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Research Statement[1]

My earliest research interest stemmed from an internship at Tall Timbers Research Station, where I participated in a long-term project on the ecology of red-cockaded woodpeckers. My responsibility was to monitor individual birds in the small population that existed there at the time. This federally endangered species has fairly narrow habitat requirements of extensive mature pine woodlands for foraging and nesting. Its relatively sedentary habits make the landscape arrangement of family groups a critical conservation issue (Engstrom and Mikusinski 1998, Cox and Engstrom 2001). Understanding foraging habitat (Engstrom and Sanders 1997), foods (Hanula and Engstrom 2000), and nesting requirements (Engstrom and Evans 1990) for the purpose of conservation have all been topics of research interest.

While at Tall Timbers my research on the red-cockaded woodpecker within the Red Hills led me and several colleagues to initiate a conservation initiative based on the long-term work by Wilson Baker. The Red Hills red-cockaded woodpecker population is the largest on private lands (Engstrom and Baker 1995) and one of the top 10 largest populations anywhere. This conservation initiative has developed into what we call the Red Hills Ecological Stewardship Consortium (the Consortium), and its membership includes: Tall Timbers Research Station, the U.S. Fish and Wildlife Service, the Georgia Department of Natural Resources, the Florida Fish and Wildlife Conservation Commission, the Turner Endangered Species Fund, and, until recently, The Nature Conservancy. The main goals of the Consortium are to:

- monitor, stabilize, and expand the red-cockaded woodpecker population in the Red Hills,
- develop and promote land management and conservation actions that support ecological stability and a healthy woodpecker population,
- use the Red Hills woodpecker population through translocation of 1st-year individuals to build other populations on private lands in the region, and
- work with landowners to provide good information and to alleviate fears about this endangered species.

Achievements of the Consortium[2] include:

- recruitment of 22 landowners who own approximately 50,000 acres of plantation land in Thomas and Grady counties in Georgia (54% [97 family groups] of the Red Hills woodpecker population) to put their property into Safe Harbor agreements held by the Georgia Department of Natural Resources,
- providing landowners with approximately $40,000 per year in incentives to manage their property with prescribed fire as a means of habitat improvement for

[1] Citations are provided in my curriculum vitae.
[2] Red Hills Woodpecker Update, Tall Timbers Research Station, January 2005.

the red-cockaded woodpecker and other plants and animals that depend on open, pine-dominated forest,
- translocation of more than 20 first-year individuals to other sites (e.g., Joseph Jones Ecological Research Center) for the purpose of increasing small woodpecker populations, and
- creation of 56 new artificial cavities in the form of nest box inserts or drilled cavities.

The Consortium is an excellent example of a cooperative, voluntary approach to conservation within a landscape dominated by private land ownership that is supported by non-governmental organizations and government agencies.

Disseminating research results was an important part of my position at Tall Timbers, and I also spent a considerable amount of time when I was with The Nature Conservancy at Greenwood Plantation on educational tours of old-growth longleaf pine forest for private landowners, university groups, and garden clubs. I reached out to private landowners through development of educational materials, workshops, demonstration tours, and discussions with individuals about decisions related to forest and wildlife management. I also had many opportunities to discuss research and management with public land managers both at Tall Timbers and at Greenwood through tours, participation in symposia, National Wildlife Refuge reviews, comments on recovery guidelines, and meeting presentations (e.g., Florida Park Service biologist annual meeting).

A second theme of my research is an examination how forest structure and composition affect bird community species richness and composition in southeastern coastal plain pine forests (Engstrom 1993). I conducted fieldwork for my master's thesis at the Wade Tract in Thomas County, Georgia. This stand is one of the finest examples of old-growth longleaf pine in existence, and my study was the first scientific study of this site (Engstrom 1981; Engstrom and James 1981). I established that bird species richness in this old-growth longleaf pine (*Pinus palustris*) community was high compared to other mature forest communities in the Southeast. High bird species richness within a longleaf pine monoculture (approx. 95%) with little foliage height diversity contradicted the prevailing theories of what habitat features are associated with bird species diversity.

Fire is the essential disturbance that maintains the longleaf pine ecosystem. My interest in the red-cockaded woodpecker and avian community diversity led me to consider the implications of management practices on birds of the longleaf pine ecosystem. Characteristics of prescribed fire used to maintain upland pine forests (e.g., season and frequency) are important for birds and wildlife (Engstrom et al. 1984; Engstrom et al. 1996a; Engstrom et al. 2005). Season of fire has been a particularly controversial issue. Late spring and early summer was apparently the "natural" season for lightning-started fires. The natural history of wiregrass (*Aristida beyrichiana/stricta*), a functionally important pyrogenic plant species, seemed to support a management shift from dormant-season to growing-season prescribed fires, because it most frequently flowers if burned in the growing season. Growing season fires, however, will burn up some bird nests and are typically less patchy than dormant season fires. I conducted a 3-year experimental study

of effects of season of fire on bird populations in Apalachicola National Forest and found little evidence that growing season burns caused a change in the avian community (Engstrom et al. 1996a).

Consideration of silvicultural approaches that maintain ecological value in forests continues to be one of my key research interests (Engstrom et al. 1996b; Engstrom and Conner 2004; Mitchell et al. *in review*). The habitat requirement of the red-cockaded woodpecker of mature pine trees for foraging and nesting/roosting cavity trees has made it a controversial species from the standpoint of the industrial timber production model. This model is now being threatened by global economic forces, and alternative forest management models need to be developed for private and public landowners. Forest management as practiced in the Red Hills provides a template for production of high quality timber ***and*** excellent habitat for the woodpecker. Herbert Stoddard developed his ecologically based approach to forest management, in part, because he incorporated his knowledge of the natural history of longleaf pine and bird habitats into his process of selection of trees for harvest. He anticipated "natural-disturbance" forest management by decades. This approach has relevance as an alternative to industrial models of production, because its ecological values can potentially provide income from non-traditional forest uses (e.g., eco-tourism).

In the past, I have participated in large-scale volunteer-based science projects (Engstrom 1989; 1990a,b), such as those used by the Cornell Laboratory of Ornithology (http://www.birds.cornell.edu/LabPrograms/?lk=nav). These popular projects have heuristic, scientific, and conservation values. I could envision developing a volunteer-based project for conservation of biological diversity (particularly birds) in the agricultural landscapes of Florida.