that have been reintroduced or that exist in second or third growth forests. The high number of captured clusters, lower number of nests located and the access issues contributed to a lower number of available juveniles than preferred in 2010. The SERPPAS biologist's request to make alterations to the sample of monitored groups and to increase the total number of clusters monitored in 2011 should alleviate many of these concerns.

Another key difference is evident when comparing the geographic locations of the 3 new donor populations. Location affects which properties the new donors can ideally contribute to within the

STRC. FMNF is part of the Mid-Atlantic Coastal Plain Recovery Unit; EAFB belongs to the Gulf Coastal Plain Recovery Unit and, adjacent to each of these is the ONF, part of the South Atlantic Coastal Plain Recovery Unit. The addition of EAFB as a donor in 2010 helps to bridge the gap that exists between the FMNF/ONF and all the populations west of the Florida Panhandle; however, the FMNF is still at a geographic disadvantage.

The USFWS discourages translocation of RCWs between non-adjacent recovery units (USFWS 2003). The reasons for this policy are to: (1) maintain genetic integrity of the species, (2) support local adaptations of translocated birds, (3) minimize stress on birds, i.e., translocation time, (4) minimize logistical challenges, (5) minimize costs, and 6) preserve progress within recovery units. A review of RCW translocation success rates by Edwards and Costa (2004) has questioned the importance of keeping birds in the same or similar physiographic province (i.e., recovery unit); however they still endorsed the current USFWS guidelines. Therefore, the populations that could receive birds from these forests are potentially limited by the recovery unit they belong to. For example, although the FMNF RCW population is approximately 3.5 times larger than the ONF's population, the ONF is at a geographic advantage over the FMNF in serving the SRTC's current recipient properties (particularly many in the South Central Florida Recovery Unit).

The issues presented by the FMNF's location are being met by the addition of new recipient properties. Fort Jackson in South Carolina and the Army's Military Ocean Terminal at Sunny Point in North Carolina, both first time recipients in the SRTC in 2008, were able to receive birds from the FMNF during its first year as a donor. However, in 2009, none of the recipient populations were within an adjacent recovery unit to the FMNF due, in part, to the bi-annual rotation of recipient properties. Therefore, birds were transported via the USFS airplane to recipient populations – a costly undertaking that potentially puts the birds under greater stress. In 2010, Fort Jackson was back in rotation to receive donated pairs and the Poinsett Electronic Combat Range in South Carolina also received birds from the FMNF. The long term hope is that more recipient properties within the expanded region of the SRTC (i.e., South Carolina and North Carolina) will begin to participate in the cooperative in response to birds available at the FMNF**.**

Revisiting Targets and Annual Goals

The 2010 RCW breeding season was a good season weather-wise and, consequently, reproduction-wise across the southeast. This is in direct contrast to the challenging year faced by many of the populations in the South Central Florida Recovery Unit in 2009 who experienced a decline in reproductive success thought to result from unprecedented amounts of rainfall. Although all three donor populations are stable and growing, they too are not immune to the impact of unforeseen stochastic events, as seen by the damage of hurricane Hugo in 1989 (see Donor Sites)**.** This variation in reproductive success illustrates just how strongly factors such as weather conditions potentially influence the success of this project year to year. However, the overall positive and stable trends support the ability of reaching the target SERPPAS contributions promised to SRTC.

Francis Marion National Forest

In 2010, the FMNF SERPPAS biologist noted slightly smaller group sizes and brood sizes (see Results). The irregularities in nesting may be attributable to severe winter conditions experienced

in that region in 2009. Breeding and helper adults may have died, causing a higher turnover in pair formation for breeding groups. In addition, severe winter conditions may have intensified inter- and intra-specific cavity competition, disrupting RCW nesting behaviors in some clusters. However, because most adults in this population are not color banded and only active cavities are examined, this competition theory is speculative. Although, similar behavior was observed in other local RCW populations (i.e. nests were initiated earlier and at least one population noted a higher incidence of flying squirrel cavity occupancy in a nearby population (Brosnan Forest) (J. Kappes, pers. comm.).

In spite of the seemingly harsh winter, the FMNF RCW population continues to thrive and the SERPPAS biologist was able to contribute the promised 10 pair of birds to SRTC in 2010. However, as of the date of this report, there is a lack of funding for this position and FMNF will not have birds to offer to the SRTC in 2011.

Osceola National Forest

Conditions on the ONF are somewhat less predictable as a result of its smaller size and rapid growth rate. SRTC donation goals were met in 2008, were short in 2009, and were exceeded in 2010. The ONF may not be able to guarantee 10 pairs of birds to the cooperative every year. However, it seems to be able to meet the target donation goal over a longer period of time, contributing 60 birds (in 30 pairs) from 2008 to 2010. The ONFs impressive 10% to 12% annual growth of active clusters over the last three years strongly supports its continued status as a donor population in the SRTC. The sharp population growth will continue to allow the SERPPAS biologist to select clusters more suited for translocation. Future years should continue to show an increase in the number of PBGs and successful nests in the monitored subset, which will increase the recruitment pool for translocations. With funding in place as of the date of this report, it is anticipated that the ONF SERPPAS biologist will be able to donate at least 10 pair to the SRTC in 2011.

Eglin Air Force Base

With a large, strong, and stable population, aggressive and successful habitat management program and prime geographic location for supporting translocations, EAFB's value as a donor is clear. The SERPPAS biologist was able to learn countless lessons from the first and somewhat 'experimental' year of this project which will contribute to increased success in future years, such as fine-tuning the selection of clusters monitored for translocation. Funding for the 2011 season has been secured as of the date of this report. Despite the unique challenges of working on a military installation, it is anticipated that EAFB, in the absence of unforeseen stochastic events, will be able to meet the goal of donating 10 pair of RCW to the SRTC in 2011.

As evidenced in this report, the availability of funding is the major catalyst driving the success of the SERPPAS project at each donor site. With funding in place, the target of the three SERPPAS donor populations contributing a combined total of 30 pairs of birds annually is not unrealistic. However, it does need to be viewed as a flexible target and responsive to the needs of the donor populations when one or more environmental factors are not optimal.

The Importance of Partnerships

The host donor populations, FMNF, ONF and EAFB play a key role in this SERPPAS RCW conservation partnership. They provide logistical and financial support in the way of vehicles and fuel, office space, computer support, maps, access to RCW databases, and equipment and supplies as needed. Obviously the project could not be successfully conducted without the full administrative support of the host populations. We believe it is critical that, prior to initiating these types of multi-partner conservation relationships, a clear understanding of each partners needs, responsibilities and expectations are agreed upon. Once this operational foundation is in place, programs move forward efficiently, economically, and most important effectively and successfully. We believe we have achieved that point during the last couple years of this project and we look forward to a long and productive partnership as we all move toward RCW recovery.

Many partners have collaborated to fund this project at EAFB, the FMNF and ONF over the past 3 years. The DoD fully funded the first year at the FMNF and ONF. Florida Fish and Wildlife Conservation Commission (FFWCC) funded the entire second year (2009) at the ONF. Georgia Department of Natural Resources (GADNR) and the Alabama Department of Conservation and Natural Resources (ADCNR) jointly financed the FMNF position in the second (2009) and third (2010) years. The U.S. Army funded the ONF and EAFB projects in 2010.

The significant contributions and commitments of state agencies to this project cannot be overstated. The SRTC's long-term success and survival as an effective multi-state, multi-agency, multi-private partner conservation program is fundamentally grounded in the concept of sharing at the landscape scale across geographic, political and administrative boundaries: sharing people, funding, equipment, time, and most importantly birds. All participating states and populations are benefiting from this sharing. One state supports a biologist in another state whose birds go to a third and fourth state; and the state supporting the biologist receives its birds from a fifth state! This now, well-established partnership sharing paradigm is what has made the SRTC the critical and significant RCW recovery program that it is.

Our university partners, CU and UGA, have the challenge of providing the financial management for the funding that comes from various sources. Given the multi-state, multi-agency (state and federal) partners embedded in SERPPAS, meeting this challenge is no simple task. Fortunately, the Cooperative Ecosystems Study Unit (CESU) system provides a mechanism for the DoD and Army to transfer their funding to cooperating universities, which include CU and UGA. The second year of funding was provided by 3 of the 5 state SERPPAS partners, Florida, Georgia, and Alabama. State funds, similar to DoD funds, are also coming from various sources both within and among the states. But again, established procedures, e.g., Cooperative Agreements exist to provide the means to transfer monies from state agencies to CU and UGA. Without these existing financial transfer programs in place, this RCW conservation project being implemented via SERPPAS would likely be impossible.

Volunteers at the donor sites have been instrumental in the success of the SERPPAS translocation project. The translocation biologists at each site have developed a small, dedicated group of people who help roost birds, participate in captures and contribute the extra hands needed to successfully move birds. The Four Rivers chapter of the Audubon Society near Lake City, Florida has been a

tremendous source of enthusiastic volunteers at the ONF. In 2010, the ONF SERPPAS biologist expanded the volunteer network to include students from the University of Florida and the Santa Fe College in Gainesville. The EAFB SERPPAS biologist received a significant amount of help from volunteers provided by EAFBs Natural Resource Department volunteer coordinator, Erica Laine. Also state and federal agency employees connected to each of the three host forests have been extremely generous with their time and skills, particularly on capture nights. Although these volunteers are mentioned by name in the acknowledgements, their involvement is an essential component to the smooth success of the program and deserves special mention in the partnership.

Conclusions

Despite the challenges faced by the new donor populations, the SERPPAS biologists were able to contribute above the target goal to the SRTC over the three year project period. Overall, the value of additional SERPPAS birds to the SRTC cannot be overstated. The SRTC is nowhere near supplying enough birds to discontinue the alternating model and initiate an annual allocation of RCWs to all properties needing them. Additionally, the net number of recipient properties has grown with the regional expansion of the SRTC to include North Carolina and South Carolina. The creation of the SERPPAS biologist positions has been a needed step towards advancing RCW recovery. The selected sites for these positions have tapped into the strong, healthy populations of the FMNF and EAFB and have connected the emerging ONF population to the greater RCW community. Results from the last two years of SERPPAS translocations have demonstrated success rates similar to SRTC overall success rates and support the continued efforts of this project. With further support and partnership funds, SERPPAS translocations will continue to be a major contribution to RCW recovery.

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