

The Red-Cockaded Woodpecker: A Selectively Annotated Bibliography

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I. Introduction

The red-cockaded woodpecker was first identified by Louis Jean Pierre Viellot in 1807 as *Picoides borealis* or northern woodpecker. Viellot wrongly assumed that this southern species ranged into the northern United States and Canada. In the 1880's Alexander Wilson became the first to apply to the species the common name, red-cockaded woodpecker. This gregarious woodpecker once common in the longleaf pine forests of the southeastern United States has been on the endangered species list since October 1970 (under a law that proceeded the Endangered Species Act of 1973).

The red-cockaded woodpecker is cardinal-sized, measuring approximately seven inches long with a fifteen-inch wingspan. The males of the species wear a black cap, with a red streak worn like a cockade on either side. This streak is the species rarely visible but distinguishing mark and namesake. Both the male and the female of the species have a distinctive black nape which encircles large white patches on the cheek along with black and white horizontal bars on the back. The young of the species bear the same general colors and patterns of the adults, but young males will have an oval shaped patch of crimson on their crown.

An intensely social and territorial bird, the red-cockaded woodpecker nests in groups of up to nine members. Groups are made up of one breeding pair, nestlings and male helpers. Male helpers assist in excavating nesting cavities, defending the territory and raising the young. Female young may leave the group during the nesting period (April-June) in search of single male groups, but often the young will stay with the group in hopes of inheriting an existing cavity.

Red-cockaded woodpeckers are one of few birds that build their nests in living trees. The red-cockaded woodpeckers require a living pine tree in diameter of at least 5 3/4 feet that has heartwood infected with fungus. The fungus causes the heartwood of the tree to become soft. The birds then excavate a gourd shaped cavity, roughly 8 to 12 inches in diameter, into the heart of the tree, a process which can take up to 1 to

3 years. Because of the size of tree required to build the nesting cavity, red-cockaded woodpeckers are limited to longleaf pines, which are between 80 to 120 years old, and loblolly pines that are 70 to 100 years old.

The red-cockaded woodpecker has been found in association with other birds such as titmice, bluebirds, and nuthatches. Since these birds all favor an open woodland environment, the sittings probably do not imply any kind of symbiotic association. Vacated red-cockaded woodpecker cavities frequently become home for associated birds, flying squirrels, bees and wasps and amphibians and reptiles.

The tree-crawling rat snake is the red-cockaded woodpecker's primary natural predator. To thwart the rat snake, the woodpeckers will peck at trees to create resin wells from which sap will flow. The sap flow creates a barrier to the rat snake, as even a small amount of resin inhibits movement of the snake's scales. thus preventing it from crawling higher and invading the nest of the woodpecker.

The activities of man have proven, however, to be the most detrimental to the habitat of the red-cockaded woodpecker. The most devastating impacts from man's encroachment are those generated by silviculture and agriculture. Silviculture activities have replaced the native longleaf pine woodlands with fast growing species such as slash pine and loblolly pine. These fast- growing species are frequently harvested before they can provide nesting habitat for the red- cockaded woodpecker. Silviculture techniques such as clear-cutting have also severely impacted the areas in which the red-cockaded woodpecker can nest. Agricultural land clearing and the use of pesticides and herbicides are also threatening to the habitat of the red-cockaded woodpecker.

The red-cockaded woodpecker feeds primarily on insects such as beetles, ants, caterpillars and wood-boring insects. The woodpecker occasionally eats berries and fruits. It has also been observed to eat the worms that are found in ripening ears of corn. This diet, if digested near an agricultural area, can result in the ingestion of herbicides and pesticides, which can affect the viability of a group.

The original range of the red-cockaded woodpecker, *Picoides borealis*, extended north from northeastern Oklahoma (Copan) through southern Missouri (Shannon county), Tennessee (Beersheba and Allardt) and Maryland (Patuxent). The range spread east along the Atlantic coast from North Carolina (Beaufort) to southern Florida (Long Pine Key) and south along the Gulf of Mexico to southeastern Texas (Houston). The

western range stretched into northwestern Louisiana (Mansfield), western Arkansas (Mena) and eastern Oklahoma (Copan) [Figure 1 (140K)]. This range, corresponds to the range of the original longleaf pine forests. Today, the longleaf pine forests exists in only six percent of its original area, while the red-cockaded woodpecker is reduced to less than one percent of its original range.

The red-cockaded woodpecker, because of its social nature and unique nesting habits, requires a disappearing ecological niche to survive. A minimum of 200 acres of woodland is necessary to support one nesting group. Most tracts of this size exist only on federal lands within the woodpecker's habitat range. The U.S. Fish and Wildlife Service, in conjunction with the U.S. Forest Service, several state agencies and private landholders, is working on a recovery strategy for the red-cockaded woodpecker. The recovery strategy includes longer cutting rotations for forested areas, tagging trees which could be used for red-cockaded woodpecker nesting cavities, creating artificial nesting cavities, maintaining corridors between nesting ranges and disruptive environments, moratoriums on clear-cutting, as well as intervention by man to keep predators out of nesting cavities.

Since the species is limited to isolated tracts of land, disasters can have a huge impact on the existing population. For instance, as a result of Hurricane Hugo in 1989, the red-cockaded woodpecker lost nearly 100,000 acres of its range in the Francis Marion National Forest in South Carolina. In the area impacted by the hurricane, over 80 percent of the viable nesting trees for the red-cockaded woodpecker were destroyed.

It is estimated that the population of the red-cockaded woodpecker currently numbers about 5,000 to 10,000 birds living in the range from northern Florida to Virginia west to southern Missouri and northern Texas. The largest community groups are clustered in the Apalachicola National Forest in northern Florida, the Francis Marion National Forest in South Carolina and private and military land in eastern North Carolina. It is hoped that the data brought together in this bibliography will foster research in preservation of the habitat of the red-cockaded woodpecker and help in saving the species from extinction.

A great deal of research on the habitat and range of the red-cockaded woodpecker has been done in attempts to protect and increase its population. Jerome A. Jackson published *An Annotated Bibliography of the Red-Cockaded Woodpecker* in 1981. Since then much has been written regarding the red-cockaded woodpecker. This bibliography includes citations for the dates 1980-1997. It covers primarily journal

articles, books, government publications and dissertations. The following indices were reviewed: Agricola, Biological Abstracts, CAB Abstracts, Ecology Abstracts, Cambridge Scientific's Environmental Sciences and Pollution Management, the Monthly Catalog of Government Publications, Natural Resources Metabase, Dissertation Abstracts, the Wildlife Review, Zoological Record, CARL UnCover, OCLC's WorldCat and Dialog's Environment One Source, among others. In addition, the online library catalogs for the following institutions were searched: the Triangle Research Library Network (comprised of University of North Carolina-Chapel Hill, Duke University and North Carolina State University), Clemson University, Auburn University, Florida State University, the University of Florida, Mississippi State University, Texas A&M, and the University of Texas, to name some of the pertinent ones. The Community Ecology Research Library and the Old Growth Forest Databases of the Southeast Regional Office of the Nature Conservancy were also reviewed.

II. Bibliography (143K)

Akcakaya, H. Resit. (1997) "Red-Cockaded Woodpeckers: Evaluating the Impact of Alternative Timber Management Plans." *Applied Biomathematics*. Retrieved February 18, 1998 from the World Wide Web: <http://www.ramas.com/rcw.htm>

Evaluates the impact of forest management practices on the viability of a red-cockaded woodpecker metapopulation in Louisiana using Geographic Information System maps and data.

Alcock, J. E. (1990) *Decision Notice, Finding of No Significant Impact, and the Environmental Assessment for the Interim Standards and Guidelines for the Protection and Management of Red-Cockaded Woodpecker Habitat within 3/4 Mile of Colony Sites*. Atlanta, GA: U. S. Forest Service.

Allen, D. H., Franzeb, K.E. & Escano, R.E.F. (1993). Efficacy of Translocation Strategies for Red-Cockaded Woodpeckers. *The Wildlife Society Bulletin*, 21(2), 155-159.

Translocation of 16 red-cockaded woodpeckers to resident and abandoned clusters at the Savannah River Site, South Carolina led to an increase in population. Translocation was augmented by control of the southern flying squirrel population and artificial cavity excavation.

Allen, David H. (1991). *An Insert Technique for Constructing Artificial Red-Cockaded Woodpecker Cavities*. General Technical Report SE-73. Asheville, NC: U. S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

A complete guide for excavating red-cockaded woodpecker cavities. Discusses the results of artificial cavity use at the Savannah River Site and the Francis Marion National Forest, South Carolina, where of 300 artificial cavities installed, 60% were inhabited within the study period.

Baggett, David L. (1995). Improved installation of artificial cavities for red-cockaded woodpeckers. *The Wildlife Society Bulletin*, 23(1), 101-102.

Suggests the use of a lift bucket rather than ladders for installing artificial red-cockaded woodpecker cavities.

Baker, W. W. (1981). The distribution, status and future of the red-cockaded woodpecker in Georgia. In Odom, R.R. & Guthrie, J.W. (eds.), *Proceedings of the Nongame and Endangered Wildlife Symposium*, August 13-14, 1981. (pp.82-87). Technical Bulletin WL-5. Atlanta, GA: Georgia Department of Natural Resources, Game and Fish Division.

Baker, W. W., Thompson, R.L. & Engstrom, R.T. (1980). The distribution and status of red-cockaded woodpecker colonies in Florida: 1969-1978. *Florida Field Naturalist* 8(2), 41-45.

Barron, E. (1989). Management of the endangered red-cockaded woodpeckers on Texas state forests. *Texas Trees* 68(3), 8-9.

Bechtel National, Inc. (1985). *Threatened and Endangered Wildlife Survey: Vacherie Dome Area Louisiana*. San Francisco, CA: Bechtel National, Inc..

Literature review on the previous distribution of endangered species in Webster and Bienville Parishes, Louisiana includes the red-cockaded woodpecker.

Beck, R. A. (1991). Red-cockaded woodpecker. In Terwilliger, K. (coordinator). *Virginia's Endangered Species. Proceedings*. (pp. 513-514). Blacksburg, VA: McDonald and Woodward Publishers.

Provides an overview of red-cockaded woodpecker systematics and distribution. Indicates the status of the only breeding colony of red-cockaded woodpeckers, located in Suffolk county, was uncertain at the time of publication.

Beever, J. W. & Dryden, K.A. (1992) Red-cockaded woodpeckers and hydric slash pine flatwoods. In McCabe, R.E. (ed), *Transactions of the North American Wildlife and Natural Resources Conference, 57; Crossroads of Conservation: 500 Years After Columbus; Charlotte, North Carolina, March 27-April 1, 1992* (pp. 693-700). Washington, DC: Wildlife Management Institute.

The unique habitat requirements of red-cockaded woodpeckers in Florida are discussed. The hydric slash pine flatwoods are identified as the most preferred nesting and foraging habitat for the red-cockaded woodpecker in southern Florida.

Belanger, Roger P., Hedden, Roy L. & Lennartz, Michael R. (1988). The potential impact of the southern pine beetle on red-cockaded woodpecker colonies in the Georgia piedmont. *Southern Journal of Applied Forestry* 12(3), 194-199.

Thirty-four red-cockaded woodpecker colonies in Jones and Jasper counties, Georgia were evaluated for stand characteristics and susceptibility to southern pine beetle bark attack. Authors found colonies consisted primarily of loblolly pines and were at low risk for pine beetle attacks.

Bennett, Julie Raye. (1995). Economic Analysis of Market-Based Approaches to Conserving Endangered Species on Private Lands in Texas. Unpublished M. S. Thesis, Stephen F. Austin State University.

Uses the red-cockaded woodpecker as a case study to examine the economic aspects of endangered species protection.

Beyer, D. E., Costa, R., Hooper, R.G. & Hess, C.A. (1996). Habitat quality and reproduction of red-cockaded woodpecker groups in Florida. *Journal of Wildlife Management* 60(4), 826-835.

Studies the relationship between reproduction success of red-cockaded woodpecker groups and availability of nesting trees and habitat fragmentation on a population in the Apalachicola National Forest, Florida. Found no association between the number of young fledged and availability of pines or degree of habitat fragmentation.

Blackwell, B. F., Doerr, P.D., Reed, J.M. & Walters, J.R. (1995). Inbreeding rate and effective population size: A comparison of estimates from pedigree analysis and a demographic model. *Biological Conservation* 71(3), 299-304.

Using data from a long-term study of the red-cockaded woodpecker in North Carolina the authors constructed a pedigree which was used to determine the realized rate of inbreeding. Comparing their results with other published reports did not yield confident results. Suggests the use of multiple methods to increase accuracy when determining the loss rate for genetic variability.

Blue, Roberta J. (1985) Home Range and Territory of Red-Cockaded Woodpeckers Utilizing Residential Habitat in North Carolina. M. S. Thesis, North Carolina State University.

Bock, Carl E. (1984). Geographical correlates of abundance vs. rarity in some North American winterland birds. *The Auk* 101(2), 266-273.

Uses Christmas Bird Count (CBC) data to compare range sizes and within range abundance of 70 avian species in North America, including the red-cockaded woodpecker.

Bonnie, Robert. (1997). Safe harbor for the red-cockaded woodpecker. *Journal of Forestry* 95(4), 17-22.

Discusses statewide habitat conservation plans used to protect red-cockaded woodpecker habitat. Specific focus is placed on the North Carolina Sandhills region and the Safe Harbors program. The Safe Harbors program was designed to coordinate conservation efforts between private landowners and federal and state conservation offices.

Bonnie, Robert & Bean, Michael. (1996). Habitat trading for red-cockaded woodpeckers: Enhancing recovery, reducing conflicts. *Endangered Species Update* 13(4-5), 7.

Examines a habitat 'trading' plan designed to reduce conflicts with federal and state agencies and private landowners.

Bradshaw, Dana Seward. (1990) Habitat Quality and Seasonal Foraging Patterns of the Red-Cockaded Woodpecker (*Picoides borealis*) in Southeastern Virginia. M. A. Thesis, College of William and Mary.

Burnside, Fred L. (1983) The status and distribution of the red-cockaded woodpecker in Arkansas. *American Birds* 37(2), 142-145.

The red-cockaded woodpecker range in Arkansas is limited to the following physiographic regions: Gulf Coastal Plain, Ouachita Mountains and marginally the Mississippi Alluvial Plain. Includes range maps.

Camann, Michael Anthony. (1995) Spatially Explicit, Epidemiological Modeling Approaches to Understanding Insect Behavior and Insect-Vertebrate Competition at Multiple Spatial and Temporal Scales. Doctoral dissertation, University of Georgia.

Developed a Geographic Information System-based habitat suitability model for the red-cockaded woodpecker colonies on the coastal plain of Alabama and Georgia. The model was developed for use in conjunction with the southern pine beetle risk assessment model to determine the degree of habitat competition with the red-cockaded woodpecker.

Carrie, N. Ross, Moore, Kenneth R., Stephens, Stephanie A. & Keith, Eric L. (1996) Long-distance homing of a translocated red-cockaded woodpecker. *The Wildlife Society Bulletin* 24(4), 607-609.

Results of observing translocated red-cockaded woodpeckers in Louisiana and other studies suggest that the birds are capable of homing over long-distances. Homing is an infrequent occurrence, though the distance between capture and release sites for translocation needs careful consideration.

Carter, J. H. III. (1982) Flying squirrel found dead at red-cockaded woodpecker cavity. *Chat* 46(2), 44-45.

Carter, J.H. III. (1995). *Habitat Conservation Plan for the Red-Cockaded Woodpecker at the Jack Primus Tract, Berkeley County, South Carolina*. Asheville, NC: U. S. Fish and Wildlife Service, Endangered Species Field Office.

Carter, J.H. III. (1990) Population Trends and Reproductive Success of the Red-Cockaded Woodpecker on Three Study Areas in the North Carolina Sand Hills, 1980-1987. Doctoral dissertation, North Carolina State University.

Carter, J.H. III. (1995) The red-cockaded woodpecker: an endangered species in golf country. *USGA Green Section Record* 33(4), 8-9.

Carter, J. H. III, et. al. (1989). Restrictors for red-cockaded woodpecker cavities. *The Wildlife Society Bulletin* 17(1), 68-72.

Use of restrictors in cavity entrances is discussed. Preliminary data suggest restrictors do thwart predators, but red-cockaded woodpecker nesting is not any more frequent or successful as a result of their use.

Cash, George. (1998). *The red-cockaded woodpecker*. Ecosystem Fact Sheet. Eglin Air Force Base, Environmental Public Affairs, 13 November 1997. Retrieved February 13, 1998 from the World Wide Web: <http://tw1.eglin.af.mil/46xpe/fact/wpecker.htm>

Provides an overview of the red-cockaded woodpecker habitat and conservation efforts at Eglin Air Force Base, Florida. Natural resource managers have identified 260,000 acres suitable for red-cockaded woodpecker habitat at the Base.

Cely, John Emmett. (1983). Comments on "Relocating red-cockaded woodpeckers." *The Wildlife Society Bulletin* 11(2), 189.

Questions the feasibility of relocating red-cockaded woodpeckers as a management technique, as described in Odum, et. al., 1982.

Cely, John Emmett. (1985). Red-cockaded woodpecker found dead in cavity. *Chat* 49(4), 98.

Cely, John Emmett & Karge, Keith. (1992). An insular group of red-cockaded woodpeckers. *Chat* 56(1), 2-4.

Chrismer, Gloria Maples. (1996). Landscape Disturbances in Red-Cockaded Woodpecker Cavity Tree Clusters: Implications for Management. M. S. Thesis, Stephen F. Austin State University.
Red-cockaded woodpecker habitats in Texas national forests were investigated to determine cause, size, frequency, and sequence of disturbance (natural and anthropogenic) for canopy gaps.

Clark, A. (1993). Characteristics of timber stands containing sufficient heartwood for cavity excavation by red-cockaded woodpecker clans. In Brissette, John C (ed), *Proceedings of the Seventh Biennial Southern Silvicultural Research Conference; Mobile, Alabama, November 17-19, 1992* (pp. 621-626). General Technical Report SO-93. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Found that fast growing loblolly and longleaf pine stands offer the highest probability of developing sufficient heartwood for red-cockaded woodpecker cavity excavation at the earliest age based on a study of 29 loblolly and 22 longleaf pine stands.

Cleaves, D. R., Doherty, Busby, B. & Martel, J. (1994). Cost of protecting red-cockaded woodpecker habitat: Interaction of parcel and cluster size. In Newman, D.H. & Arnow, M.E. (eds.), *Forest Economics on the Edge: Proceedings of the Twenty-fourth Southern Forest Economics Workshop* (pp. 276-293). Athens, GA: University of Georgia.

Cohn, Jeffrey. (1998) Red-cockaded woodpecker. *From the Land To the Sea: The Navy Protects Endangered Species*, U. S. Air Force, Eglin Air Force Base, Environmental Public Affairs Coordinator, 17. Retrieved February 13, 1998 from the World Wide Web:
<http://128.174.5.51/denix/Public/News/Navy/Outreach/Endangered/pg17.html>

Profile of U. S. Navy efforts to restore red-cockaded woodpecker nesting habitat, damaged by Hurricane Hugo, on the Charleston Naval Weapons Station, South Carolina. Of the 54 nesting trees on the Station, prior to the storm, only three were found intact after the storm.

Collazo, Michelle. (1996) *The Red-Cockaded Woodpecker*. Gainesville, FL: University of Florida, Cooperative Extension Service, Institute of Food and Agricultural Sciences.

Conner, R. N. (1989). *Injection of 2,4-D to Remove Hardwood Midstory within Red-Cockaded Woodpecker Colony Areas*. Research Paper SO-251. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Observed red-cockaded woodpeckers in the Angelina National Forest after 2,4-D herbicide was used to control midstory growth. Suggests the use of less toxic hexazinone. Indicates that herbicides should only be used once, after which prescribed burns should be used to control midstory growth.

Conner, R. N. (1981). Fire and cavity nesters. In *Prescribed Fire and Wildlife in Southern Forests: Proceedings of a Symposium; Myrtle Beach, South Carolina, April 6-8, 1981* (pp. 61-66). Georgetown, SC: Belle W. Baruch Forest Science Institute of Clemson University.

Conner, Richard N., & Locke, Brian, A. (1982). Fungi and red-cockaded woodpeckers cavity trees. *Wilson Bulletin* 94(1), 64-70.

Examines internal conditions of red-cockaded woodpecker cavities to determine presence or absence of decay fungi species and the mode of entry for the heartwood fungi into cavity trees in east Texas. Found red heart fungus was most common, but six other species were also identified.

Conner, Richard N. & Rudolph, D. Craig. (1991). Effects of midstory reduction and thinning in red-cockaded woodpecker cavity tree clusters. *The Wildlife Society Bulletin* 19(1), 63-66.

Found sudden midstory removal during the non-breeding season did not negatively affect red-cockaded woodpecker groups or breeding succession in a study performed near 16 active groups in the national forests of east Texas.

Conner, Richard N. & Rudolph, D. Craig. (1991). Forest habitat loss, fragmentation and red-cockaded woodpecker populations. *Wilson Bulletin* 103(3), 446-457.

Measures the loss of mature forest habitat around red-cockaded woodpecker cavity clusters. Found negative association between habitat loss and group size.

Conner, Richard N. & Rudolph, D. Craig. (1995). Losses of red-cockaded woodpecker cavity trees to southern pine beetles. *Wilson Bulletin* 107(1), 81-92.

Examined southern pine beetle infestation on red-cockaded woodpecker cavity trees over an 11 year period on the Angelina National Forest, Texas. During periods of intense red-cockaded woodpecker population management there was high mortality rate of cavity trees from southern pine beetles (64%).

Conner, Richard N. & Rudolph, D. Craig. (1989). *Red-cockaded Woodpecker Colony Status and Trends on the Angelina, Davy Crockett, and Sabine National Forests*. Research Paper SO-250. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Found that the main reason for population declines in three east Texas national forest populations of the red-cockaded woodpecker included hardwood in the midstory and colony isolation. Suggests methods for hardwood control .

Conner, Richard N. & O'Halloran, Kathleen A. (1987). Cavity-tree selection by red-cockaded woodpeckers as related to growth dynamics of southern pines. *Wilson Bulletin* 99(3), 398-412.

Sampled 212 red-cockaded woodpecker cavity trees and 150 randomly selected mature pines. Found red-cockaded woodpecker trees were older, taller, had greater crown depths, volume, weights and diameter breast heights. Suggests the use of the shelterwood silviculture technique instead of clearcutting near red-cockaded woodpecker colonies in order to provide more usable habitat.

Conner, Richard N., Snow, Anne E. & Kathleen O'Halloran, Kathleen. (1991) Red-cockaded woodpecker use of seed-tree/shelterwood cuts in eastern Texas, [USA]. *The Wildlife Society Bulletin* 19(1), 67-73.

Suggests shelterwood silviculture technique may reduce fragmentation of red-cockaded woodpecker populations. The openness and older trees which results from the shelterwood method benefit red-cockaded woodpeckers by mimicking their preferred nesting habitat.

Conner, Richard N., Rudolph, D.C. & Bonner, L.H. (1995). Red-cockaded woodpecker population trends and management on Texas national forests. *Journal of Field Ornithology* 66(1), 140-151.

During a 1983 to 1993 study, red-cockaded woodpecker populations in Texas national forests increased as a result of intensive management. Management techniques included: control of hardwood midstory and understory, thinning of pines in cavity tree areas, use of cavity restrictors and artificial cavities and translocations to replace lost breeders, among

others.

Conner, Richard N., Rudolph, D. Craig, Kulhavy, David L. & Snow, Ann E. (1991). Causes of mortality of red-cockaded woodpecker cavity trees. *Journal of Wildlife Management* 55(3), 531-537.

Examined mortality of red-cockaded woodpecker cavity trees over a thirteen year period in the national forests of east Texas. Major causes of mortality for cavity trees were found to be bark beetles (53%), wind snap (30%), and fire (7%).

Conner, Richard N., Rudolph, D. Craig, Saenz, Daniel & Schaefer, Richard R. (1996). Red-cockaded woodpecker nesting success, forest structure, and southern flying squirrels in Texas. *Wilson Bulletin* 108(4), 697-711.

Determined the flying squirrel occupancy of loblolly-shortleaf pine habitat during a spring season. Found flying squirrel use of red-cockaded woodpecker cavities was variable and was not related to the presence or abundance of hardwoods. Observed several instances of red-cockaded woodpecker nest productivity while flying squirrels occupied cavities in the same tree.

Conner, Richard N., Rudolph, D. Craig, Schaefer, Richard R. & Saenz, Daniel. (1994). Heartwood, sapwood, and fungal decay associated with red-cockaded woodpecker cavity trees. *Journal of Wildlife Management* 58(4), 728-734.

Evaluated internal characteristics of 53 red-cockaded woodpecker cavity trees and 53 control trees to determine heartwood diameter, sapwood thickness and presence of heartwood fungus. Found red-cockaded woodpecker cavity trees had thinner sapwood and greater heartwood diameter. Heartwood decay was not found in trees less than 100 years old.

Conner, Richard N., Rudolph, D. Craig, Schaefer, Richard R. & Saenz, Daniel. (1997). Long-distance dispersal of red-cockaded woodpeckers in Texas. *Wilson Bulletin* 109(1), 157-160.

Examines six instances of long-distance dispersal in red-cockaded woodpecker populations in the Angelina, Davy Crockett and Sabine National Forests, Texas.

Conner, Richard N., Rudolph, D. Craig, Maxey, Ricky M. & Parker, M. Melissa. (1998) Southern Pine Beetle Infestation of Red-Cockaded Woodpecker Cavity Trees. Texas Parks and Wildlife, 18 August 1997. Retrieved February 13, 1998 from the World Wide Web: <http://www.tpwd.state.tx.us/hunt/research/rcwbeetle.htm>

Found only six red-cockaded woodpecker cavity trees were killed by southern pine beetles in the nearly 570 trees examined.

Cooper, Jeffrey Lane. (1997). Species Composition and Relative Abundance of Mammals in Managed Red-Cockaded Woodpecker Colony Sites and Unmanaged Stands. Doctoral dissertation, Mississippi State University.

Studied small and midsize mammal species composition and abundance in managed and unmanaged red-cockaded woodpecker colony sites. Found greater species abundance in the managed Noxubee Wildlife Refuge site than the unmanaged Bienville National Forest site.

Cooperative Extension Service, University of Georgia. Red-Cockaded Woodpecker: *Picoides borealis*. The Service. Retrieved February 13, 1998 from the World Wide Web:

<http://www.forestry.uga.edu/docs/for94-36.html>

A profile of the red-cockaded woodpecker's habits and habitat. Includes a generalized range map.

Copeyon, Carole K. (1990). A technique for constructing cavities for the red-cockaded woodpecker. *The Wildlife Society Bulletin* 18(3), 303-311.

Construction guidelines for building artificial red-cockaded woodpecker cavities. During the study period 80% of the constructed cavities were occupied.

Copeyon, Carole K. An Experimental Test of the Ecological Basis of Cooperative Breeding in the Red-Cockaded Woodpecker, and Implications for Management. M. S. Thesis, North Carolina State University.

Copeyon, Carole K., Walters, Jeffrey R. & Carter, J.H. III. (1991). Introduction of red-cockaded woodpecker group formation by artificial cavity construction. *Journal of Wildlife Management* 55(4), 549-556.

Previous studies indicate red-cockaded woodpeckers are reluctant to occupy sites without sufficient existing cavities. This study suggests reprovisioning can be used on vacant and abandoned sites in order to stabilize or increase red-cockaded woodpecker populations.

Corn, M. Lynne. (1993). *CRS Report for Congress: The Red-Cockaded Woodpecker Federal Protection*. Washington, DC: Congressional Research Service, Library of Congress.

Costa, R. (1992). *Red-Cockaded Woodpecker Procedures Manual for Private Lands* (Draft). Atlanta, GA: U. S. Fish and Wildlife Service, Southern Region.

Costa, R. & Kennedy, E.T. (1994). Red-cockaded woodpecker translocations 1989-1994: State-of-our knowledge. In *American Zoo and Aquarium Association Annual Conference Proceedings* (pp. 74-81). Wheeling, WV: American Zoo and Aquarium Association.

Costa, Ralph & Walker, Joan L. (1995). Red-cockaded woodpecker. In LaRoe, Edward T. (ed.), *Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U. S. Plants, Animals and Ecosystems* (pp. 86-89). Washington, DC: U. S. Department of Interior, National Biological Survey.

An outline of the historical distribution and abundance of the red-cockaded woodpecker including a comparative range map. Discusses population status and the causes for decline. Includes a state-by-state count of active clusters which indicates if the cluster is on federal, state or private land.

Costa, Ralph & Escano, R.E.F. (1989). *Red-Cockaded Woodpecker: Status and Management in the Southern Region in 1986*. Technical Publication R8-TP-12. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Region.

Crum, Dave. (1997). Red-Cockaded Woodpecker. GeoCites, 1997. Retrieved February 17, 1998 from the World Wide Web: <http://www.geocites.com/Heartland/5960/rcockade.html>

A birder's overview of the habitat and biology of the red-cockaded woodpecker.

Csuti, B. (1988) Red-cockaded woodpecker. *Conservation Biology* 2(2): 136-137.

Discusses some of the debate surrounding conservation efforts related to the red-cockaded woodpecker.

Daniels, Jean Marie. (1996). Economic Analysis of Property Tax Incentives for Management of the Red-Cockaded Woodpecker on Private Forest Lands in Texas. Doctoral dissertation, Stephen F. Austin State University.

Used the discounted cash flow methodology to compare per acre traditional short rotation loblolly pine management with long rotations needed to manage red-cockaded woodpecker habitat. Study attempts to determine if incentive programs can help alleviate the financial impacts for private landowners who maintain endangered species habitat.

DeFazio, John T., et. al. (1987). Red-cockaded woodpecker translocation experiments in South Carolina. *Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies 41*, 311-317.

Relocation of three female red-cockaded woodpeckers into separate colonies increased the local population after one nesting season. Flying squirrels were removed from cavities with nest box traps in order to reduce squirrel use of nesting cavities.

DeLotelle, R. S., Epting, R.J. & Newman, J.R. (1987). Habitat use and territory characteristics of red-cockaded woodpeckers in central Florida. *Wilson Bulletin 99(2)*, 202-217.

Habitat differences show effects of demographics, social dynamics and reproductive success between red-cockaded woodpecker populations.

DeLotelle, Roy S. & Epting, Robert J. (1988). Selection of old trees for cavity excavation by red-cockaded woodpeckers. *The Wildlife Society Bulletin 16(1)*, 48-52.

Results confirm the red-cockaded woodpeckers preference for old-age pine trees for cavity excavation in longleaf pine forests based on a study of the nesting habitat for two Florida and one North Carolina populations.

DeLotelle, Roy S. & Epting, Robert J. (1992). Reproduction of the red-cockaded woodpecker in Central Florida." *Wilson Bulletin 104(2)*, 285-294.

Reiterates the results of DeLotelle, et. al., 1988.

Department of the Army Corps of Engineers. (1983). *Wildlife Mitigation Feasibility Study, Tennessee-Tombigbee Waterway, Alabama and Mississippi*. Mobile, AL: Department of Army, Corps of Engineers.

Devlin, W. J., Mosher, J.A. & Taylor, G.J. (1980). Potential red-cockaded woodpecker habitat in Maryland. *Natural History Miscellanea 212*, 1-7.

After a year-long study of the potential habitat in Maryland suitable for the red-cockaded woodpecker, the authors found that there were no active colonies. Suggests that management of marginal red-cockaded woodpecker habitat could promote red-cockaded woodpecker colonization in Maryland.

Devlin, W. J., Mosher, J.A. & Taylor, G.J. (1980). History and present status of the red-cockaded woodpecker in Maryland. *American Birds 34(3)*, 314-316.

Found no living red-cockaded woodpeckers in Maryland despite previous sightings in Patuxent, Gum Swamp, Blackwater, Assateague and Golden Hill.

Dickson, James G. (1991). Birds and mammals of pre-colonial southern old-growth forests. *Natural Areas Journal 11(1)*, 26-33.

Describes wildlife and habitat of pre-colonial forests. Posits that the red-cockaded

woodpecker was probably abundant in the pre-colonial southeastern longleaf pine forests because these forests were frequently burned thus resulting in an ideal habitat for the species.

Dimmick, R. W. (1980). *Red-Cockaded Woodpecker in the Great Smoky Mountains National Park: Their Status and Habitat*. Atlanta, GA: U. S. Department of Interior, National Park Service, Southeast Regional Office, Natural Science and Research Division.

Doerr, Phillip. (1993). Review of "A Stillness in the Pines." *Journal of Wildlife Management* 57(1), 192-194.

Mixed review of *A Stillness in the Pines*. Questions some of the data presented, but felt that the title was a welcome addition to the red-cockaded woodpecker literature.

Doerr, P. D. & Hair, J.D. (1983). *Red-Cockaded Woodpecker Status in North Carolina*. Raleigh, NC: North Carolina State University.

Doerr, P. D., Walters, J.R. & Carter, J.H.,III. (1990). Reoccupation of abandoned clusters of cavity trees (colonies) by red-cockaded woodpeckers. *Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies* 43, 326-336.

Ten year study of red-cockaded woodpecker cavity tree cluster occupation in North Carolina found 93% of clusters occupied while 6.8% were abandoned annually. Abandoned sites were found to have a 60% chance of reoccupation within a ten year period.

Dong, Quan. (1991). Demographic Analysis and Stochastic Simulation of a Red-Cockaded Woodpecker Population on the Piedmont National Wildlife Refuge, Georgia. M. S. Thesis, Duke University.

Eddleman, W. R. (1985). *An Investigation of the Population Status and Habitat Conditions for the Red-Cockaded Woodpecker in Missouri*. [Jefferson City, MO?]: Missouri Department of Conservation.

Eddleman, William R. & Clawson, Richard L. (1987). Population status and habitat conditions for the red-cockaded woodpecker in Missouri, [USA]. *Transactions of the Missouri Academy of Science* 21, 105-118.

Found no red-cockaded woodpeckers or active cavities in 122 national forest sites in Missouri. All cavities found were attributed to other woodpecker species. Discusses the original range of the red-cockaded woodpecker in Missouri and potential reasons for why no active colonies were found at the time of the study.

Edwards, J. W., Stevens, E.E. & Dachelet, C.A. (1997). Insert modifications improve access to artificial red-cockaded woodpecker nest cavities. *Journal of Field Ornithology* 68(2), 228-234.

Suggests modifications to artificial red-cockaded woodpecker cavity construction. Modifications make it easier to inspect the interior and do not appear to affect red-cockaded woodpecker behaviors.

Engstrom, R. T. (1995, September 29). *Red-Cockaded Woodpecker Behavioral Response to the Use of Fire Retardant Foaming Agents*. Tall Timbers Research Station. Retrieved February 13, 1998 from the World Wide Web: <http://fire.r9.fws.gov/ifcc/research/rcwrep.html>

Discusses the impacts of foam concentrate surfactants, used to control prescribed burns in cavity stands, on red-cockaded woodpeckers. Found foam could affect birds through direct contact and accidental ingestion. Suggests sparing use of the foam on ground-level vegetation at least three meters from cavity trees.

Engstrom, R. T. (1996). Silvicultural practices and red-cockaded woodpecker management: A reply to Rudolph and Conner. *The Wildlife Society Bulletin* 24(2), 334-338.

Responds to the Rudolph and Conner, 1996 article about red-cockaded woodpecker preferences between uneven-aged and even-aged silviculture.

Engstrom, R. Todd & Evans, Gregory W. (1990). Hurricane damage to red-cockaded woodpecker cavity trees. *The Auk* 107(3), 608-610.

Reports storm damage to red-cockaded woodpecker cavity trees from Tropical Storm Juan, and Hurricanes Kate and Elena (fall 1985) in the forests of northern Florida and southern Georgia.

Environmental Defense Fund. (1995). *Meet the Red-Cockaded Woodpecker*. Environmental Defense Fund. Retrieved February 13, 1998 from the World Wide Web:

<http://www.edf.org/want2help/es/redcockadwood.html>

Brief overview of red-cockaded woodpecker distribution and conservation efforts including links to EDF efforts in support of the Endangered Species Act.

Environmental Defense Fund. (1996, May 28). *Red-Cockaded Woodpecker "Safe Harbor" for Landowners Proves Big Success*. Environmental Defense Fund News Releases. Retrieved February 13, 1998 from the World Wide Web:

http://www.edf.org/pubs/newsreleases/1996/may/e_ncpk.html

Environmental Impact on Endangered Animals: Red-Cockaded Woodpecker (Picoides borealis). (1998 February). Retrieved February 13, 1998, from the World Wide Web:

http://ananke.advanced.org/2878/tx_red-cockaded_woodpecker.html

Profile of the Safe Harbors conservation plan in North Carolina which attempts to harmonize the interests of private landowners and endangered species.

Erbilgin, Nadir. (1997). Dispersion Patterns of Disturbances and Canopy Gaps in Red-Cockaded Woodpecker Cavity Tree Clusters. M. S. Thesis, Stephen F. Austin State University.

A managed red-cockaded woodpecker habitat in Texas was investigated to determine the cause, size, frequency and sequence of both natural and anthropogenic disturbance-caused canopy gaps. The most common cases of disturbances were lightning and bark beetles.

Ehrlich, Paul R., Dobkin, David S. & Wheye, Darryl. (1992). *Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico*.

Stanford, CA: Stanford University Press.

Synopsis of nesting, food, range and conservation efforts relating to endangered and threatened birds in North America, including the red-cockaded woodpecker.

Ertep, Serdar A. & Lee, Gregory W. (1994). Use of GRASS to Facilitate Red-Cockaded Woodpecker Management at Fort Benning Military Reservation. Urban and Regional Information Association, Spatial Odyssey Database. Retrieved February 17, 1998 from the World Wide Web:

<http://www.sgi.ursus.maine.edu/gisweb/spatdb/urisa/ur94056.html>

Describes the use of Geographic Resources Analysis Support System (GRASS) to

determine the amount of suitable red-cockaded woodpecker foraging habitat at Fort Benning, Georgia. With the use of GRASS researchers were able to determine total basal area and the number of pine stems in significantly less time than traditional field-based analysis methods.

Everhart, Steven Howard. (1986). Avian Interspecific Utilization of Red-Cockaded Woodpecker Cavities. Doctoral dissertation, North Carolina State University.

Studies the relationships among measures of midstory vegetation, dead tree density, cavity nesting bird density and use of red-cockaded woodpecker cavities by other species in 12 red-cockaded woodpecker groups in south-central North Carolina.

Ferral, D. Pat, Edwards, John W. & Armstrong, Amy E. (1997). Long-distance dispersal of red-cockaded woodpeckers. *Wilson Bulletin* 109(1), 154-157.

Found female red-cockaded woodpeckers almost exclusively disperse from their natal area. Studies seven long-distance dispersal events by both juvenile and adult birds.

Field, R. & Williams, B.K. (1985). Age of cavity trees and colony stands selected by red-cockaded woodpeckers. *The Wildlife Society Bulletin* 13(1), 92-96.

Attempts to build a quantitative model of red-cockaded woodpecker nesting habitat based on data from the literature rather than field work.

Finto, Kevin J. (1995). Reexamining the endangered species act. In *TAPPI Proceedings of International Environmental Conference, Vol. 2* (pp. 1085-1092). Atlanta, GA: TAPPI Press.

Provides a detailed description of substantive and procedural requirements of the Endangered Species Act and some proposals to reduce the economic impacts of its implementation. Considers case studies of the spotted owl, bald eagle and the red-cockaded woodpecker with specific emphasis on the pulp and paper industry.

Flather, Curtis H. & King, Rudy M. (1992). Evaluating performance of regional wildlife habitat models: Implications to resource planning. *Journal of Environmental Management* 34(1), 31-46.

Regional wildlife habitat models are used to determine the relationship between the composition of land use and land cover to the abundance or presence of white-tailed deer, wild turkey and the red-cockaded woodpecker.

Franzeb, K. E. (1997). Success of intensive management of a critically imperiled population of red-cockaded woodpeckers in South Carolina. *Journal of Field Ornithology* 68(3), 458-470.

The 1985 red-cockaded woodpecker population at the Savannah River Site, South Carolina was down to four birds. Using intensive management practices including translocation, installation of artificial cavities and the removal of competitors yielded significant growth in the population. The population increased to 19 breeding pairs and 99 birds.

Franzeb, K. E. & Hanula, J.L. (1995). Evaluation of photographic devices to determine nestling diet of the endangered red-cockaded woodpecker. *Journal of Field Ornithology* 66(2), 253-259.

Use of several different types of photographic devices were evaluated for their use in quantifying the diet of nestling red-cockaded woodpeckers. Found that a Nikon F4 camera with flash attachment and Trailmaster sensor was the most successful combination.

- Freeman, J. T. (1984). Woodsman spare that woodpecker! *Defenders* 59(6), 5-13.
Popular article on the effort to manage red-cockaded woodpecker populations and their common predators. Provides information on how the public can help red-cockaded woodpecker conservation efforts.
- Fuller, Richard Shane. (1994). Relationships Between Northern Bobwhite Habitat Use and Forest Stands Managed for Red-Cockaded Woodpeckers at Noxubee National Wildlife Refuge. Doctoral dissertation, Mississippi State University.
Found a strong correlation with the northern bobwhite use of red-cockaded woodpecker habitats. Both species benefit from habitat management plans that promote low basal areas and reduced litter.
- Gann, Rod M. & Beverlin, Barbara. (1991). New line flows gas from prolific Arkoma basin to eastern U.S. *Oil and Gas Journal* 89(6), 4.
Discusses environmental obstacles, including red-cockaded woodpecker populations, which had to be surmounted in construction of a natural gas pipeline from Oklahoma to the eastern U.S.
- Georgia Department of Natural Resources. (1996). *Remnants of a Forest: Georgia's Longleaf Pine Ecosystem*. Atlanta, GA: The Department.
A video exploring Georgia's last remaining longleaf pine stands with a focus on the plants and animals that depend on this ecosystem to survive, including the red-cockaded woodpecker.
- Gorsira, B., Belfit, S.C. & Cantrell, M.A. (1996). Alleviating conflicts between Army training and endangered species at Fort Bragg. *Federal Facilities Environmental Journal* 7(3), 59-67.
A large proportion of the red-cockaded woodpecker population is located in the Sandhills region of North Carolina, with the majority of the birds in this area nesting at the Fort Bragg Military Installation, Camp Mackall, the Sandhills Game Lands and on private land. The article presents an overview of the efforts between federal, state and private conservation organizations to protect the red-cockaded woodpecker and its unique habitat in this area.
- Gowaty, Patricia Adair & Lennartz, Michael R. (1985). Sex ratios of nestling and fledgling red-cockaded woodpeckers (*Picoides borealis*) favor males. *American Naturalist* 126(3), 347-353.
Found no relationship between the presence or absence of helpers to progeny sex. Observed that nestling sex variations may be related to kinship asymmetries among clan types. Suggests further research is needed in this area of red-cockaded woodpecker behavior.
- Hacker, W. D. (1994). Growth models loblolly and shortleaf pine red-cockaded woodpecker nesting trees. *The Texas Journal of Science* 46(2), 187-198.
Red-cockaded woodpecker nesting trees damaged by a tornado event in the Angelina and Davy Crockett National Forests, Texas were subjected to a stem analysis.
- Hagan, J. M. & Reed, J.M. (1988). Red color bands reduce fledgling success in red-cockaded woodpeckers. *The Auk* 105(3), 498-503.
Reduced fledgling success of male red-cockaded woodpeckers tagged with red monitoring bands was found consistent with the species-recognition hypothesis and coverable-badge

hypothesis. Authors suggest that the inability to hide the red color bands is detrimental since display of the red cockaded typically signals aggression.

Hagan, J. M. & Reed, J.M. (1989) Response to Hill and Carr. *The Auk* 106(3), 518-520. [See also Hill, G. E. and D. E. Carr, 1989.]

Responds that data in the original study (Hagan and Reed, 1988) is accurate.

Haig, S. M., Belthoff, J.R. & Allen, D.H. (1993). Examination of population structure in red-cockaded woodpeckers using DNA profiles. *Evolution* 47(1), 185-194.

Studies the degree to which DNA similarity is related to kinship and population structure in natural populations of the red-cockaded woodpecker in South Carolina.

Haig, S. M., Belthoff, J.R. & Allen, D.H. (1993). Population viability analysis for a small population of red-cockaded woodpeckers and an evaluation of enhancement strategies. *Conservation Biology* 7(2), 289-301.

Performed a series of population pedigree analyses in order to examine viability of small red-cockaded woodpecker populations in the Savannah River Site, South Carolina. Found population survival is precarious because of a lack of gene diversity.

Haig, S. M. Bowman, R. & Mullins, T.D. (1996). Population structure of red-cockaded woodpeckers in south Florida: RAPDs revisited. *Molecular Ecology* 5(6), 725-734.

Found significant genetic differentiation within six south Florida red-cockaded woodpecker populations which were examined for genetic diversity and population structure. Suggests that translocation of birds between proximate populations is preferable to movement between distant populations.

Haig, S. M., Rhymer, J.M. & Heckel, D.G. (1994). Population differentiation in randomly amplified polymorphic DNA of red-cockaded woodpeckers *Picoides borealis*. *Molecular Ecology* 3(6), 581-595.

Random amplified polymorphic (RAPD) DNA phenotypes for 101 birds in 14 populations found no population-specific markers. Results confirm that translocation can be used as a successful red-cockaded woodpecker management technique.

Haig, S. M., Walters, J.R. & Plissner, J.H. (1994). Genetic evidence for monogamy in the cooperatively breeding red-cockaded woodpecker. *Behavioral Ecology and Sociobiology* 34(4), 295-303.

Examined the genetic relationship among parents, offspring and helpers in 224 red-cockaded woodpeckers from North Carolina. Found that in all but one case DNA profiles indicated that offspring were sired by putative parents. The exceptional case was sired by a male external to the studied group.

Hanula, J. L. & Franzeb, K.E. (1995). Arthropod prey of nestling red-cockaded woodpeckers in the upper coastal plain of South Carolina. *Wilson Bulletin* 107(3), 485-494.

Four red-cockaded woodpecker cavities were monitored with cameras to determine prey fed to nestlings. The most common prey fed to nestlings were wood roaches (69.4%), wood borer larvae (5.4%), lepidoptera larvae (4.5%) and ants (3.1%).

Harlow, Richard F. & Doyle, Arlene T. (1990). Food habitats of southern flying squirrels collected from red-cockaded woodpecker colonies in South Carolina. *American Midland Naturalist* 124(1), 187-191.

Stomach contents of 71 squirrels were collected over a 12 month period in South Carolina. Most prevalent food items found were starch grains and seed coat parts of acorns.

Harlow, Richard F., Hopper, Robert G. & Lennartz, Michael R. (1983). Estimating numbers of red-cockaded woodpecker colonies. *The Wildlife Society Bulletin* 11(4), 360-363.

Estimated red-cockaded woodpecker population size by using a 460 meter diameter circles to aggregate individual cavity trees which have been plotted into colony groups. With use of complimentary check methods, estimates were found to be 80 to 90% accurate.

Harris, Barbara A. & Jerauld, Ann E. (1982). Extra-hole roosting and changes in hole use by two juvenile red-cockaded woodpeckers. *Florida Field Naturalist* 10(1), 21.

Harwood, M. (1983). A clannish problem. *Audubon* 85(4), 30-32.

A popular article describing the red-cockaded woodpecker's social nesting habits. Describes conservation efforts.

Hawkins, Diana. (1995). Safe harbors. *Endangered Species Bulletin* 20(3), 10.

Provides an overview of a conservation plan between the federal government and private landowners. Landowners agree to terms of protection on private lands and Fish and Wildlife Service biologists monitor the birds and habitat.

Hayden, Timothy J. (1997). *Biological Assessment of the Effects of the Proposed Revision of the 1994 "Management Guidelines for the Red-Cockaded Woodpecker on Army Installations."* USACERL Special Report 97/48. Champaign, IL: U. S. Army Corps of Engineers Construction Engineering Laboratories.

Heinrichs, J. & Heinrichs, D.B. (1984) The woodpecker and the pines. *American Forests* 90(3), 24-26, 46-49.

Overview of red-cockaded woodpecker habitat and conservation methods. Provides a profile of the conservation efforts of Jerome Jackson, a leading red-cockaded woodpecker researcher. Includes an historical range map.

Heppell, S. S., Walters, J.R. & Crowder, L.B. (1993). A stage-based model for management of an endangered cooperative breeder the red-cockaded woodpecker. *Bulletin of the Ecological Society of America* 74(Supplement 2), 273-274.

A brief explanation of a hypothesis stating that models of the long term effects for some management plans may result in the increased survival of the red-cockaded woodpecker species but do not maintain or increase suitable habitat.

Heppell, S. S., Walters, J.R. & Crowder, L.B. (1994). Evaluating management alternatives for red-cockaded woodpeckers: A modeling approach. *Journal of Wildlife Management* 58(3), 479-494.

Presents a male-only stage-based matrix model for assessing red-cockaded woodpecker management techniques. Found the most likely way to restore declining red-cockaded woodpecker habitat was to increase the number of nesting cavities in unoccupied, suitable habitat.

Hernando, Ernesto J. (1992). A Habitat Suitability Index Model for the Red-Cockaded Woodpecker. M. S. Thesis, Colorado State University.

Hess, Charles A. (1997). Diet of the Red-Cockaded Woodpecker in the Apalachicola National Forest. M. S. Thesis, Florida State University.

Hill, G. E. & Carr, D.E. (1989). Statistical inference from color banding data. *The Auk* 106(3), 517-518.

Implies that Hagan and Reed's (1988) data, which implied the use of red color bands to monitor red-cockaded woodpeckers is detrimental to their reproductive success, is inaccurately determined.

Hines, Martina. (1993). Some Aspects of the Foraging Behavior of Red-Cockaded Woodpeckers on the Daniel Boone National Forest in Kentucky. M. S. Thesis, University of Kentucky.

Hipes, D. L. & Jackson, D. R. (1996). Rare vertebrate fauna of Camp Blanding Training Site, a potential landscape linkage in northeastern Florida. *Florida Scientist* 59(2), 96-114.

Observed 18 species of rare vertebrates, including the red-cockaded woodpecker. Suggests the use of more ecologically sensitive practices may promote Camp Blanding as a viable location for endangered species populations and promote greater biodiversity in northern Florida and southern Georgia.

Hooper, Robert G. (1982). Use of dead cavity trees by red-cockaded woodpeckers. *The Wildlife Society Bulletin* 10(2), 163-164.

Examines the use of dead cavity trees by adult and juvenile red-cockaded woodpeckers.

Hooper, Robert G. (1988). Longleaf pines used for cavities by red-cockaded woodpeckers. *Journal of Wildlife Management* 52(3), 392-398.

Examines characteristics and availability of young and old longleaf pines and their use as red-cockaded woodpecker cavities as well as the population density of the species in the Osceola, Ocala and Francis Marion National Forests, Florida.

Hooper, Robert G. (1996). Arthropod biomass in winter and the age of longleaf pines. *Forest Ecology and Management* 82(1-3), 115-131.

Red-cockaded woodpeckers require arthropod biomass from living pine trees in order to fulfill their nutrient requirements. The arthropod biomass yield of longleaf pines is related to the tree's age. Found that the biomass yield increases until the trees are 86 years old, after which the yield declines with increasing age.

Hooper, Robert G & Harlow, Richard F. (1986). *Forest Stands Selected by Foraging Red-Cockaded Woodpeckers*. Research Paper SE-259. Asheville, NC: U. S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

Study of the foraging habitats of 18 red-cockaded woodpecker clans found that birds were not very selective in terms of stand age. Found a weak preference towards stand density, basal area and diameter breast heights.

Hooper, Robert G. & Lennartz, Michael R. (1981). Foraging behavior of the red-cockaded woodpeckers in South Carolin., *The Auk* 98(2), 321-334.

Discusses foraging preferences of male and female red-cockaded woodpeckers. Live pines were selected over hardwoods. Average foraging height for males was 14.1 meters, and for females it was 8.7 meters. Observed seasonal differences in foraging sites and methods.

Hooper, Robert G. & Lennartz, Michael R. (1983). Roosting behavior of red-cockaded woodpecker clans with insufficient cavities. *Journal of Field Ornithology* 54(1), 72-76.

Observed open roosting on trunks and limbs of live pines as well as extraterritorial roosting in cavities of neighboring clans as common behaviors in red-cockaded woodpecker clans which have insufficient cavities.

Hooper, R. G. & Muse, H.D. (1989). *Sequentially Observed Periodic Surveys of Management Compartments to Monitor Red-Cockaded Woodpecker Populations*. Research Paper SE-276. Asheville, NC: U. S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

Suggests habitat management techniques such as thinning and regeneration of cavity stands provides opportunities to gather data on cavity trees and populations. Recommends gathering annual estimates rather than every five to ten years.

Hooper, Robert G., Robinson, Jr., Andrew F. & Jackson, Jerome A. (1980). *The Red-Cockaded Woodpecker: Notes on Life History and Management*. General Technical Report SA-GR 9. Atlanta, GA: U. S. Department of Agriculture, Forest Service, Southern Region.

Hooper, Robert G., Krusac, Dennis & Carlson, Danny. (1991). An increase in a population of red-cockaded woodpeckers. *The Wildlife Society Bulletin* 19(3), 277-286.

Found a red-cockaded woodpecker population in the Francis Marion National Forest, South Carolina, increased from 427 clans in 1980-1981 to 470 clans in 1987-1988. Observed that habitat was abandoned at a rate of 1.1% annually.

Hooper, Robert G., Watson, J. Craig & Escano, Ronald E.F. (1990). Hurricane Hugo's initial effects on red-cockaded woodpeckers in the Francis Marion National Forest. In McCabe, Richard E. (ed), *Transactions of the North American Wildlife and Natural Resources Conference, 55; Resource Management for the '90s; Denver, Colorado, March 16-21, 1990* (pp. 220-224. Washington, DC: Wildlife Management Institute.

Studying the impacts of Hurricane Hugo on lost habitat (87 percent) and lost population (67 percent) in the Francis Marion National Forest prompts the authors to suggest that large populations of red-cockaded woodpecker geographically dispersed may be a key to the species survival since hurricanes are a regular uncontrollable occurrence in their habitat range.

Hooper, Robert G., Lennartz, Michael R. & Muse, H. David. (1991). Heart rot and cavity tree selection by red-cockaded woodpecker. *Journal of Wildlife Management* 55(2), 323-327.

The use of trees with decayed heartwood by red-cockaded woodpeckers in this study supports previous studies which indicate that trees with heartwood decay are their preferred habitat.

Hooper, Robert G., Niles, Lawrence J., Harlow, Richard F. & Wood, Gene W. (1982). Home ranges of red-cockaded woodpeckers in coastal South Carolina. *The Auk* 99(4), 675-682.

Observations of 24 red-cockaded woodpecker groups found the average home range to be 86.9 hectares. Seasonal variations in the size of home ranges between groups and within groups were related to group size and population density.

Hovis, Julie Anne. (1982). Population Biology and Vegetative Requirements of the Red-Cockaded Woodpecker (*Picoides borealis*) in Apalachicola National Forest, Florida. M. S. Thesis, University of Florida.

Hovis, Julie Anne. (1997). *Red-Cockaded Woodpecker Status on the Goethe State Forest*. Tallahassee, FL: Florida Game and Fresh Water Fish Commission.

Hovis, Julie A. & Labisky, Ronald F. (1985). Vegetative associations of red-cockaded woodpecker colonies in Florida. *The Wildlife Society Bulletin* 13(3), 307-314.

Presents quantitative data that red-cockaded woodpeckers prefer open, mature, pine stands with little undergrowth as their preferred roosting habitat. Results are based on a study of 42 colonies in five 181 hectare areas in the Apalachicola National Forest.

Hughell, David Alan. (1997). *Simulated Adaptive Management for Timber and Wildlife Under Uncertainty*. Doctoral dissertation, North Carolina State University.

Using a spatially-based stochastic 200 year-run simulation model of red-cockaded woodpecker behavior in conjunction with forest management optimization algorithms the author identifies production possibilities that benefit timber production and red-cockaded woodpecker habitat.

Hunt, Frances. (1988). Wildlife issues in national forests. In Chandler, William J. (ed.), *Audubon Wildlife Report 1988/1989* (pp. 101-129). San Diego, CA: Academic Press.

Examines management plans in national forests for several endangered species including the red-cockaded woodpecker (pp. 116-119, 122)

Hyde, W. F. (1989). Marginal cost of managing endangered species: The case of the red-cockaded woodpecker. *Journal of Agricultural Economics Research* 41(2), 12-19.

Case study for red-cockaded woodpecker management in the Croatan National Forest, North Carolina suggests costs for management are easy to calculate and can help clarify management and policy alternatives.

Irwin, L. L. & Wigley, T.B. (1992) Impacts on private forestry of conservation strategies for threatened and endangered species. In McCabe, Richard E. (ed.), *Transactions of the North American Wildlife and Natural Resources Conference, 57; Crossroads of Conservation: 500 years after Columbus; Charlotte, North Carolina, March 27-April 1, 1992* (pp. 657-664). Washington, DC: Wildlife Management Institute.

Suggests that promoting private support for landscape-scale conservation techniques and cooperative management plans in endangered species habitat will increase probability of survival. Uses the red-cockaded woodpecker as a case study.

Irwin, L. L. & Wigley, T.B. (1993) Toward an experimental basis for protecting forest wildlife. *Ecological Applications* 3(2), 213-217.

Authors suggest the use of adaptive management practices over soft inferencing systems. Uses the red-cockaded woodpecker and spotted owls as case studies.

Jackson, Jerome A. (1981). *An Annotated Bibliography of the Red-Cockaded Woodpecker*. Aiken, SC: Savannah River National Environmental Research Park, Savannah River Ecology Lab.

Over 170 citations to the literature of the red-cockaded woodpecker from the species' first identification to 1980. Citations are annotated with geographic and subject codes, including: level of data, taxonomy, distribution, habitat, breeding, et. al.

Jackson, Jerome A. (1984). *Red-Cockaded Woodpecker Studies at the Savannah River Plant, South Carolina: 1976-1984*. Final Technical Summary Report. Prepared for the U. S. Department of

Energy.

Jackson, Jerome A. (1985). An evaluation of aerial survey techniques for red-cockaded woodpeckers. *Journal of Wildlife Management* 49(4), 1083-1088.

Comparisons between aerial survey techniques found that the best results occurred with double coverage perpendicular transects on calm, overcast winter days. Aerial techniques offer useful alternatives for locating red-cockaded woodpeckers in previously inaccessible areas.

Jackson, Jerome A. (1986). Biopolitics, management of federal lands, and the conservation of the red-cockaded woodpecker. *American Birds* 40(5), 1162-1168.

Summarizes the unique biology and problems resulting from the red-cockaded woodpecker's endangered species status. Conservation efforts are profiled.

Jackson, Jerome A. (1985). Cavity tree killed by red-cockaded woodpeckers. *Chat* 49(3), 72-74.

Jackson, Jerome A. (1990) Intercolony movements of red-cockaded woodpeckers in South Carolina. *Journal of Field Ornithology* 61(2), 149-155.

Found red-cockaded woodpeckers movement associated with a reduction in the number of roosting cavities (frequently usurped by southern flying squirrels) and the sudden removal of understory vegetation within colony sites.

Jackson, Jerome A. (1987). The red-cockaded woodpecker. In DiSilvestro, Roger L. (ed.), *Audubon Wildlife Report 1987* (pp. 479-494). San Diego, CA: Academic Press.

Overview of the red-cockaded woodpecker's natural history, significance, historical perspective, population trends, management plans and survival prognosis. Outlines recommendations for the survival of the species.

Jackson, Jerome A. (1988) The southeastern pine forest ecosystem and its birds: Past, present and future. In Jackson, J.A. (ed), *Bird Conservation* 3 (pp. 119-159). Madison, WI: University of Wisconsin Press.

Discusses the land use and silviculture methods used in southeastern forests in relation to their impact on the red-cockaded woodpecker. Makes suggestions for improving red-cockaded woodpecker habitat.

Jackson, Jerome A. (1994) *Red-Cockaded Woodpecker: Picoides Borealis*. *The Birds of North America* no. 85. A joint publication of the Washington, DC: American Ornithologist's Union and Philadelphia, PA: Academy of Natural Sciences.

Extensive overview of the systematics, range and habitat of the red-cockaded woodpecker.

Jackson, Jerome A. & Schardein Jackson, Betty J. (1986). Why do red-cockaded woodpeckers need old trees? *The Wildlife Society Bulletin* 14(3), 318-322.

Refutes the findings in Field and Williams (1985) and outlines why red-cockaded woodpeckers need old trees. Indicates preferred characteristics for red-cockaded woodpecker habitat include: stand density, soil nutrients, water supply, tree size, resin flow and heartwood to sapwood ratio among others.

Jackson, Jerome A., Schardein, Betty J. & Miller, Patricia Ramey. (1983). Moving red-cockaded woodpecker colonies: Relocation or phased destruction? *The Wildlife Society Bulletin*

11(1), 59-62.

Strongly encourages protection of existing red-cockaded woodpecker habitat and the use of conservation methods other than translocation for population management.

Jackson, J. A., Conner, Richard N. & Jackson, B.J.S. (1986) The effects of wilderness on the endangered red-cockaded woodpecker. In Kulhavy, D.D. & Conner, Richard N. (eds.) *Wilderness and Natural Areas in the Eastern United States: A Management Challenge* (pp. 71-78).

Nacogdoches, TX: Center for Applied Studies, School of Forestry, Stephen F. Austin State University.

Suggests a fire regime suitable for maintaining red-cockaded woodpecker habitat. Gives a synopsis of existing red-cockaded woodpecker groups in wilderness areas throughout the southeastern U.S.

James, D. A., Hart, D.L. & Burnside, F.L. (1981). *Study of the Red-Cockaded Woodpecker in Arkansas: Final Report*. Fayetteville, AR: University of Arkansas, Department of Zoology.

James, Frances C. (1991). Signs of trouble in the largest remaining population of red-cockaded woodpeckers. *The Auk* 108(2), 419-423.

A random sample of 50 out of 186 'active' sites in an eastern district of the Apalachicola National Forest, Florida found 26% of the sites abandoned and 37% inhabited by a single bird indicating a potential population crash. Management recovery plans are suggested.

James, F. C., Hess, C.A. & Kufrin, D. (1997). Species-centered environmental analysis: Indirect effects of fire history on red-cockaded woodpeckers. *Ecological Applications* 7(1), 118-129.

Suggests environmental factors including insufficient and/or fragmented habitat, shortage of suitable cavities and demographic isolation limit the size of red-cockaded woodpecker populations. Studied 87 groups and found that fire driven ecological processes are another factor impacting population size--affecting both ground cover and clutch size.

Johnson, Linda K. (1985). Forest Habitat Analysis for Potential Red-Cockaded Woodpecker (*Picoides borealis*) Habitat at the Big South Fork National River and Recreation Area, Kentucky and Tennessee. M. S. Thesis, Tennessee Technological University.

Jones, Charles Michael. (1994). Foraging Habitat of the Red-Cockaded Woodpecker on the D'Abonne National Wildlife Refuge. M. S. Thesis, Louisiana Technical University.

Jones, E. P. Jr. (1993) Silvicultural treatments to maintain red-cockaded woodpecker habitat. In Brissette, John C. (ed.), *Proceedings of the Seventh Biennial Southern Silvicultural Research Conference; Mobile, Alabama, November 17-19, 1992* (pp. 627-632). General Technical Report SO-93. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Found the use of an herbicide with summer prescribed burns was the most effective in controlling midstory growth and hardwood encroachment in pine stands being managed for red-cockaded woodpecker habitat on the Georgia piedmont.

Joyce, L. A., Flather, C.H, Flebbe, P.A., Hoekstra, T.W. & Ursic, S.J. (1990). Integrating forage, wildlife, water and fish projections with timber projections at the regional level: A case study in southern United States. *Environmental Management* 14(4), 489-500.

Used a multi-resource modeling framework to link timber management and land-use policy models to changes in red-cockaded woodpecker colonies. Also measured deer,

turkey and trout abundance, water yield and forage production.

Judge, R. P., Strait, R. & Hyde, W.R. (1985). Economics of endangered species management: the red-cockaded woodpecker. In Sabol, K. (ed.), *Transactions of the North American Wildlife and Natural Resources Conference, 49; Society's Responsibility in Fish and Wildlife Management; Boston, Massachusetts, March 23-28, 1984* (pp. 375-381). Washington, DC: Wildlife Management Institute.

Examines marginal costs associated with realizing a target population of red-cockaded woodpeckers in the Croatan National Forest, North Carolina. Found that loblolly pine habitat sites were less expensive to maintain than longleaf pine sites.

Kalisz, Paul J. & Boettcher, Susan E. (1991). Active and abandoned red-cockaded woodpecker habitat in Kentucky. *Journal of Wildlife Management* 55(1), 146-154.

Examines the composition, structure and density of red-cockaded woodpecker habitat in the Daniel Boone National Forest, Kentucky. Found the habitat was comprised of 48% pine and 52% hardwood, displaying a higher hardwood abundance than related studies.

Kappes, John J. (1993). Interspecific Interactions Associated with Red-Cockaded Woodpecker Cavities at a North Florida Site. M. S. Thesis, University of Florida.

Keeler, J. E. (1986). Red-cockaded woodpecker. In Mount, R.H. (ed.), *Vertebrate Animals of Alabama in Need of Special Attention* (pp. 78-79). Auburn, AL: Alabama Agricultural Experiment Station.

Kelly, Jeffrey F. T. (1991). The Influence of Habitat Quality on the Population Decline of the Red-Cockaded Woodpecker in the McCurtain County Wilderness Area, Oklahoma. M. S. Thesis, Oklahoma State University, 1991.

Kelly, Jeffrey, Pletschet, Sandra M. & Leslie, Jr., David M. (1993). Habitat associations of red-cockaded woodpecker cavity trees in an old growth forest of Oklahoma. *Journal of Wildlife Management* 57(1), 122-128.

Measures habitat structure at cavity sites, non-use sites and systematically located sites of the red-cockaded woodpecker in the McCurtain County Wilderness Area, Oklahoma.

Kelly, Jeffrey, Pletschet, Sandra M. & Leslie, Jr., David M. (1994). Decline of the red-cockaded woodpecker (*Picoides borealis*) in southeastern Oklahoma. *The American Midland Naturalist* 132(2), 275-283.

Surveys of the McCurtain County Wilderness Area, Oklahoma in 1989-1990 located 15 groups of red-cockaded woodpeckers. This was a significant population decline compared to a survey of the same area in 1977. Suggests periodic burns may improve the habitat and improve the integrity of the local population.

Kennedy, E. T. (1995). Development and Analysis of Economic Incentives for a Red-Cockaded Woodpecker Habitat Conservation Plan in South Carolina and Georgia. M. S. Thesis, Clemson University.

Kennedy, E. T. (1996). Economic incentives: New directions for red-cockaded woodpecker habitat conservation. *Journal of Forestry* 94(4), 22-26.

Suggest the use of Transferable Endangered Species Certificates (TESC) which translocate juvenile red-cockaded woodpeckers off private lands for economic incentives.

King, Tony & Ashwood, Tom. (1998) *Red-Cockaded Woodpecker*. Oak Ridge National Laboratory, Environmental Sciences Division, Strategic Environmental Research and Development Program. Retrieved February 17, 1998 from the World Wide Web:

<http://www.esd.ornl.gov/programs/SERDP/rcw.html>

Examines the use of ecological models to address land management issues. The red-cockaded woodpecker case study discusses the viability of managing the species as a regional metapopulation across its current range.

Klaper, Rebecca Davida. (1995). A Study of the Arthropods and Monoterpene Volatiles Associated with the Artificial Nesting Cavity and Sap Face of the Red-Cockaded Woodpecker, *Picoides borealis*. M. S. Thesis, University of Georgia.

Krusac, D. L. (1992). Is triage necessary with ecosystem management: The longleaf pine example. In *Transactions of the North American Wildlife and Natural Resources Conference*, 60; Minneapolis, Minnesota, March 24-29, 1995 (pp. 501-505). Washington, DC: Wildlife Management Institute.

Suggests landscape-scale approach to managing threatened and endangered species rather than triage at a local level. Uses the red-cockaded woodpecker in the southern U.S. as a case study.

Krusac, D. L. & Dabney, J.M. (1991). Red-cockaded woodpecker recovery: An ecological approach. In *Transactions of the North American Wildlife and Natural Resources Conference*, 59; Anchorage, Alaska, March 18-23, 1991 (pp. 386-394). Washington, DC: Wildlife Management Institute.

An overview of Fish and Wildlife Service and Forest Service red-cockaded woodpecker recovery plans in southern national forests.

Krusac, D. L., Dabney, J.M. & Petrick, J.J. (1994). An ecological approach to managing southern national forests for red-cockaded woodpecker recovery. *Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies* 48, 374-382.

Suggests a landscape-scale habitat management plan for an 810,000 hectare area consisting of habitat management areas. Management Intensity Levels (MIL) would be based on red-cockaded woodpecker population size.

Kulhavy, David L., Hooper, Robert G. & Costa, Ralph, eds. (1995). *Papers from the Red-cockaded Woodpecker Symposium III: Species Recovery, Ecology and Management; North Charleston, South Carolina, January 24-28, 1993*. Nacogdoches, TX: Center for Applied Studies, College of Forestry, Stephen F. Austin State University.

Kulhavy, D. L., Mitchell, J.H. & Conner, R.N. (1988). The southern pine beetle and the red-cockaded woodpecker: potential for interaction. In Payne, T.L. & Saarenmaa, H. (eds.), *Integrated Control of Scolytid Bark Beetles, IUFRO Working Party and the XVII International Congress of Entomology Symposium, Vancouver, British Columbia, Canada, July 4, 1988*. (pp. 337-343). Blacksburg, VA: College of Agriculture, Virginia Polytechnic Institute and State University.

Kulhavy, D. L. [et. al.]. (1991). Silviculture and the red-cockaded woodpecker: Where do we go from here? In Coleman, Sandra S. & Neary, David G. (eds.), *Proceedings of the Sixth Biennial Southern Silvicultural Research Conference. Vol. 2; Memphis, Tennessee, October 30-November 1, 1990* (pp. 786-794). General Technical Report SE-70. Asheville, NC: U. S. Department of

- Agriculture, Forest Service, Southeastern Forest Experiment Station. 2 vol.
Examines red-cockaded woodpecker management techniques. Looks at hazard risk ratings for the Texas hazard system and the National Forest risk system. Research into resin flow, plant moisture stress and catastrophic losses is presented.
- LaBranche, Melinda Sue. (1992). Asynchronous Hatching, Brood Reduction and Sex Ratio Biases in Red-Cockaded Woodpeckers. Doctoral dissertation, North Carolina State University.
A study of a population of red-cockaded woodpeckers in the Sandhills of North Carolina found variation in red-cockaded woodpecker clutch size may be environmentally induced.
- LaBranche, Melinda Sue. (1988). Reproductive Ecology of the Red-Cockaded Woodpecker in the Sandhills of North Carolina. M. S. Thesis, North Carolina State University.
- LaBranche, Melinda S. & Walters, Jeffrey R. (1994). Patterns of mortality in nests of red-cockaded woodpeckers in the Sandhills of south-central North Carolina. *Wilson Bulletin* 106(2), 258-271.
Measured a 43 percent mortality rate for an observed red-cockaded woodpecker nesting period. Nests made earlier in the season had significantly lower mortality rates than those made later in the season.
- LaBranche, Melinda S., Walters, Jeffrey R. & Laves, Kevin S. (1994). Double brooding in red-cockaded woodpeckers. *Wilson Bulletin* 106(2), 403-408.
Observed seven occurrences of cooperatively breeding red-cockaded woodpeckers which produced a second brood after young were successfully fledged from the first brood.
- Lancia, Richard A. & Adams, David A. (1985). A test of habitat suitability index models for five bird species. *Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies* 39, 412-419.
Found that the Habitat Suitability Index (HSI) did not perform well when used with the red-cockaded woodpecker, perhaps because of the low number of birds observed.
- Lancia, Richard A., Roise, Joseph P., Adams, David A. & Lennartz, Michael R. (1989). Opportunity cost of red-cockaded woodpecker foraging habitat. *Southern Journal of Applied Forestry* 13(2), 81-85.
Indicates forest crop rotation ranges are related to the opportunity costs of managing red-cockaded woodpecker habitat. Suggests 60, 79 and 95 year crop rotations.
- Larkin, Ronald P., Margoliash, Daniel & Kogan, Joseph A. (1996). Recognition of the utterances of terrestrial wildlife: A new approach. *Journal of the Acoustical Society of America* 99(4 part 2), 2532.
Suggests the use of recorded vocalizations as a possible survey technique for red-cockaded woodpeckers.
- Laves, Kevin S. (1996). Effects of Southern Flying Squirrels, *Glaucomys Volans*, on Red-Cockaded Woodpecker, *Picoides Borealis*, Reproductive Success. M. S. Thesis, Clemson University.
- Lennartz, M. R. & Henry, V.G. (1985). *Red-Cockaded Woodpecker Recovery Plan (Revision)*. Atlanta, GA: U. S. Department of Interior, Fish and Wildlife Service.
- Lennartz, Michael R. (1988). The red-cockaded woodpecker: Old-growth species in a second growth landscape. *Natural Areas Journal* 8(3), 160-165.

Suggests that management practices for old growth forests which only focus on habitat preservation need to be broadened to include strategies which promote habitats appropriate for multiple species.

Lennartz, Michael R. (1983). Sociality and Cooperative Breeding of Red-Cockaded Woodpeckers, *Picoides Borealis*. Doctoral dissertation, Clemson University.

Lennartz, Michael R. & Heckel, David G. (1988). Population dynamics of red-cockaded woodpecker population in Georgia Piedmont loblolly pine habitat. In Odum, Ron R., Riddleberger, Kenneth A. & Ozler, James C. (eds.), *Third Southeastern Nongame and Endangered Wildlife Symposium; Athens, Georgia, August 8-10, 1987* (pp. 48-55). Atlanta, GA: Georgia Department of Natural Resources.

Lennartz, Michael & Metteaur, J.D. (1986). Test of a population estimation technique for red-cockaded woodpeckers. *Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies* 40, 320-324.

Application of a population estimate technique to a red-cockaded woodpecker population on the Georgia piedmont yielded results which were accurate within 8% of the true population size.

Lennartz, M. R. & Stangel, P. W. (1989). Few and far between. *Living Bird Quarterly* 8(4), 14-20. Summarizes the status and conservation history of the red-cockaded woodpecker in the southeastern U. S. with specific emphasis on the efforts around the Savannah River Site, South Carolina.

Lennartz, Michael R., Hooper, Robert G. & Harlow, Richard F. (1987). Sociality and cooperative breeding of red-cockaded woodpeckers, *Picoides borealis*. *Behavioral Ecology and Sociobiology* 20(2), 77-88.

Studied demographic structure of red-cockaded woodpecker groups, the role of helpers in reproductive activities and the selective pressures promoting sociality and helping behavior.

Lessells, C. M. & Avery, M.I. (1987). Sex-ratio selection in species with helpers at the nest: Some extensions of repayment model. *American Naturalist* 129(4), 610-620.

Indicates helpers at nests may act as a selection pressure resulting in biased sex ratios in red-cockaded woodpecker groups.

Ligon, J. D., Stacey, P.B., Conner, Richard N., Bock, C.E. & Adkisson, C.S. (1986). Report of the American Ornithologists' Union committee for the conservation of the red-cockaded woodpecker. *The Auk* 103(4), 848-855.

Presents an evaluation of the current status and conservation efforts towards the red-cockaded woodpecker. Report provides suggestions for improving habitat management programs, reducing fragmented populations and increasing public involvement.

Ligon, J. D. et al. (1991). The red-cockaded woodpecker: On the road to oblivion? *The Auk* 108(1), 200-201.

Implies that the red-cockaded woodpecker will survive with compromises on silviculture practices, increased political and public support and additional ornithological studies.

Lipske, Michael. (1996). Finding a future for an endangered bird. *National Wildlife* 34(3), 42-45.

Discusses the Safe Harbors plan for the cooperative protection of red-cockaded woodpeckers between private landowners and federal and state conservation agencies. Also gives an overview of the birds habitat and characteristics.

Locke, Brian Alvin. (1980). Colony Site Selection by Red-Cockaded Woodpeckers in East Texas. M. S. Thesis, Stephen F. Austin State University.

Loeb, S. C. (1993). Use and selection of red-cockaded woodpecker cavities by southern flying squirrels. *Journal of Wildlife Management* 57(2), 329-335.
Studies red-cockaded woodpecker cavity use in central Georgia over four breeding seasons. The southern flying squirrel accounted for only 10-20% of cavity use, other avian use was found to be between 4-8 percent.

Loeb, S. C., Pepper, W.D. & Doyle, A.T. (1992). Habitat characteristics of active and abandoned red-cockaded woodpecker colonies. *Southern Journal of Applied Forestry* 16(3), 120-125.
Suggests hardwood and pine density in the midstory of red-cockaded woodpecker habitats needs to be managed. Midstory management should be applied to the entire red-cockaded woodpecker habitat not just near cavity trees.

Loope, Lloyd, Duever, Michael, Herndon, Alan, Snyder, James & Jansen, Deborah. (1994). Hurricane impact on uplands and freshwater swamp forest. *BioScience* 44(4), 238-246.
Damage to a red-cockaded woodpecker cavity trees from Hurricane Hugo in the Francis Marion National Forest is described: 6 percent uprooted, 45 percent snapped, 36 percent broken trunks and 12 percent intact.

Lotter, Deanna M. (1997). Factors Influencing Southern Flying Squirrel Use of Red-Cockaded Woodpecker Cavities at Savannah River Site, South Carolina. M. S. Thesis, Clemson University.

Lucas, Kathleen Elizabeth. Modeling Avian Responses to Red-Cockaded Woodpecker Habitat Management in Loblolly Pine Forests of East-Central Mississippi. M. S. Thesis, Mississippi State University.

MacFarlane, Robert W. (1992). *A Stillness in the Pines: The Ecology of the Red-Cockaded Woodpecker*. New York: Norton.
One of few full-length commercial monographs related to the red-cockaded woodpecker. Surveys the ecology, life history and conservation efforts of the species.

Maguire, L. A., Wilhere, G.F. & Dong, Q. (1995). Population viability analysis for red-cockaded woodpeckers in the Georgia piedmont. *Journal of Wildlife Management* 59(3), 533-542.
Using two parameter stochastic modeling the authors evaluated the risk of red-cockaded woodpecker extinction in the Piedmont National Wildlife Refuge and Hitchiti Experimental Forest, Georgia. Results indicated both a possibility of extinction as well as an increasing population. As no definitive results were obtained authors suggest management practices to decrease juvenile mortality.

Manor, Phillip Douglas. (1990). Demography of the Red-Cockaded Woodpecker in the Sandhills of North Carolina. M. S. Thesis, North Carolina State University.

Masters, R. E., Skeen, J.E. & Garner, J.A. (1989). Red-cockaded woodpecker in Oklahoma [USA]: An update of Wood's 1974-1977 study. *Proceedings of the Oklahoma Academy of Science* 69, 27-32.

The Oklahoma population of red-cockaded woodpeckers is in decline according to a 1985-1987 reevaluation of sites observed in 1974-1977. 51% of the sites previously occupied were vacant during the second survey. Decline is blamed on changes in land use as well as habitat succession.

Masters, Ronald E., Wilson, Christopher W., Buekenhofer, George A. & Payton, Mark E. (1996). Effects of pine-grassland restoration for red-cockaded woodpeckers on white-tailed deer foraging production. *The Wildfire Society Bulletin* 24(1), 77-84.

Found prescribed burns and stand thinning improved foraging production for both the red-cockaded woodpecker and the white-tailed deer.

McGriff, J. A. (1992). Implementing habitat management decisions. In *Proceedings of the Annual Forest Vegetation Management Conference; Eureka, California, January 14-16, 1992* (pp. 6-11). Redding, CA: The Conference.

McNair, D. B. (1985). Status of three colonies of red-cockaded woodpeckers at Pee Dee National Wildlife Refuge, Anson County, North Carolina. *Chat* 49(3), 75-78.

Mersmann, Tim. (1991-92). Ecological restoration for the Homochitto National Forest, red-cockaded woodpecker. *The Blue Darter: a Newsletter for Fisheries, Wildlife and Range, U. S. Department of Agriculture, Region 8, 8 (Winter)*, 9-11.

Meyers, Steven Patrick. (1996). Opportunity Costs of Implementing the Red-Cockaded Woodpecker Procedures Manual for Private Lands. M. S. Thesis, Auburn University.

Miles, Bruce R. (1988). Federally-mandated protection of red-cockaded woodpeckers or 'spotted owl' found in Texas. *Forest Farmer* 48(2), 17-18.

Examines a potential legal case against red-cockaded woodpecker forest management in Texas. Compares the impact of red-cockaded woodpecker habitat maintenance in the southeast to the spotted owl situation in the Pacific Northwest.

Mitchell, James Henry. (1987). Hazard and Risk Rating of Red-Cockaded Woodpecker Colony Areas and Relative Susceptibility of Cavity Trees to the Southern Pine Beetle. M. S. Thesis, Stephen F. Austin University.

Mitchell, J. H., Kulhavy, D. L., Conner, R.N. & Bryant, C.M. (1991). Susceptibility of red-cockaded woodpecker colony areas to southern pine beetle infestation in east Texas. *Southern Journal of Applied Forestry* 15(3), 158-162.

Rated seven red-cockaded woodpecker colonies for hazard susceptibility to southern pine beetles. Found pine beetle activity did not correlate to hazard ratings. Suggests the use of an alternative model which takes into account stand characteristics, disturbances, cavity tree condition and the presence of other bark beetle species.

Montague, Warren G. (1995). Cavity protection techniques for red-cockaded woodpeckers. *Proceedings of the Arkansas Academy of Science* 49, 115-120.

Describes techniques for preventing damage to artificial cavities and deterring the use of artificial cavities by southern flying squirrels.

Morton, J. F. (1994). The black olive (*Bucida buceras* L.), a tropical timber tree, has many faults as an ornamental. In *Proceedings of the Annual Meeting of the Florida State Horticultural Society 106; Miami Beach, FL, October 19-21, 1993* (pp. 338-343). Lake Alfred, FL: The Society.

Murphy, Ginger A. (1981). 1981 status of the red-cockaded woodpecker on the Daniel Boone National Forest. *Kentucky Warbler 58(3)*, 43-47.

Murphy, Ginger A. (1982). Status, Nesting Habitat, Foraging Ecology, and Home Range of the Red-Cockaded Woodpecker (*Picoides borealis*) in Kentucky. M. S. Thesis, Eastern Kentucky University.

Neal, J. C., Montague, W.G. & James, D.A. (1993). Climbing by black rat snakes on cavity trees of red-cockaded woodpeckers. *The Wildlife Society Bulletin 21(2)*, 160-165.

Examines the effectiveness of net snake traps and frequency of predation by black rat snakes on red-cockaded woodpecker cavities.

Neal, Joseph C., James, Douglas A., Montague, Warren G. & Johnson, James E. (1993). Effects of weather and helpers on survival of nestling red-cockaded woodpeckers. *Wilson Bulletin 105(4)*, 666-673.

Explores the importance of helpers in red-cockaded woodpecker breeding and rearing.

Nesbitt, Stephen A., Harris, Barbara A., Repenning, Robert W. & Brownsmith, C. Barbara. (1982). Notes on red-cockaded woodpecker study techniques. *The Wildlife Society Bulletin 10(2)*, 160-163.

Discusses the use of radio telemetry as a useful tool for studying the red-cockaded woodpecker.

Nicholson, Charles P. (1980). Red-cockaded woodpecker colony in Campbell county, Tennessee. *Migrant 51(4)*, 89.

Red-cockaded woodpecker cavity trees were found on Pine Mountain in Campbell county, Tennessee. This was the first known colony observed in the county.

Nickens, Eddie. (1992). Meet red-cockaded woodpecker: An endangered species cause celebre. *Wildlife Conservation 95(3)*, 68-70.

Surveys the red-cockaded woodpecker conservation efforts and controversy surrounding them.

Nickens, Eddie. (1993). Woodpecker wars. *American Forests 99(1-2)*, 28-32, 54-55.

Outlines the red-cockaded woodpecker conservation efforts and profiles some of the species' 'hot pockets' located in the Apalachicola National Forest, Florida; Sandhills of North Carolina; Kisatchie National Forest, Louisiana and the Francis Marion National Forest, South Carolina. Provides a case study for a population located at Ft. Benning, Georgia.

Northern Prairie Wildlife Research Center. (1998). *Status of Listed Species and Recovery Plan Development: Red-Cockaded Woodpecker (*Picoides borealis*)* Endangered, South Carolina. Department of the Interior, National Biological Survey. Retrieved February 13, 1998 from the World Wide Web:

<http://www.npsc.nbs.gov/resource/distr/others/recoprogram/states/species/picobors.htm>

Profiles the current status of the red-cockaded woodpecker population, conservation

achievements and partnerships, and recovery needs in South Carolina. Includes a distribution map of red-cockaded woodpeckers in South Carolina.

Odom, R. R., Rappole, J., Evans, J., Charbonneau, D. & Palmer, D. (1982). Red-cockaded woodpecker relocation experiment in coastal Georgia. *The Wildlife Society Bulletin* 10(3), 197-203. Examines results of moving 12 red-cockaded woodpeckers from five different clans from Ft. Stewart Army Base to St. Catherines Island in Georgia. Three birds were killed, five were still accounted for at the end of the study period, and successful breeding occurred at one insert. Aggression by competing species did dislocate some red-cockaded woodpeckers.

Oklahoma Department of Wildlife Conservation. (1993). *Red-Cockaded Woodpecker (Picoides borealis) Recovery on the McCurtain County Wilderness Area (MCWA)*. Oklahoma City, OK: The Department.

Ortego, Brent and Dan Lay. (1988) Status of red-cockaded woodpecker colonies on private land in east Texas. *The Wildlife Society Bulletin* 16(4), 403-405.

Since 75% of the red-cockaded woodpecker's preferred habitat exists on private land, incentives for private land owners are necessary to preserve habitat. On private land where red-cockaded woodpecker habitat declines at a rate of 4.4 percent per year, short rotation forestry methods resulted in the most detrimental impacts.

Ortego, B., Conner, Richard N. & Craig, Rudolph D. (1988). Status of the red-cockaded woodpecker in Texas, 1985-1987. *Bulletin of the Texas Ornithological Society* 21(1-2), 22-24.

Parker, Melissa. (1998). *Cooperative Efforts to Help the Endangered Red-Cockaded Woodpecker*. Texas Parks and Wildlife, 8 August 1996. Retrieved February 13, 1998 from the World Wide Web: <http://www.tpwd.state.tx.us/nature/research/cooprcw.htm>

Describes Texas Parks and Wildlife Department involvement in red-cockaded woodpecker conservation efforts in Texas.

Patterson, G. A. & Robertson, Jr., W.B. (1981). *Distribution and Habitat of the Red-Cockaded Woodpecker in the Big Cypress National Preserve*. Homestead, FL: South Florida Research Center.

Pease, C. M. & Fowler, N.L. (1997). A systematic approach to some aspects of conservation biology. *Ecology* 78(5), 1321-1329.

Suggests the use of ANalysis Of VAriance (ANOVA) models to assess database completeness, management plans and theoretical models for species conservation. Uses the red-cockaded woodpecker as a case study.

Pelligrine, Matt. (1992). Potential Impact of Southern Pine Beetle on Red-Cockaded Woodpecker Colonies on the Noxubee National Wildlife Refuge, Mississippi. M. S. Thesis, Mississippi State University.

Pestana, Karen E. (1986) Remote sensing technique for identifying potential red-cockaded woodpecker habitat. In Singer, Francis J. (ed.), *Proceedings, Fourth Triennial Conference on Research in the National Parks and Equivalent Reserves: Wildlife Management and Habitats, Vol. 2; Fort Collins, Colorado, July 13-18, 1986* (pp. 1060116). [Hancock, MI?]: George Wright Society and Washington, DC: U. S. National Park Service.

Peters, Robert L. (1996). Hope for the red-cockaded? *Defenders* 71(4), 2.

Phillips, Douglas Jay. (1994). *Red-Cockaded Woodpecker*. Tuscaloosa, AL: Alabama State Museum of Natural History.

A video profiling the environmental controversy surrounding the red-cockaded woodpecker and the importance of biodiversity in Alabama.

Phillips, Pamela Caroline.(1989). Public Policy Decisions when Scientific Evidence is Disputed: Forest Wilderness Areas and Control of the Southern Pine Beetle. Doctoral dissertation, The University of Texas at Dallas.

Examined the implications of a decision to cut pine trees in wilderness areas in order to control southern pine beetles and the impact of this decision on red-cockaded woodpecker habitat.

Pizzoni-Ardemani, Armando. (1990). Sexual Dimorphism and Geographic Variation in the Red-Cockaded Woodpecker. M. S. Thesis, North Carolina State University.

Porter, M. L. (1984). Home Range and Foraging Requirements of the Red-Cockaded Woodpecker (*Picoides borealis*) in Pine Habitats of North Florida. M. S. Thesis, University of Florida at Gainesville.

Porter, M. L. and Labisky, R.F. Home range and foraging habitat of red-cockaded woodpecker in northern Florida. *Journal of Wildlife Management* 50(2), 239-247.

Foraging and home ranges of red-cockaded woodpeckers in the Apalachicola National Forest were seasonally consistent. There were observed preferences for foraging in live pines. Study compares results with the foraging and home ranges of a red-cockaded woodpecker population in the Francis Marion National Forest, South Carolina.

Porter, M. L, Collopy, M.W. & Littell, R.C. Foraging behavior of red-cockaded woodpecker: An evaluation of research methodologies. *Journal of Wildlife Management* 49(2), 505-507.

Examines red-cockaded woodpecker foraging behaviors by sex. Found very little differences between male and female foraging habits.

Price, Jeff. (1995). *Ranges of North American Breeding Birds: Visualizing Long-Term Population in North American Breeding Birds*. Northern Prairie Wildlife Research Center.

Retrieved February 13, 1998 from the World Wide Web:

<http://www.npsc.nbs.gov/resources/distr/breeding/breedrng/breedrng.htm#woodpeckers>

Distribution maps for the periods 1970-1974, 1975-1979, 1980-1984 and 1985-1989 for North American breeding bird species, including the red-cockaded woodpecker. Maps are based on U. S. Fish and Wildlife Service and Canadian Wildlife Service Breeding Bird Survey (BBS) data.

Pulliam, H.R., Liu, J., Dunning Jr., J.B, Stewart, D.J. & Bishop, T.D. Modeling animal populations in changing landscapes. *IBIS* 137 (Supplement 1), S120-S126.

Using Mobile Animal Population (MAP) models the authors show the impact of red-cockaded woodpecker management upon other endangered species at the Savannah River Site.

Ramey, Patricia. (1980). Seasonal, Sexual and Geographical Variation in the Foraging Ecology of

Red-Cockaded Woodpeckers. M. S. Thesis, Mississippi State University.

Raulston, Barbara E. (1992). Effects of Cavity Restrictors on Red-Cockaded Woodpeckers. M. S. Thesis, University of Arkansas.

Raulston, B.E., James, D.A. & Johnson, J.E. (1996). Effects of cavity-entrance restrictors on red-cockaded woodpeckers. *The Wildlife Society Bulletin* 24(4), 694-698.

Found restrictors do not negatively affect red-cockaded woodpeckers, in a study of 40 Cavities (20 with restrictors and 20 without restrictors) in the Bienville National Forest, Mississippi.

Reaves, Dixie Watts. (1993). Valuing an Endangered Species and Its Habitat: An Application of the Contingent Valuation Method. Doctoral dissertation, Duke University.

Estimates the economic value of the loss of red-cockaded woodpecker populations and habitat in the Francis Marion National Forest as a result of Hurricane Hugo.

Recupero, Lisa A. (1996, September). *The Red-Cockaded Woodpecker: A Bibliography*. North Carolina State University, Natural Resources Library. Updated Jo Bohanan, September 1996.

Retrieved February 13, 1998 from the World Wide Web:

<http://www.lib.ncsu.edu/libraries/natural/rcwbib.html>

A guide to red-cockaded woodpecker literature for the years 1980-1993, updated in part in 1996, with an emphasis on the holdings for the University of North Carolina, Chapel Hill; North Carolina State University and Duke University libraries.

Red-Cockaded Woodpecker. (1997). Cecil Community College. Retrieved February 17, 1998 from the World Wide Web: <http://clab.cecil.cc.md.us/faculty/biology/Chesapeake/woodpecker.html>

A student biology project on the ecosystem of the Chesapeake Bay includes a profile of the habitat and characteristics of the red-cockaded woodpecker.

Reed, J. Michael. (1988). An evaluation of indices of red-cockaded woodpecker populations: An independent test of the circular scale technique. *The Wildlife Society Bulletin* 16(4), 406-410.

Found a circular scale technique for measuring red-cockaded woodpecker populations accurate although it significantly underestimated the number of groups in the study. Suggests the use of a ratio of active cavities to adults as a more reliable index.

Reed, J. Michael. (1989). Some Aspects of Vertebrate Conservation, with Particular Attention to the Red-Cockaded Woodpecker. Doctoral dissertation, North Carolina State University.

Applies a new equation for determining effective population size to the red-cockaded woodpecker.

Reed, J. M. & Walters, J.R. (1996). Helper effects on variance components of fitness in the cooperatively breeding red-cockaded woodpecker. *The Auk* 113(3), 608-616.

Found that helpers did not affect variance in breeder survival but did affect reproductive success at nests that produced young. Similar results may be impacted by habitat quality.

Reed, J. M., Doerr, P.D. & Walters, J.R. (1988). Minimum viable population size of the red-cockaded woodpecker. *Journal of Wildlife Management* 52(3), 385-391.

Authors calculate a genetically based minimum population for red-cockaded woodpeckers using life history data and a formula derived from Hill (1972). Determines the minimum

viable population must contain 50 per cent breeding pairs requiring an area greater than or equal to 25,450 hectares.

Reed, J. M., Walters, J.R., Emigh, T.E. & Seaman, D.E. (1993). Effective population size in red-cockaded woodpeckers population and model differences. *Conservation Biology* 7(2), 302-308.

Analyzes the viability for three red-cockaded woodpecker populations from different regions with two different models for estimating loss of genetic viability. Found a wide variation in the ratio of effective population size to breeder population size.

Renken, Rochelle B. & Wiggers, E.P. (1989). Forest characteristics related to pileated woodpecker territory size in Missouri. *Condor* 91(3), 642-652.

Compares habitat requirements of the pileated woodpecker to red-cockaded woodpecker requirements and influences.

Repanshek, Kurt. (1996). Species protection: New incentives for landowners. *Technology Review* 99(7), 17.

Examines the financial impacts of the Endangered Species Act on private landowners. Studies a group of red-cockaded woodpeckers on private land on the coastal plain of North Carolina.

Repasky, Richard R. (1984). Utilization of Home Range and Foraging Substrates by Red-Cockaded Woodpeckers. M. S. Thesis, North Carolina State University.

Repasky, Richard R. & Doerr, Phillip D. (1991). Home range and substrate use by two family groups of red-cockaded woodpeckers in the North Carolina Sandhills. *Brimleyana* 17, 37-52.

Average year round home range was 159 hectares. Authors observed that most foraging occurred in live pines and found that food limitation, if present, was most severe in the early winter.

Repasky, Richard R., Blue, Roberta J. & Doerr, Phillip D. (1991). Laying red-cockaded woodpecker cache bone fragments. *Condor* 93(2): 458-461.

Anecdotal observation of a nesting female red-cockaded woodpecker obtaining and caching bone fragments as a potential source of calcium.

Richardson, David M. & Smith, David L. (1992). Hardwood removal in red-cockaded woodpecker colonies using a shear V-blade. *The Wildlife Society Bulletin* 20(4), 428-433.

Found the use of a shear V-blade to remove hardwood encroachment in red-cockaded woodpecker group habitats was a cost effective method of removal without displacing woodpeckers.

Robertson, William B. & Patterson, Gary A. (1982). Historical and present occurrences of the red-cockaded woodpecker in southern Florida. *Florida Scientist* 41 (Supplement 1), 39.

Roise, Joseph P., et. al. (1990). Red-cockaded woodpecker habitat and timber management: Production possibilities. *Southern Journal of Applied Forestry* 14(1), 6-12.

Using multiple objective linear programming, the authors present management techniques to increase red-cockaded woodpecker habitat slowly over time without causing negative financial impacts on timber rotations in southern pine habitats.

Roise, Joseph P., Chung, Joosan & Lancia, Richard. (1991). Red-cockaded woodpecker habitat management and longleaf pine straw production: An economic analysis. *Southern Journal of Applied Forestry* 15(2), 88-92.

Provides an economic analysis of the use of the shelterwood silviculture technique in longleaf pine forests that contain both pine straw and timber markets. Suggests that the long rotations needed for red-cockaded woodpecker habitat would benefit the pine straw market.

Ross, William Griff. (1995). Resin Flow in Red-Cockaded Woodpecker Cavity Trees: Site and Stand Influences and Management Implications. Doctoral dissertation, Stephen F. Austin State University.

Resin flow and xylem moisture potential were measured in loblolly, shortleaf and longleaf pines in the Angelina, Davy Crockett National Forests in Texas and Apalachicola National Forest in Florida. Resin flow was found to vary by species as suggested by the growth-differentiation balance hypothesis.

Ross, W. G. (1993). Evaluating susceptibility of red-cockaded woodpecker cavity trees to southern pine beetle in Texas. In Brissette, John C. (ed.), *Proceedings of the Seventh Biennial Southern Silvicultural Research Conference; Mobile, Alabama, November 17-19, 1992* (pp. 547-553). General Technical Report SO-93. New Orleans, LA: U. S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Measured resin flow and xylem moisture, as indications of pine bark beetle susceptibility, in loblolly and shortleaf pines in the Angelina and Davy Crockett National Forests, Texas. Found no significant difference in measured factors, suggesting that habitat management is needed to ensure red-cockaded woodpecker habitat.

Ross, W. G., Kulhavy, D.L. & Conner, R.N. (1997). Stand conditions and tree characteristics affect quality of longleaf pine for red-cockaded woodpecker cavity trees. *Forest Ecology and Management* 91(2-3), 145-154.

Measured the resin flow of 11 longleaf pines in red-cockaded woodpecker habitat in the Angelina National Forest, Texas and the Apalachicola National Forest, Florida. Results indicate that the best active red-cockaded woodpecker cavity trees, from a resin flow perspective, are on or near the forest edges.

Ross, W. G., Kulhavy, D.L., Conner, R.N. & Sun, J. (1991). Physiology of red-cockaded woodpecker cavity trees: Implications for management. In Coleman, Sandra S. & Neary, David G. (eds.), *Proceedings of the Sixth Biennial Southern Silvicultural Research Conference, Vol. 2.; Memphis, Tennessee, October 30-November 1, 1990* (pp. 558-566). General Technical Report SE-70. Asheville, NC: U. S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 2 vol.

Resin flow and tree moisture stress were used as potential indications of pine bark beetle infestations in red-cockaded woodpecker cavities. Results suggest that susceptibility varies by site, tree species and host tree condition.

Rossell, C. Reed Jr. and Britcher, Jacqueline J. (1994). Evidence of plural breeding by red-cockaded woodpeckers. *Wilson Bulletin* 106(5), 557-559.

Observed a group of red-cockaded woodpeckers at Fort Bragg, North Carolina that had two nests and an unrelated female helper. Plural nesting had not previously been an observed red-cockaded woodpecker behavior. The authors suggest that this may have occurred because of limited breeding opportunities in the area.

Rossell, C. Reed Jr. & Gorsira, Bryan. (1996). Assessment of condition and availability of active red-cockaded woodpecker cavities. *The Wildlife Society Bulletin* 24(1), 21-24.

Examined condition and general characteristics of active red-cockaded woodpecker cavities in relation to cavities used by other species. Found red-cockaded woodpeckers and flying squirrels preferred different cavity types.

Rudolph, D. Craig & Conner, Richard N. (1991). Cavity tree selection by red-cockaded woodpecker in relation to tree age. *Wilson Bulletin* 103(3), 458-467.

Aged 1350 red-cockaded woodpecker cavity trees and found that birds select the oldest trees. These results suggest that the current average age of existing cavity trees may not provide the optimum habitat for the red-cockaded woodpecker.

Rudolph, D. Craig & Conner, Richard N. (1988). *Red-Cockaded Woodpecker Colony Status on the Sam Houston National Forest: A Report to the National Forest System*. Nacogdoches, TX: Wildlife Habitat and Silviculture Laboratory, Southern Forest Experiment Station.

Rudolph, D. Craig & Conner, Richard N. (1994). Forest fragmentation and red-cockaded woodpecker population: An analysis at intermediate scale. *Journal of Field Ornithology* 65(3), 365-375.

Survey of 128 active clusters in the Sam Houston National Forest, Texas, found a correlation between pine stands of 60 years old to the number of red-cockaded woodpeckers per group. Authors posit that the fragmentation of forests in excess of 60 years of age by younger stands is impacting the demographics of the population.

Rudolph, D. Craig & Conner, Richard N. (1996). Red-cockaded woodpeckers and silvicultural practice: Is uneven-aged silviculture preferable to even-aged? *The Wildlife Society Bulletin* 24(2), 330-333.

Suggest the irregular use of the shelterwood silvicultural technique for creating the most preferred red-cockaded woodpecker habitat.

Rudolph, D. C., Kyle, H. & Conner, R.N. (1990). Red-cockaded woodpecker vs. rat snakes: The effectiveness of the resin barrier. *Wilson Bulletin* 102(1), 14-22.

This study found that the resin and bark barriers excavated by red-cockaded woodpeckers around cavity entrances, which produces a smooth sticky surface, is a highly effective barrier in preventing predatory snakes from entering the cavity.

Rudolph, D. C., Conner, R.N. & Schaefer, R.R. (1991). Yellow-bellied sapsuckers feeding at red-cockaded woodpecker resin wells. *Wilson Bulletin* 103(1), 122-123.

An anecdotal description of observed red-cockaded woodpecker aggression towards yellow-bellied sapsuckers near red-cockaded woodpecker nests.

Rudolph, D. C., Conner, R.N. & Turner, J. (1990). Competition for red-cockaded woodpecker roost and nest cavities: Effects of resin age and entrance diameter. *Wilson Bulletin* 102(1), 23-26.

Observations from a red-cockaded woodpecker population in Texas found 22% of the examined cavities were occupied by red-cockaded woodpeckers and 46% by other species. The most common other inhabitant was the southern flying squirrel which also prefers cavities with small entrance diameters and are not deterred by resin barriers.

Rudolph, D. C., Conner, R.N., Carrie, D.K. & Schaefer, R.R. (1992). Experimental reintroduction of red-cockaded woodpeckers. *The Auk* 109(4), 914-916.

Re-examines the issue of introducing red-cockaded woodpecker breeding pairs into suitable breeding habitats through translocation.

Sarkozi, David. (1996, February). *Birds of the Upper Texas Coast: Red-Cockaded Woodpecker*.

Retrieved January 21, 1998 from the World Wide Web:

<http://www.infocom.net/~dsarkozi/birds/red-cock.htm>

Brief profile of the red-cockaded woodpecker. Includes directions to red-cockaded woodpecker birding sites in Texas.

Sauer, J. R., Hines, J.E., Gough, G., Thomas, L. & Peterjohn, B.G. (1997, July 29). *The North American Breeding Bird Survey Results and Analysis. Version 96.4*. Patuxent Wildlife Research Center. Retrieved February 13, 1998 from the World Wide Web:

<http://www.mbr.nbs.gov/bbs/bbs.html>

Information on North American breeding birds, including the red-cockaded woodpecker. Data includes Christmas Bird Count distribution maps, range maps, life history groupings and links to related species sites.

Schaeffer, Richard Reuben. (1996). Red-Cockaded Woodpecker Reproduction and Provisioning of Nestlings in Relation to Habitat. M. S. Thesis, Stephen F. Austin State University.

A comparison between 11 longleaf and 14 loblolly pine stands in east Texas is presented. Forest composition near cavities in each type of stand consisted of older trees, with larger diameter breast heights and significantly less midstory vegetation than in areas further away from cavities.

Schaeffer, Richard R., Rudolph, D. Craig & Conner, Richard N. (1991). The response of an adult red-cockaded woodpecker to a fallen nestling. *Wilson Bulletin* 103(3), 514-515.

A fallen nestling observed feeding on pine logging slash raises concerns about the use of insecticides and herbicides near red-cockaded woodpecker populations.

Schillaci, Jessica M. & Smith, Ruthe J. (1994). Red-cockaded woodpeckers in northwestern Florida produce a second clutch. *Florida Field Naturalist* 22(4), 112-113.

Schimmoeller, Chris. (1994). Red-cockaded woodpeckers near extinction in Kentucky. *Wild Earth* 4(3), 15.

Schmaltz, Jeffrey S. (1981). Past and present status of the red-cockaded woodpecker on the Daniel Boone National Forest, Kentucky. *Kentucky Warbler* 57(1), 3-7.

Scientific Summit on the Red-Cockaded Woodpecker: Summary Report. (1990). Atlanta, GA: Southeast Negotiation Network, Georgia Institute of Technology.

Scroogs, Shelly. (1997, May 5). Red-Cockaded Woodpecker. University of Texas, Department of Geography, 5 May 1997. Retrieved January 21, 1998 from the World Wide Web:

<http://www.utexas.edu/depts/grg/ustudent/gcraft/fall96/scroggs/RCW/main.html>

Student research paper on red-cockaded woodpecker habitat and range. Includes historic and current range maps for the red-cockaded woodpecker in Texas.

Seagle, Steven W., Lancia, Richard A. & Adams, David A. (1987). A multivariate analysis of

rangewide red-cockaded woodpecker habitat. *Journal of Environmental Management* 25(1), 45-56.

Performed a discriminate function analysis on 71 habitat variables for 295 red-cockaded woodpecker colonies in southeastern National Forests. Found that the highest habitat quality continuum was most strongly related to the availability of longleaf pine.

Seagle, Steven W., Lancia, Richard A., Adams, David A., Lennartz, Michael R. & Devine, Hugh A. (1987). Integrating timber and red-cockaded woodpecker habitat management. In *Transactions of the North American Wildlife and Natural Resources Conference*, 52; *Sharing Resource Challenges: Opportunities and Responsibilities; Quebec City, Quebec, March 20-25, 1987* (pp. 41-52). Washington, DC: Wildlife Management Institute.

Presents strategies for managing species habitat using temporal modeling and spatial mapping. The case study is based upon a red-cockaded woodpecker population at the Savannah River Plant, South Carolina.

Senecal, Kearny C. (1981). South Carolina state report: Endangered species project yields valuable management data. *Endangered Species Technical Bulletin* 6(8), 6-11.

Found 400 red-cockaded woodpecker clans in South Carolina. Most observed data from South Carolina is from red-cockaded woodpecker populations on state-owned land.

Senecal, Kearny C. (1981). State report: Arkansas studies state species of concern. *Endangered Species Technical Bulletin* 6(9), 3-5.

Most of the Arkansas population of red-cockaded woodpeckers is on private land (88%) though some fragment populations are located in the Felsenthal National Wildlife Refuge and the Ouachita National Forest.

Shapiro, A. E. (1983). Characteristics of red-cockaded woodpecker cavity trees and colony areas in southern Florida. *Florida Scientist* 46(2), 89-95.

Summarizes cavity tree and vegetative characteristics of red-cockaded woodpecker groups in south Florida. Indicates cavity trees observed in this study were shorter, older, had smaller diameter breast heights and were more widely spaced than elsewhere in the species range. In addition cavities were most commonly found in slash pines in the study area.

Sherrill, Denise Moreau & Case, Verna Miller. (1980). Winter home ranges of four clans of red-cockaded woodpeckers in the Carolina Sandhills. *Wilson Bulletin* 92(3), 369-375.

The average winter range of observed clans was 31.2 hectares. Authors found little relation between nest cavity distances and home range sizes indicating that range size may not be related to interclan pressure.

Shore, Dee. (1993). Into the act: research at NCSU advances the wildlife management aims of the Endangered Species Act. *Alumni Magazine of North Carolina State University* March/April, 2-5.

Profiles the activities of researchers at North Carolina State University and their work with the red-cockaded woodpecker and other endangered species.

Shrader-Frechette, K. S. & McCoy, E.D. (1994). Ecology and environmental problem solving. *The Environmental Professional* 16(4), 342-348.

Discusses the shortcomings of some ecological theories. Profiles the use of practical ecological applications in the management of the red-cockaded woodpecker and the

vampire bat.

Simbeck, D. J. (1988). The 1987 Christmas bird count. *Migrant* 59(1), 5-13.

One red-cockaded woodpecker was observed near Kingsport, Tennessee in the 1987 Tennessee Christmas bird count.

Simberloff, Daniel. (1993). How forest fragmentation hurts species and what to do about it. In Kaufmann, Merrill R. et al. (eds.), *General Technical Report RM-247. An Ecological Basis for Ecosystem Management* (pp. 85-90). Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.

A case study focusing on the red-cockaded woodpecker and the affects of fragmentation on its habitat suggests that an ecosystem-level approach would result in more effective management the bird and related species in the southeastern pine forests.

Slocum, Kevin. (1996, August 21). *Legacy Project: Hyper Spectral Data and Identification of Red-Cockaded Woodpecker Habitat*. U. S. Army Topographic Engineering Center. Retrieved January 21, 1998 from the World Wide Web: <http://curly.tec.army.mil/rcw/rcw.html>

Digital multi-spectral video, site maps, SPOT imagery and scanned photography were used to map red-cockaded woodpecker habitat at Fort Benning, Georgia.

Slocum, Kevin. (1996, August 21). *Red-Cockaded Woodpecker (Picoides Borealis) Ecology*. U. S. Army Topographic Engineering Center. Retrieved January 21, 1998 from the World Wide Web: <http://curly.tec.army.mil/rcw/rcweco.html>

An overview of red-cockaded woodpecker ecology including habitat, distribution and conservation efforts, with an emphasis on populations at Fort Bragg, North Carolina and Fort Benning, Georgia.

Smith, K. G. & Petit, D. R. (1988). Breeding birds and forestry practices in the Ozarks: Past, present and future. In Jackson, J.A. (ed.), *Bird Conservation*, No. 3 (pp. 23-49). Madison, WI: University of Wisconsin Press.

The historic range of the red-cockaded woodpecker in the Ozarks is briefly discussed.

Smith, Michael W. (1981). Comments on herbicide injection for habitat maintenance of red-cockaded woodpecker colonies. *Mississippi Kite* 11(2), 52-53.

Society of American Foresters. (1992). Red-cockaded woodpecker protection and habitat management in private lands: A regional Society of American Foresters position statement. *Journal of Forestry* 90(8), 38-39.

Outlines recommendations for working with the U. S. Forest Service, private landowners and foresters for cooperative management of red-cockaded woodpecker habitat.

Spellman, C. B. (1987). Simulation Modeling of Red-Cockaded Woodpecker Clan Dynamics. Unpublished M. S. Thesis, Duke University.

Stangel, Peter Wenzel. (1990). Genetic Variation and Population Structure of the Red-Cockaded Woodpecker. Doctoral dissertation, University of Georgia.

Tissues collected from the red-cockaded woodpecker were used to determine morphological variability across populations. Some weak trends were observed in characteristics for decreasing fluctuating asymmetry with increasing heterozygosity and population size.

Stangel, Peter W. & Lennartz, Michael R. (1988). Survival of red-cockaded woodpecker nestlings unaffected by sampling blood and feather pulp for genetic studies. *Journal of Field Ornithology* 59(4), 389-394.

Examines non-destructive sampling techniques to obtain tissues from nestlings for genetic analysis. Small blood samples and primary feather sampling did not affect nestling survival. The feather pulp sample provided the clearest results.

Stangel, Peter W., Lennartz, Michael R. & Smith, Michael H. (1992). Genetic variation and population structure of red-cockaded woodpeckers. *Conservation Biology* 6(2), 283-292.

Surveyed genetic variability among red-cockaded woodpecker populations. Mean heterozygosity was 7.8%. Heterozygosity was reduced in some small populations but most exhibited normal levels indicating viability.

Stone, Richard. (1995). Endangered Species Act: Incentives offer hope for habitat. *Science* 269(5528), 1212.

Discusses an agreement between the federal government and private landowners in the North Carolina Sandhills. The agreement allows for future development if certain tracts of land area are restored or managed for the red-cockaded woodpecker.

Strait, R. P. (1982). A Least-Cost Approach for Endangered Species Management: The Red-Cockaded Woodpecker as an Illustrative Case. M. S. Thesis, Duke University.

A population of red-cockaded woodpeckers studied in the Croatan National Forest, North Carolina suggests costs to preserve bird habitat are relatively small but future economic development may result in higher costs.

Summerour, B. (1988). Gray rat snakes observed climbing red-cockaded woodpecker nesting trees. *Alabama Birdlife* 35, 13.

Taylor, William E. & Hooper, Robert G. (1991). *A Modification of Copeyon's Drilling Technique for Making Artificial Red-Cockaded Woodpecker Cavities*. General Technical Report SE-72.

Asheville, NC: U. S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

Outlines changes to artificial cavity construction techniques. Changes promote a lower learning curve and include changing the size of the access hole and the cavity routing technique.

Teitelbaum, R. D. & Smith, W.P. (1985). Cavity-site characteristics of red-cockaded woodpeckers in Fountainebleau State Park, Louisiana. *Proceedings of the Louisiana Academy of Science* 48, 116-122.

Study found red-cockaded woodpecker cavities occurred more in 156-171 year old loblolly pines and 208-374 year old longleaf pines with a mean diameter breast height of 68.8 centimeters and 61.2 centimeters respectively. Random comparisons of vegetation characteristics near cavity sites indicate a preference for less midstory.

Teskey, Julie. (1994, August). *Picoides Borealis*. U. S. Forest Service, Intermountain Research Station, Fire Sciences Lab. Retrieved February 17, 1998 from the World Wide Web:

<http://www.fs.fed.us/databases/feis/animals/Bird/PIBO/index.html>

The red-cockaded woodpecker entry in the Forest Services' Fire Effects Information System (FEIS) database provides information related to the distribution, biology and habitat as well as the effects of fire on the species. Red-cockaded woodpeckers can easily

escape fires, but fires can cause severe impact and mortality to cavity trees.

Texas Forest Service. *Texas' Endangered Species: Red-Cockaded Woodpecker*. Retrieved February 13, 1998 from the World Wide Web: <http://agnews.tamu.edu/graphics/endan/wood.html>

A brief guide to red-cockaded woodpecker conservation efforts in Texas. Includes a red-cockaded woodpecker range map for Texas.

Texas Parks and Wildlife Department. (1997, March 26). *Endangered and Threatened Species: Red-Cockaded Woodpecker*. Retrieved January 21, 1998 from the World Wide Web:

<http://www.tpwd.state.tx.us/nature/endang/rcw.htm>

Overview of red-cockaded woodpecker status with an emphasis on the population in Texas.

Thomas, Joseph Daniel. (1981). Cultural Techniques for Regenerating Shortleaf Pine as a Habitat for the Red-Cockaded Woodpecker on the Cumberland Plateau. M. S. Thesis, University of Tennessee.

Thomas, J. Daniel & Buckner, Edward. (1981). Re-establishing yellow pine habitat for the red-cockaded woodpecker on the Cumberland Plateau. In Barnett, James P. (ed.), *Proceedings of the First Biennial Southern Silvicultural Research Conference; Atlanta, Georgia, November 6-7, 1980* (pp. 358-361). General Technical Report SO-34. New Orleans, LA: U. S.

Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Examines management techniques for re-establishing red-cockaded woodpecker habitat, including: burning, fire plowing, drum chopping and velpar treatment. Drum chopping and fire plowing reduced hardwood encroachment.

Thomlinson, John Richard. (1993). Landscape Ecological Characteristics of Habitat of the Red-Cockaded Woodpecker (*Picoides borealis*). Doctoral dissertation, University of North Texas.

Geographic Information Systems were used to analyze red-cockaded woodpecker habitat in the Sam Houston National Forest, Texas. Structural characteristics and spatial relations among tree stands were considered. Active colony stands were larger and closer together, had greater gravitational attraction and lower isolation coefficients. The use of satellite imagery for identify red-cockaded woodpecker habitat was not found to be useful.

Thomlinson, John Richard. (1995). Landscape characteristics associated with active and abandoned red-cockaded woodpecker clusters in east Texas. *Wilson Bulletin* 107(4), 603-614.

Investigates red-cockaded woodpecker clusters in the Sam Houston National Forest, Texas. Found that active cluster stands were larger than inactive stands. Also found inactive stands were more likely to be surrounded by inimical land uses and less likely to be connected to active colony sites by corridors of mature timber.

Thomlinson, John Richard . (1996). Predicting status change in red-cockaded woodpecker cavity-tree clusters. *Journal of Wildlife Management* 60(2), 350-354.

Examined red-cockaded woodpecker clusters during several non-breeding seasons and found that cavity-tree stands that are too small or isolated may be unattractive to the birds, demonstrating that certain spatial characteristics are good predictors of cluster status.

Thompson, Richard L. (1982). Red-cockaded woodpecker. In Davis, David E. (ed.), *CRC Handbook of Census Methods for Terrestrial Vertebrates* (pp. 91-92). Boca Raton, FL: CRC Press.

Outlines techniques for determining red-cockaded woodpecker populations in a discrete

area. Describes how to survey red-cockaded woodpecker habitat and observe individual birds.

U. S. Army. (1996, October 30). *Endangered Species Programs. 1996 'Management Guidelines for the Red-Cockaded Woodpecker on Army Installations*. Retrieved February 13, 1998 from the World Wide Web:

<http://128.174.5.51/denix/Public/ES-Programs/Conservation/Woodpecker/woodp.html>

Outline of the U. S. Army installation guidelines for developing endangered species management plans for the red-cockaded woodpecker. Includes information about mission requirements, management strategies, population goals, etc.

U. S. Congress. House Committee on Agriculture. Subcommittee on Forests, Family Farms and Energy. (1991). *Management of National Forest Resources: (Red-Cockaded Woodpecker): Hearing Before the Subcommittee on Forests, Family Farms, and Energy of the 102nd Congress, First Session, December 16, 1991, Bristol, Florida*. Washington, DC: Government Printing Office.

Text of the Senate hearing on the proposed interim guidelines for the management of the red-cockaded woodpecker as a forest resource in Florida national forests. Includes expert testimony from ecologists, biologists as well as labor and lumber industry representatives among others.

U. S. Congress. Senate Committee on Environmental Public Works. (1995). *Endangered Species Conservation Programs at Fort Bragg, North Carolina, and the Back Bay National Wildlife Refuge, Virginia Beach, Virginia: Hearing Before the Committee on Environment and Public Works, United States Senate, 104th Congress, First Session, March 17, 1995*. Washington, DC: Government Printing Office.

Presents expert testimony from ecologists, military experts and private citizens regarding the implementation of the Endangered Species Act at Fort Bragg, North Carolina the Back Bay Wildlife Refuge, Virginia. Compromises between the Fish and Wildlife Service and U. S. Military that protect the red-cockaded woodpecker and maintain adequate area for military training and housing are outlined.

U. S. Congress. Senate Committee on Environmental Public Works. (1991). *Endangered and Threatened Species of the Southeast United States*. Atlanta, GA: U. S. Fish and Wildlife Service.

Provides descriptions of endangered and threatened species. Data includes status, description, reproduction and development, range and population level, habitat, reasons for current status as well as management and protection efforts. This same information can also be found online from the Georgia Wildlife Federation, http://www.gwf.org/library/ani_rcw.html, and the Fish and Wildlife Service, Department of Forest Resources, <http://www.fws.gov/~r9endspp/i/b/sab4a.html>.

U. S. Congress. Senate Committee on Environmental Public Works. (1984). *An Estimate of Red-Cockaded Woodpecker Populations on Federal Lands in the South*. (Research Information Bulletin; no. 84-109). Washington, DC: U. S. Department of the Interior, Fish and Wildlife Service.

U. S. Congress. Senate Committee on Environmental Public Works. (1980). *National Fish and Wildlife Laboratory Selected Vertebrate Endangered Species of the Seacoast of the United States--The Red-Cockaded Woodpecker*. Washington, DC: U. S. Fish and Wildlife Service, Biological Services Program.

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Draft amendment proposed to the Ouachita National Forest Land and Resource Management plan to allocate an additional 155,010 acres of land. Discusses the impacts to red-cockaded woodpecker habitat as well as the financial impacts for the timber harvest.

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U. S. Forest Service. (1986). *Suppression of the Southern Pine Beetle, Southern Region*. Atlanta, GA: U. S. Department of Agriculture, Forest Service, Southern Region. Overview of best management practices for controlling southern pine beetles in the southern U. S. Presents positive and negative impacts. Discusses the impact of managing for the beetle on red-cockaded woodpecker habitat.

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Presents a table displaying the distribution, seasons of occurrence and diet for woodpecker.

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