

Ecological Correlates of Red-Cockaded Woodpecker (PICOIDES BOREALIS) Foraging Preference, Habitat Use and Home Range Size in Northwest Florida (EGLIN AFB)Part 1

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ABSTRACT

This study provided a scientific basis for management of red-cockaded woodpecker (RCW) (*Picoides borealis*) habitat on Eglin Air Force Base (Eglin) in northwest Florida. Studies elsewhere have shown that RCW population numbers are limited by at least four environmental factors: 1) loss and fragmentation of habitat due to conversion, 2) degradation of habitat due to hardwood midstory encroachment, 3) shortage of suitable cavity trees and 4) demographic isolation. Other environmental factors may constrain RCW population growth, including limited foraging area or lack of suitable or preferred foraging resources within available habitat. The existing US Fish and Wildlife Service guidelines for estimating appropriate levels of foraging resources and area appeared to be inappropriate for Eglin RCWs, primarily because the guidelines were developed from studies of RCW populations occurring in forests with more productive soils and a different habitat structure. The 187,515 ha Eglin installation is comprised of 78% longleaf pine-turkey oak (*Pines palustris-quercus laevis*) associations occurring on highly xeric, deep sands. In 1997, Eglin was estimated to have a population of 243 active RCW clusters or approximately 221 groups consisting of one to six birds. The objectives of this study were to 1) estimate home range size of RCW groups consisting of at least a breeding pair, 2) estimate the foraging resources used and available, 3) determine habitat preference or avoidance based on habitat structure, 4) relate home range size to RCW demographic and habitat variables, 5) relate RCW demography to habitat structure and composition, 6) document gender-based foraging preferences and 7) recommend biological and management thresholds for key habitat variables.

We studied a sample of 25 Eglin RCW social units (groups) consisting of at least a breeding pair with or without attendant helpers in 1993-94 and 18 RCW groups in 1994-95. Each group defended a territory consisting of a cluster of cavity trees occurring in longleaf pine-hardwood forests of varying habitat structure and composition. We estimated home range sizes by following each group two to four times per month during one of three four-hour periods during the day. Home range sizes were estimated using minimum convex polygons. We measured RCW demographic variables, including density, group size, clutch size, brood size and number of young fledged. We measured 18 habitat variables ranging from pine density to understory cover based on randomly chosen points in the vicinity of foraging observations. For analysis, per group home range and demographic variables were averaged across two years (one year for seven groups).

We report several new findings: 1) at Eglin AFB, RCWs prefer both larger *and* older (>150 years) trees as a foraging substrate significantly more often than expected, 2) on average, successful RCW groups used home ranges that were 46% larger than unsuccessful groups and 3) significant variation in RCW productivity was explained by increased forest cover (35% of variation), decreased hardwood height (28%), decreased hardwood dbh (26%) and lower densities of pines >25 cm dbh (22%). For successful groups, home ranges averaged 126 ha

versus 86 ha for unsuccessful groups. Successful groups used home ranges that contained more pines, but not more large pines, than did unsuccessful groups, despite having larger home ranges. Regression models indicated that the extent of forte cover was more important (i.e., explained a greater proportion of variability in reproduction) than the structure of the hardwood midstory or pine overstory. In all cases, regression models showed consistent relationships among increased RCW productivity, an open pine overstory, suppressed hardwood midstory, and a well-developed herbaceous (i.e., forte) ground cover. These results provided the basis for Eglin-specific management recommendations. The recommendations include methods for estimating home range boundaries and habitat quantity and quality in occupied RCW habitat, and the means for estimating the suitability and quality of unoccupied RCW habitat.

This study contributed to and supported more recent studies that have begun to link RCW population health to ecosystem processes. These results support the hypotheses put forth by F. James and colleagues working on the Apalachicola National Forest in Florida. They suggested that ecosystem processes, particularly frequent fire, may be as important as habitat structure and resource quantity in determining population health. In particular, they hypothesize that RCW nutrition is related to increased quality and quantity of arboreal insects resulting from increased nutrient mobility mediated by frequent fire. Researchers conducting studies in Blackwater River State Forest (FL) and Escambia Experimental Forest (AL) found that insect biomass on longleaf pines was correlated with increasing ground cover. Our observation and that of others that male and female RCWs segregate foraging activity, with females foraging primarily on tree boles, suggests a possible link between ground cover quality and female nutrition. However, further study is required to elucidate these relationships. Regardless, our results emphasize the importance of frequent prescribed fire and protecting and restoring native ground cover.

Habitat management recommendations in this report are consistent with ecosystem recovery and restoration. Nonetheless, we caution Eglin managers against managing stands solely on the basis of RCW habitat needs; Eglin forests were no doubt always associated with significant habitat heterogeneity at the landscape level. While RCW productivity is important, other demographic factors are perhaps even more critical to population health, including population density and connectedness. The management recommendations contained in this report are conservative. These recommendations have two purposes; to provide a reasonable level of security for RCWs, while providing managers with a reasonable level of decision-making certainty. Underlying these recommendations is the assumption that it is better to err on the side of caution. These recommendations will in some cases provide more habitat than is necessary for sustaining occupation and reproduction by some RCW groups. We also realize that as the Eglin population increase in size, so will the area of the total Eglin landscape set aside for their recovery. This will undoubtedly lead to increased conflicts among different users of Eglin's resources. Periodic review and update of these management recommendations is essential. Within reason, managers should be permitted to carry out most management actions within RCW foraging areas that are intended to benefit the integrity of the longleaf pine-turkey oak ecosystem as a whole. If applied in an adaptive management context with adequate monitoring and evaluation these recommendations should aid in recovery of RCWs, as well as longleaf pine ecosystems, on Eglin.

Key words: demography, Eglin Air Force Base, fire, ground cover, habitat quality, home range, longleaf pine, management recommendations, minimum convex polygon, red-cockaded woodpecker, understory.

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