

FINAL PERFORMANCE REPORT



Federal Aid Grant No. F19AP00197 (E-21-23)

**Red-cockaded Woodpecker Recovery
on the McCurtain County Wilderness Area**

Oklahoma Department of Wildlife Conservation

April 1, 2019 – March 31, 2020

FINAL REPORT

State: Oklahoma

Grant Number: F19AP00197 (E-21-23)

Grant Program: Endangered Species Act Section 6

Grant Title: Red-cockaded Woodpecker Recovery on the McCurtain County Wilderness Area

Grant Period: April 1, 2019 – March 31, 2020

Reporting Period: April 1, 2019 – March 31, 2020

Principal Investigator: Matt Fullerton, Oklahoma Department of Wildlife Conservation

A. ABSTRACT:

Recovery efforts were conducted for the Red-cockaded Woodpecker (*Picoides borealis*, RCW) population on the McCurtain County Wilderness Area (MCWA) in accordance with the 1991 MCWA Management Plan and the U.S. Fish and Wildlife Service's guidelines (USFWS 2003). As of March 2020, the number of active RCW clusters on the MCWA and adjacent Ouachita National Forest (ONF) tract was (16), including two (2) single bird clusters. The number of potential breeding groups (PBGs), or those composed of at least one male and one female, was fourteen (14) during the reporting period. Throughout the year, cavities (both natural and artificial) were serviced and cleaned periodically to maintain their suitability for RCW occupation. PBGs were monitored at least weekly during the nesting season (April 15 – June 15). During the 2019 nesting season, 12 PBGs nested, with 36 eggs laid and 22 hatched. Sixteen (16) nestlings successfully fledged (9 males, 6 females, and 1 unknown). Though no live-capture (trapping) of RCWs occurred during the reporting period, five (5) pairs of RCWs were translocated from the Sam Houston National Forest to the MCWA and an adjacent ONF tract in October 2019. Long term RCW nesting data (1991 – 2016) collected by both the Oklahoma Department of Wildlife Conservation (ODWC) and (ONF) was analyzed to determine effects of inter-annual weather variation on nest initiation, clutch size, and fledging success for all RCW nests within the Ouachita Mountains ecoregion, including the large population in the Poteau-Cold Springs District of the ONF in Arkansas. As expected, we found that warmer temperatures and greater precipitation do affect RCW nesting variables in a variety of ways. These results were drafted into a manuscript for *The Condor: Ornithological Applications*.

B. BACKGROUND:

In Oklahoma, the last known population of Red-cockaded Woodpeckers (RCWs) resides within both the state-owned McCurtain County Wilderness Area (MCWA) and an adjacent tract of the Ouachita National Forest (ONF) that borders the western edge of the MCWA (see Appendix Figure 5). The narrow range of suitable habitat for this species is limited to mature pine woodlands and savannahs. In the Ouachita Mountains, which comprise the northwestern most extension of its range, the RCW is found in mature shortleaf pine woodlands with a grassy understory dominated by bluestem species (*Andropogon* sp.). Over the past century, the RCW population in the Ouachita Mountains has declined as a result of habitat degradation. Widespread logging in the early part of the twentieth century eliminated many of the mature pine stands which

supported RCW clusters. Through the rest of the century, the remaining pockets of mature pine habitat declined in quality as a result of fire suppression and the subsequent increase in mid-story vegetation. The population on the MCWA declined from approximately 28 active clusters in 1977 (Wood 1977) to 15 in 1990 (Kelly et al. 1994). Since 1992, the Oklahoma Department of Wildlife Conservation has been implementing a management plan to recover the Red-cockaded Woodpecker population on the area and the surrounding portions of the Broken Bow Unit of the ONF.

Despite intensive population management and habitat restoration, population growth has been extremely slow and limited in Oklahoma. Throughout its range, several studies have determined that the RCWs require living, mature (> 60 years of age) pine trees infected with Red Heart fungus for cavity excavation (Jones & Ott 1973, Jackson 1977, Conner & O'Halloran 1987). While a sufficient number of suitable trees appear to be present on the MCWA, other constraining factors may exist that limit population growth and expansion. Research is needed to determine the limiting factors acting on this population. In addition to population monitoring and habitat restoration, ODWC is examining how weather variables affect the timing and overall success of nesting in the northwest edge of their occupied range. Results of such analyses could greatly inform management and recovery for this species in the Ouachita Mountains ecoregion.

C. OBJECTIVES:

- 1) Continue to monitor both the number of active clusters and individual birds within the Oklahoma population, including accounting for active cavity trees, reproductive activity, nesting success, group size, and cluster (stand) use on both the MCWA and adjacent Ouachita National Forest with the eventual goal of reaching the long-term goal 45 active clusters across the entire MCWA. Particular emphasis will be placed on the northwest portion of the MCWA where the majority of active territories exist.
- 2) Facilitate population expansion of Red-cockaded Woodpeckers through the use of artificial nest boxes (inserts) placed both within active clusters and in unoccupied (recruitment) shortleaf pine stands.
- 3) Coordinate with the U.S. Fish and Wildlife Service, U.S. Forest Service, and other agencies participating in the Western Range Translocation Cooperative (WRTC) to continue to remain eligible for future augmentations from donor populations on USFS lands. Release sites for the establishment of translocated sub-adult birds will be selected based upon their close proximity to currently active RCW territories to maximize the chances of success.
- 4) Attempt to determine the factors that influence both habitat selection and reproductive success of Red-cockaded Woodpecker in the Ouachita Mountains using a combination of datasets, with the ultimate goal of understanding the limiting factors acting upon this species in the northwest periphery of its range.
- 5) Continue to mechanically remove hardwood trees, stump re-sprouts, and dense stands of small pines on areas in and around both active RCW clusters and recruitment stands as a supplement to the currently implemented 3-year prescribed fire return interval that has been in place since 1991.

D. PROCEDURES:

Population Monitoring

Red-cockaded Woodpecker (RCW) Potential Breeding Groups are usually checked on (or close to) April 20th to determine if nests have been initiated (determined by day first egg is laid). RCW nestlings are banded to obtain data on production changes, dispersal, and mortality and to aid in identification of single bird clusters that may be suitable for future augmentations. Nestlings are typically leg-banded at seven (7) days of age with a U.S. Geological Survey metal band and a combination of colored plastic bands on both legs. At day 26 of nestling age, brood checks are made at nesting clusters to determine how many have successfully fledged.

Cluster Stand Management

New cavity trees, when located, are tagged and mapped. The status of cavity trees and clusters are determined at least twice annually, including immediately prior to each nesting period. The density of hardwood mid-story and understory trees is reduced as needed within a 10-acre block surrounding each active cluster. Hardwood mid-story trees within each cluster stand are controlled by both mechanical cutting and prescribed fire (prescribed burns were conducted under a separate grant funded through the Wildlife Restoration Act program).

Recruitment Stand Management

Recruitment clusters are developed and maintained in portions of the Wilderness Area within 1/4 mile to one mile of active clusters, and each recruitment stand is provisioned with at least three artificial cavity inserts. Recruitment stand locations are in areas where the habitat within and surrounding each recruitment stand is as similar as possible to the habitat found at the active clusters.

Corridors

Where needed and feasible, corridors are developed and maintained between clusters and recruitment stands.

Restrictors and Predator Guards

Restrictor plates are placed on RCW cavities to prevent enlargement by other woodpecker species (e.g. Pileated) and to rehabilitate previously enlarged cavities. Predator guards are installed and maintained on all active cavity trees. Southern Flying Squirrels (*Glaucomys volans*) and other species that may usurp RCW cavities are removed as they are discovered during bi-monthly cavity checks.

Artificial Cavities

Cavity inserts are installed in active cluster stands to provide at least five usable cavities at each site. Each recruitment cluster contains a minimum of three artificial inserts; upon activation by dispersing RCWs, two or three additional inserts are installed.

Population Augmentation via Translocations

Through the multi-agency group called the RCW Western Range Translocation Cooperative (WRTC), translocations are implemented to both help bolster small populations of Red-cockaded Woodpeckers and maintain genetic diversity. The WRTC holds an annual meeting each August. Within the network, “donor” populations give hatch year RCWs to “recipient” populations to increase small and isolated population numbers. Birds to be translocated are identified within donor populations for several weeks prior to capture and are typically hatch year birds that are

“floaters”, or young birds that have left their natal cluster but have not yet established themselves into a territory. Males and females are then paired up by the recipient and released into recruitment stands outfitted with artificial cavity inserts. In addition to releasing pre-paired RCWs, single bird clusters (usually a single male on territory) are identified and females from donor populations may be translocated in an effort to complete pairs at those clusters.

The WRTC maintains a translocation schedule and recipients usually wait in a “rotation” to receive birds from donor populations. However, this is contingent upon both the availability of suitable birds in donor populations and U.S. Fish and Wildlife Service approval. Juvenile pairs may also be translocated to the MCWA when population conditions (such as population declines) warrant and when RCWs are available to move from donor populations. The two primary donor populations for Oklahoma include the Sam Houston National Forest in Texas and the Kisatchie National Forest in Louisiana.

Nesting and Inter-Annual Weather Variation Study

We used 26 years of nesting data (1991 – 2016) from two RCW populations in the Ouachita Mountains ecoregion to determine how inter-annual weather variation affects nesting date, clutch size, and number of nestlings fledged. For each population, we used daily temperature and precipitation data from Oregon State University’s PRISM® network for 3 periods (30 and 60 days before nesting and 40 days overlapping nesting) to determine effects at the population level. For the nest initiation date analysis, we converted nesting date to “Julian” date (days numbered sequentially from 1 to 365) and then used the median date as a replicate for all nests for that year. Furthermore, we averaged clutch size, nestlings present at banding age, and nestlings fledged for each year and used that number as a replicate within each nesting year for the statistical models. Single-variable generalized mixed models with a “Gamma” distribution were used for the three time periods. A “backwards stepwise” Akaike Information Criterion (AIC) model comparison approach was then implemented to determine which weather variable “windows” had the strongest statistical effect on the three RCW nesting co-variables.

E. RESULTS AND DISCUSSION:

I. RESULTS

Population Monitoring

During the 2019 - 2020 reporting period, there were sixteen (16) active clusters, of which 14 were Potential Breeding Groups (PBGs). Twelve (12) PBGs initiated nests in 2019, of which one re-nested. A total of 36 eggs were laid, of which 22 hatched. No nesting activity was detected at the two “single bird” clusters. A total brood loss occurred at cluster 109. We were unable to determine the cause for this nest failure. Twelve (12) nesting attempts were successful and 16 nestlings (9 males, 6 females, and 1 of unknown sex) were fledged (see Appendix Figure 1).

Cluster Stand Management

During the reporting period, the total number of active clusters was 16 (see Appendix Figures 1-2). In 2019, 25 of the 36 natural cavities at active clusters were active, while only 14 of the 56 inserts were used. All usable natural cavities at active and inactive clusters have been restricted at the cavity entrances with metal plates that prevent destruction of entrances by species such as Pileated Woodpeckers. Active cavity trees are also outfitted with 2-3 foot sections of aluminum flashing that serve as predator guards to protect against climbing species such as ratsnakes (*Pantherophis* sp.). Cavity inserts were maintained at both currently active and unoccupied

recruitment stands in preparation for future RCW territorial establishment via natural dispersal (Fig. 3).

In March 2019, a natural cavity tree fell due to exceptionally high winds at the “single bird” cluster on the west portion of the MCWA.

Habitat Management

- *Hardwood Mid-story Thinning and Corridors*
No additional corridors to connect clusters and recruitment stands were developed during this grant period. Mechanical thinning of mid-story hardwood vegetation within and immediately surrounding active cavity trees continued as a supplement to prescribed fire treatment on the MCWA. In addition to using a chainsaw to remove select hardwood trees and small, dense pines, a skidsteer with a bucket was also used by ODWC personnel around several cavity trees on the west portion of the MCWA.
- *Prescribed Burning*
Approximately 4,156 total acres (972 on Ouachita National Forest lands) was jointly burned during March 2020 between ODWC and the U.S. Forest Service. Efforts were mostly focused on the central portion (between Linson Creek and Broken Bow Lake) of the MCWA and adjacent ONF lands. The costs associated with the burn were paid outside of this grant, but the burn is worthy of mention due to its importance in maintaining a suitable forest structure (open midstory and herbaceous understory) for RCWs.

Translocation

In October 2019, 5 pairs of hatch year RCWs were translocated from the Sam Houston National Forest in Texas to the MCWA and adjacent Oklahoma District of the ONF (see Figure 3, Appendix). Assistance was provided by USFS – Ouachita National Forest staff.

Nesting and Inter-Annual Weather Variation Study

Based on 20+ years of data for two RCW populations in the Ouachita Mountains ecoregion, several apparent effects of climate variation on population-level nesting variables were documented. Nesting occurred earlier with warmer average temperatures and later with greater precipitation. Both populations also experience greater average clutch size and number of nestlings fledged with warmer temperatures, but increased precipitation reduced overall fledgling number and survival. As expected, RCWs appear to respond to inter-annual variation, with such information potentially informing management and recovery efforts for the species in the future (see Figures 1-3 & Appendix Figure 8).

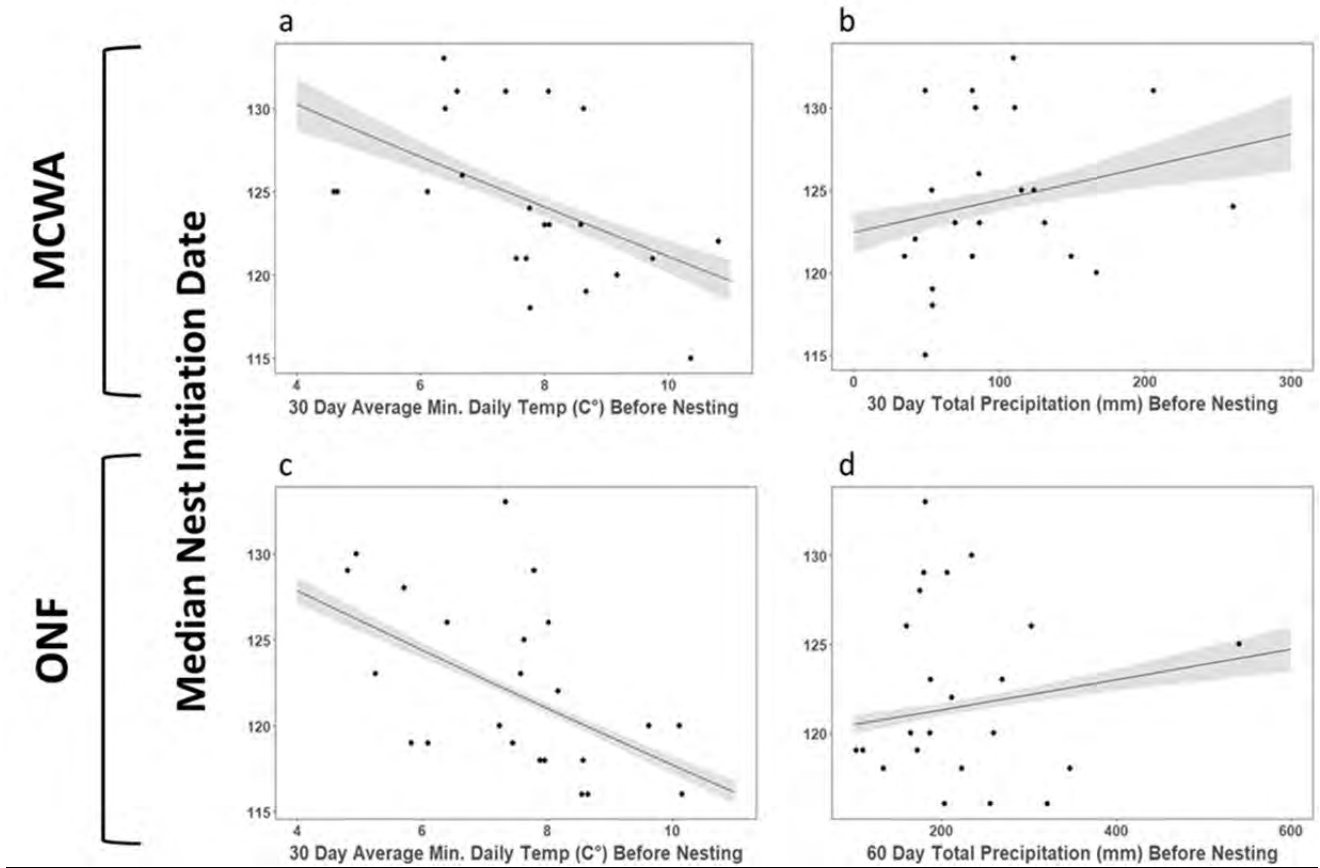


Figure 1. Population-level observed and fitted relationships between pre-nesting weather conditions and nest initiation dates for RCW nests on the McCurtain Co. Wilderness Area, (MCWA) (A-B) and Poteau-Cold Springs District of the Ouachita National Forest (ONF) (C-D),

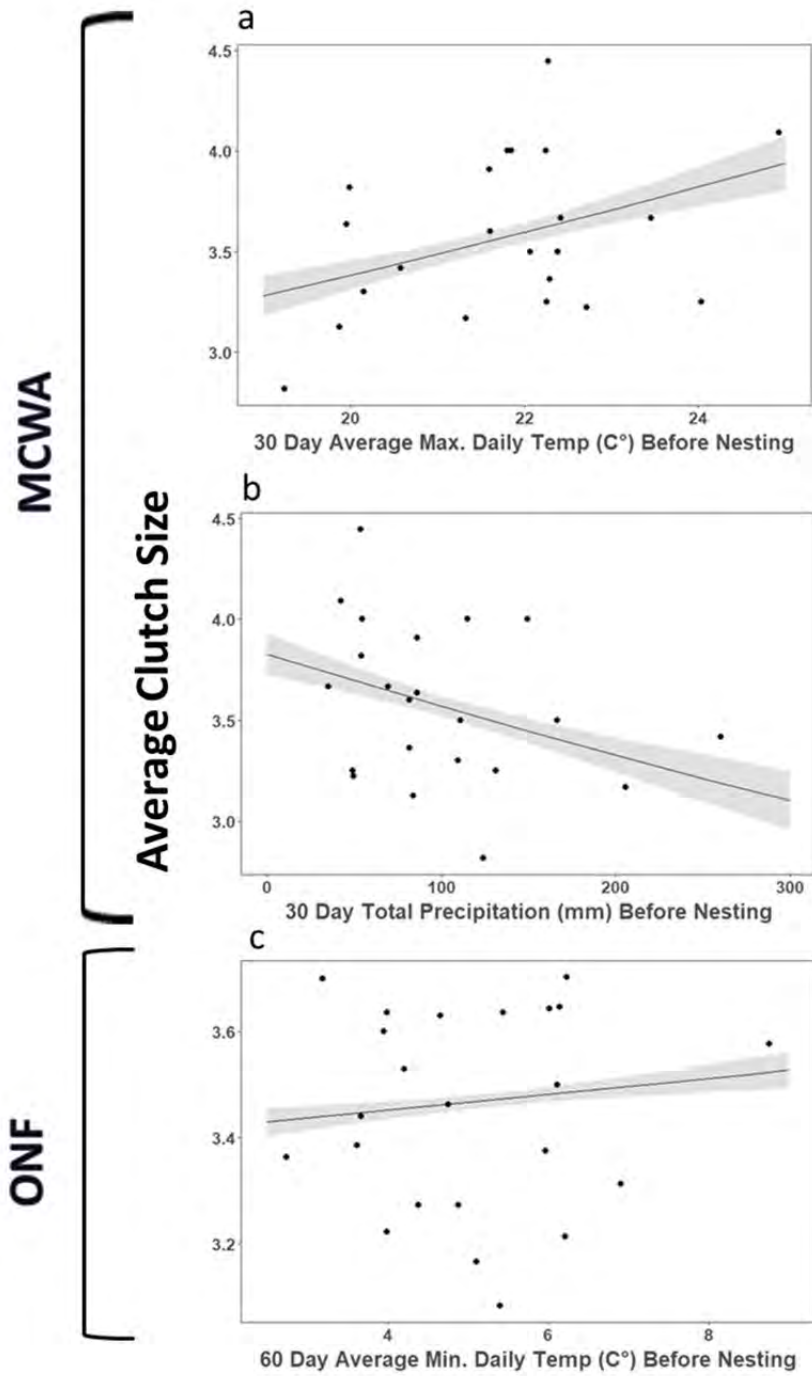


Figure 2. Population-level observed and fitted relationships between pre-nesting weather conditions and clutch size for RCW nests on the McCurtain Co. Wilderness Area (MCWA) (**A-B**) and Poteau-Cold Spring District of the Ouachita National Forest (ONF) (**C**).

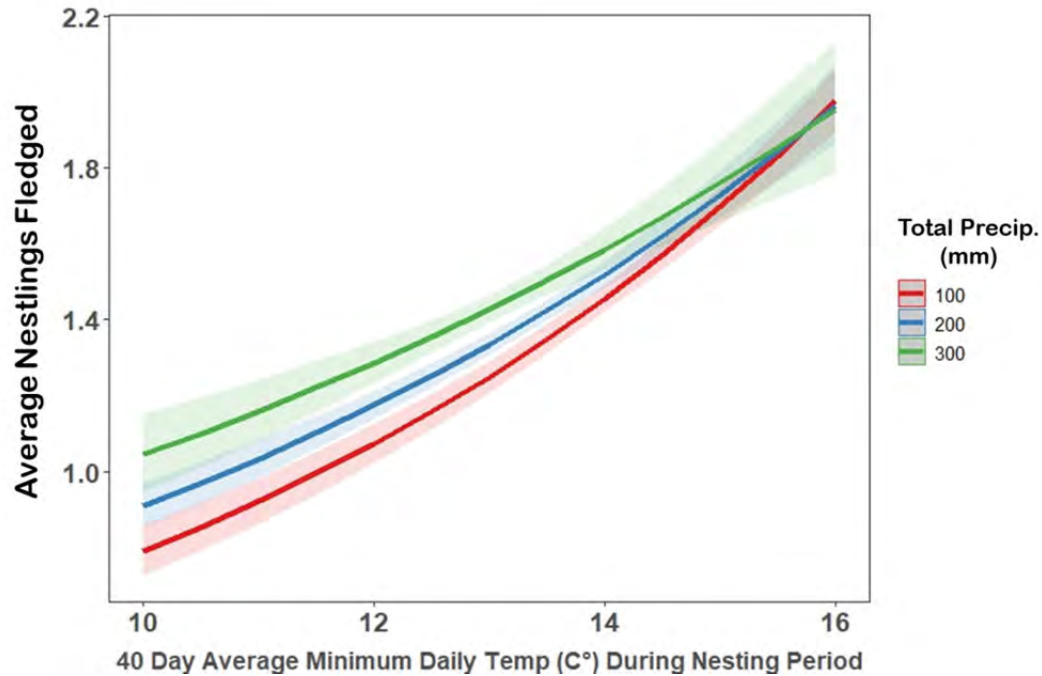


Figure 3. Effects of average minimum daily temperature (C°) and total precipitation (mm) during the 40 day nesting period on average nestlings fledged for RCW nests on the Poteau-Cold Spring District of the Ouachita National Forest.

F. RECOMMENDATIONS

Due to the high ODWC prioritization of recovery efforts for Red-cockaded Woodpeckers, this project will likely continue beyond the current grant segment until such time as the population attains the MCWA management plan goal of 45 active clusters. Even if the population goal of 45 territories is achieved, continued habitat management and population monitoring will be required in perpetuity if RCWs are to persist on the MCWA and surrounding Oklahoma Ranger District of the Ouachita National Forest.

G. SIGNIFICANT DEVIATIONS:

No significant deviations.

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Date: April 28, 2020

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Kelly, J. F., et al. (1994). Decline of the Red-cockaded Woodpecker (*Picoides borealis*) in Southeastern Oklahoma. American Midland Naturalist 132(2): 275-283.

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APPENDIX

Figure 1. 2019 Red-cockaded Woodpecker Nesting Season Summary, McCurtain Co., Oklahoma.
(* indicates a renest)

| Cluster | Estimated Group Size | Nest Initiation Date | Clutch Size | Eggs Hatched | Nestlings Banded | Nestlings Fledged | Property |
|---------|----------------------|----------------------|-------------|--------------|------------------|-------------------|----------|
| 2 | 2 | 4/30/19 | 2 | 0 | 0 | 0 | MCWA |
| 2 | 2 | 5/28/19* | 3 | 1 | 1 | 1 | MCWA |
| 5 | 3 | 5/2/19 | 4 | 3 | 3 | 2 | MCWA |
| 16 | 2 | N/A | NA | NA | NA | NA | MCWA |
| 20 | 3 | N/A | NA | NA | NA | NA | MCWA |
| 37 | 3 | 5/2/19 | 4 | 4 | 2 | 2 | MCWA |
| 109 | 3 | 4/30/19 | 4 | 0 | 0 | 0 | MCWA |
| 111 | 3 | 5/10/19 | 3 | 2 | 2 | 1 | MCWA |
| 112 | 3 | 5/10/19 | N/A | NA | 1 | 1 | MCWA |
| 202 | 3 | 5/14/19 | N/A | NA | 1 | 1 | MCWA |
| 205 | 3 | 4/25/19 | 4 | 2 | 2 | 2 | MCWA |
| 210 | 2 | 4.28/19 | 4 | 2 | 2 | 2 | MCWA |
| 1201 | 2 | 5/1/19 | 3 | 3 | 1 | 1 | MCWA |
| NF4 | 3 | 5/25/19 | 4 | 2 | 2 | 2 | ONF |
| E1 | 2 | 5/2/19 | 4 | 2 | 1 | 1 | MCWA |

Figure 2. Summary of cavity availability and use within active RCW clusters on the McCurtain Co. Wilderness Area and adjacent Oklahoma Ranger District of the Oauchita National Forest, Oklahoma (as of March 2019).

| Cluster (Stand) Number | Natural Cavities | | Artificial Inserts | |
|------------------------|------------------|-------|--------------------|-------|
| | Active | Total | Active | Total |
| 300 | 0 | 0 | 2 | 4 |
| 2 | 1 | 1 | 1 | 6 |
| 205 | 3 | 3 | 0 | 3 |
| 109 | 2 | 3 | 1 | 2 |
| 111 | 3 | 4 | 0 | 2 |
| 112 | 2 | 5 | 1 | 4 |
| 37 | 3 | 4 | 0 | 3 |
| NF4 | 1 | 1 | 2 | 4 |
| “Single bird” | 1 | 1 | 0 | 2 |
| 5 | 2 | 3 | 0 | 3 |
| 20 | 2 | 2 | 1 | 5 |
| 210 | 1 | 1 | 1 | 4 |
| 16 | 1 | 3 | 1 | 3 |
| 202 | 1 | 2 | 2 | 5 |
| 1201 | 1 | 1 | 1 | 4 |
| E1 | 1 | 2 | 1 | 2 |

Figure 3. Red-cockaded Woodpeckers translocated to Oklahoma in 2019.

| USGS Band No. | Leg Band Color | | Date of Move | Site of Origin | Age (Months) | Recruit. Year | Sex | Release Site |
|---------------|----------------|----------|--------------|--------------------|--------------|---------------|-----|--------------|
| | Left | Right | | | | | | |
| 2371-95874 | G/O | W/*Metal | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | F | R302 |
| 2731-95806 | HP/*Metal | LP/B/B | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | M | R302 |
| 2731-95857 | HD | Y | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | F | USFS-East |
| 0951-23020 | Pink M | OGY | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | M | USFS-East |
| 2731-95974 | W/AL | Y/O/O | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | F | R301 |
| 2731-95845 | HP/*Metal | B/HP/LP | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | M | R301 |
| 2731-95930 | HP/*Metal | B/G/Y | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | F | C25 |
| 2731-95973 | G/AL | B/HP/W | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | M | C25 |
| 2731-95843 | G/*Metal | Y/W/Y | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | F | Cooperville |
| 2731-95894 | G/*Metal | HP/G/W | 10/8/2019 | Sam Houston NF, TX | 3 | 2019 | M | Cooperville |

Figure 4. Adult Red-cockaded Woodpecker (*Picoides borealis*) on a cavity tree on the McCurtain County Wilderness Area. (Credit: Tom Wipple, w/permission)



Figure 5. Map of the McCurtain Co. Wilderness Area (owned by ODWC) and surrounding Oklahoma Ranger District of the Ouachita National Forest.

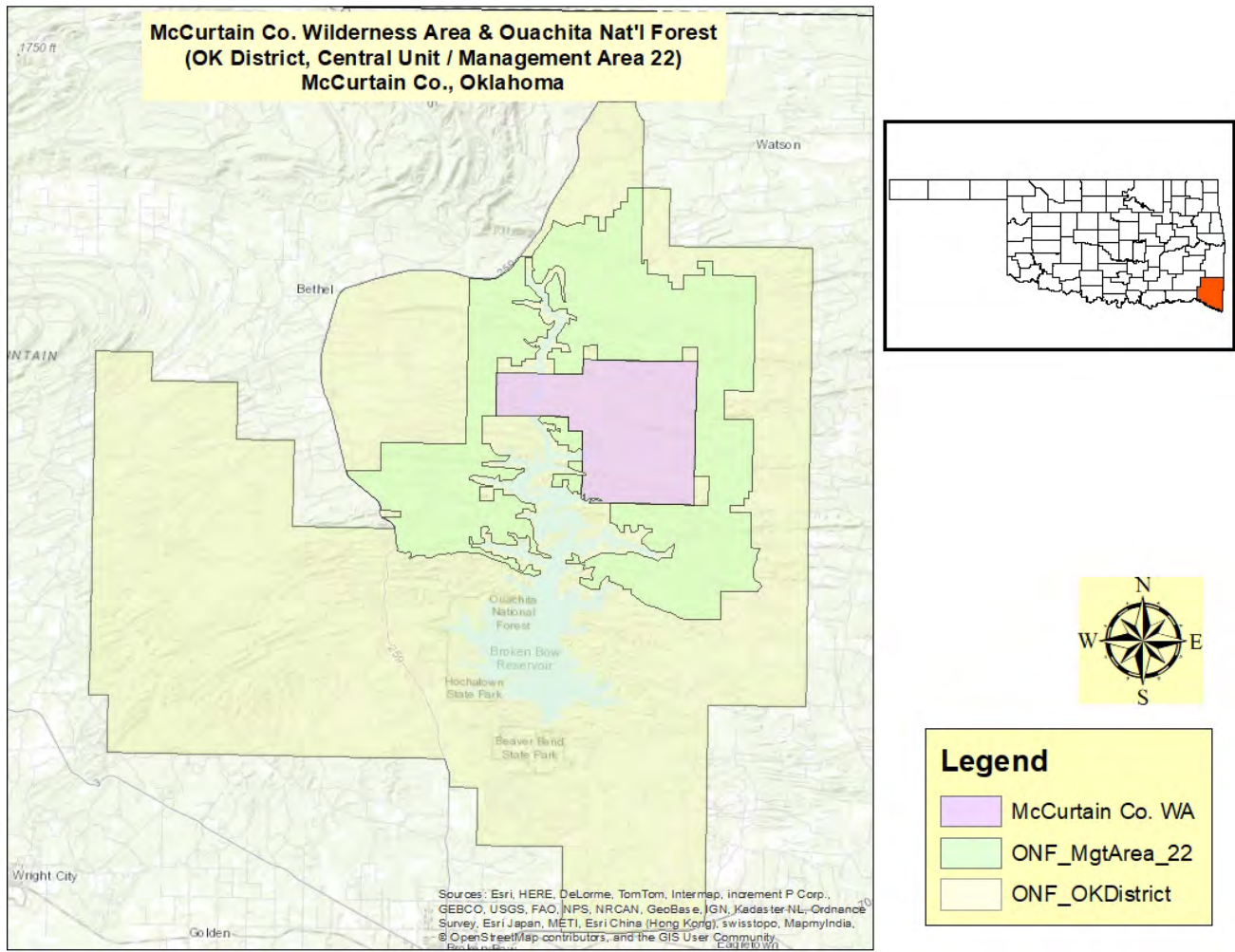


Figure 6. Active Red-cockaded Woodpecker cluster locations (including currently active clusters and recruitment stands) in Oklahoma. Recruitment stand locations are where translocated RCWs were released in 2019.

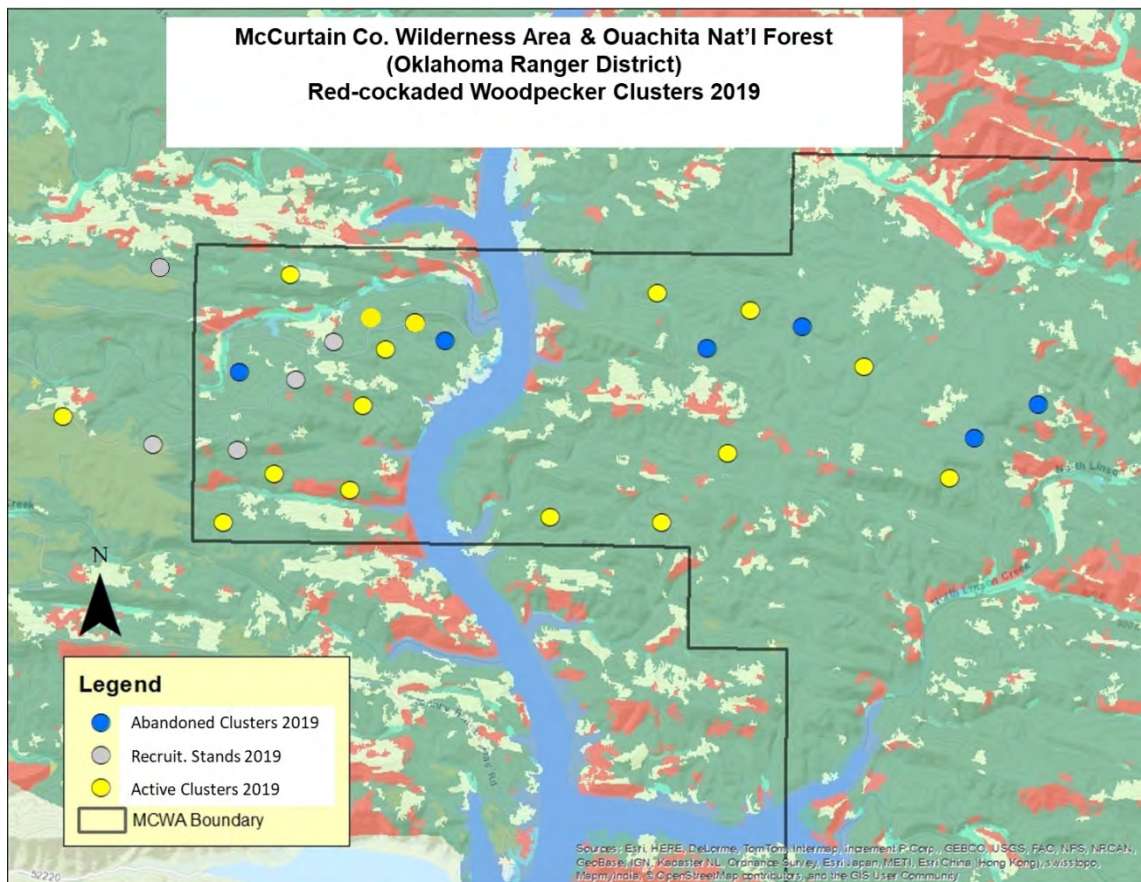


Figure 7. Map of study sites used for inter-annual weather variation analysis throughout the entire Ouachita Mountains ecoregion, including the McCurtain Co. Wilderness Area in Oklahoma and the Oklahoma, Poteau, and Cold Springs Districts of the Ouachita National Forest in Oklahoma and Arkansas.

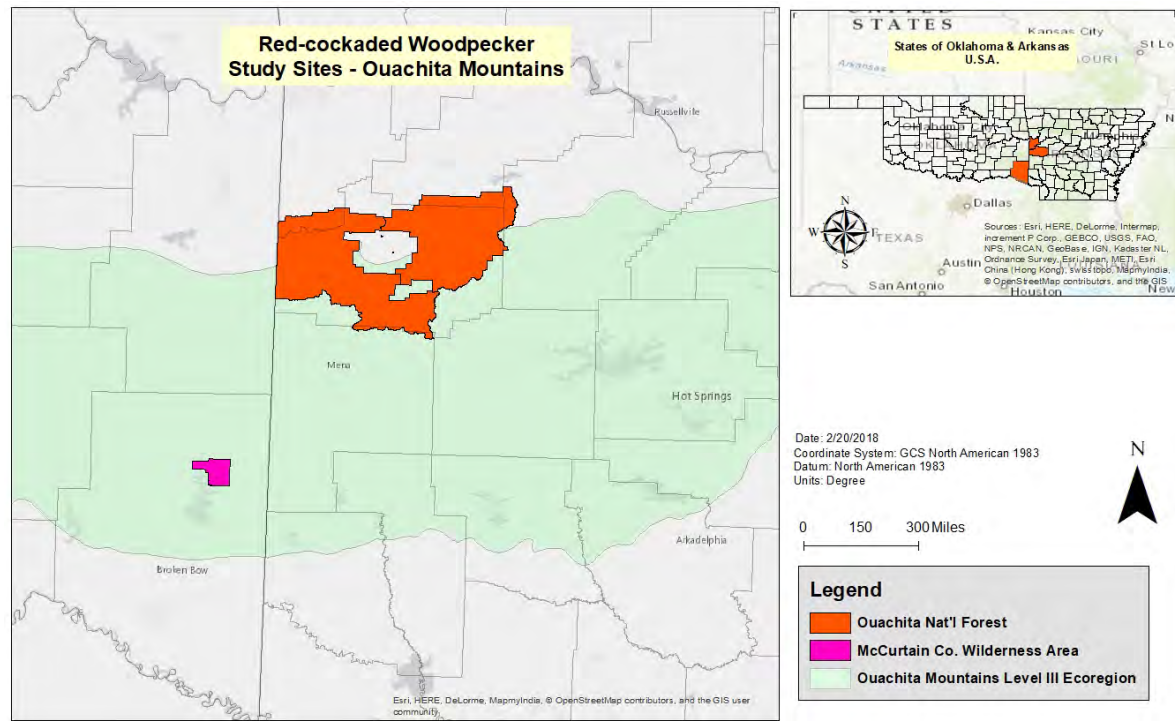


Figure 8. Variables from top-supported models (selected using stepAIC, backwards-selection model selection approach applied to Generalized Linear Models) for population-level analysis of the effects of weather averages on average nest initiation date, average clutch size, and average number of nestlings fledged for two red-cockaded woodpecker (*Dryobates borealis*, RCW) populations in the Ouachita Mountains ecoregion (MCWA – McCurtain County Wilderness Area in Oklahoma; ONF – Ouachita National Forest in Arkansas).

| Response variable | Site | Weather Variables | β^a | SE ^b | Lower 95% CI | Upper 95% CI | AIC ^c |
|--------------------------|------|-------------------|-----------|-----------------|--------------|--------------|------------------|
| Median Nest Date | MCWA | 60d avg tmax | -0.00292 | 0.00190 | -0.00666 | 0.00082 | 1174.2 |
| | | 30d avg tmax | 0.00419 | 0.00275 | -0.00125 | 0.00963 | |
| | | 30d avg tmin | -0.01310 | 0.00206 | -0.01719 | -0.00902 | |
| | | 30d total ppt | 0.00015 | 0.00004 | 0.00006 | 0.00023 | |
| | ONF | 60d total ppt | 0.00008 | 0.00001 | 0.00006 | 0.00010 | 3222.1 |
| | | 30d avg tmin | -0.01402 | 0.00077 | -0.01553 | -0.01251 | |
| Clutch Size (Average) | MCWA | 30d avg tmax | 0.02260 | 0.00505 | 0.01257 | 0.03263 | 142.57 |
| | | 30d total ppt | -0.00050 | 0.00012 | -0.00073 | -0.00026 | |
| | ONF | 60d avg tmin | 0.00431 | 0.00122 | 0.00193 | 0.00670 | -497.95 |
| Number fledged (Average) | MCWA | 40d avg tmax | 0.10368 | 0.02956 | 0.04436 | 0.16373 | 366.78 |
| | | 40d avg tmin | 0.06300 | 0.02877 | 0.01021 | 0.11517 | |
| | | 40d total ppt | -0.00078 | 0.00034 | -0.00146 | -0.00008 | |
| | ONF | 40d avg tmin | 0.13990 | 0.00849 | 0.12182 | 0.15784 | 378.76 |
| | | 40d total ppt | 0.00054 | 0.00009 | 0.00034 | 0.00073 | |

^aBeta coefficient estimate for each predictor variable from the top model selected using AIC

^bStandard error of beta coefficient estimate

^cValue of Akaike's Information Criterion for top model assessed for each response variable

Figure 7. Oklahoma Department of Wildlife Conservation personnel preparing cavities in March for the upcoming nesting season; condition of each cavity (both natural and artificial) is assessed and Southern Flying Squirrels, if present, are removed accordingly. (*Credit: Matt Fullerton/ODWC*)



Figure 8. Metal flashing (“Snake Excluder Devices”) installed at the base of occupied (active) RCW cavity trees to prevent rat snakes from climbing trunks and depredating on nests. (*Credit: M. Fullerton/ODWC*)



Figure 9. Recruitment stand (“R-stand”) with four (4) artificial nest boxes (inserts) installed. R-stands are maintained for eventual colonization of dispersing RCWs as well as translocation release sites. (*Credit: M. Fullerton/ODWC*)

