

Appendix B: Research Work Unit Descriptions

SRS-4157- Upland Hardwood Ecology and Management

Asheville, NC; Clemson, SC; Knoxville, TN; Huntsville, AL; Hot Springs, AR
Project Leader: Cathryn (Katie) H. Greenberg

Mission: We will develop and disseminate knowledge and strategies for restoring, managing, sustaining, and enhancing the vegetation and wildlife of upland hardwood-dominated forest ecosystems of the central region of the eastern United States. We will concentrate on the oak and yellow-poplar dominated forests of the southern Appalachian Mountains and the oak and hickory forests of the Interior Highlands, Boston Mountains, and Missouri Plateau.

Area of Research Applicability: Regional- Forested ecosystems dominated by oak, hickory, and yellow-poplar and ecotones of mixed hardwood-pine types of the east-central United States; National- Related ecosystems dominated by upland hardwood forests, particularly in the north-central and northeastern United States; International- Related environments dominated by upland hardwood forests, particularly in eastern Asia, central Europe, southeastern Australia, and New Zealand.

Problem 1.

We need a better understanding of how upland hardwood-dominated forests are affected by disturbances across environmental gradients. Understanding the range of responses will enable land managers to better predict changes in forest structure, composition, and habitat quality and to develop methods to meet management and restoration goals.

Problem 1a. We need methods for classifying forest sites using ecological approaches. Ecological approaches to forest site classification will enable land managers to better predict species composition and productivity in relation to environmental gradients across landscapes in upland hardwood-dominated forest ecosystems.

Problem 1b. We need methods for predicting and controlling changes in the structure and composition of upland hardwood-dominated forest vegetation. Understanding how forest structure and composition changes in response to natural disturbance, silvicultural activities, climate change, and non-native invasive species will enable land managers to better meet the goals of management and restoration of native upland hardwood-dominated forest communities.

1b.1. We do not fully understand the complexities of natural regeneration in upland hardwood-dominated forests. A fuller understanding will enable land managers to better maintain the productivity and sustainability of upland hardwood-dominated forest stands.

1b.2. We need to improve the competitive ability of planted seedlings through better prediction of seedling performance given variations in nursery seedling quality, stand conditions and cultural practices. An increased knowledge base on the cultural practices and biological mechanisms affecting seedling success will enable land managers to maintain or restore hardwood species using artificial regeneration.

1b.3. We need a better understanding of the ecological patterns and processes that govern stand dynamics and development. A fuller understanding will enable land managers to better apply and modify silvicultural practices in young and mature stands of naturally regenerated hardwoods, and to predict and control changes in species composition and stand structure.

1b.4. We need to better understand the range of natural disturbance types, frequencies, intensities, and conditions in upland hardwood-dominated forests. A fuller understanding will enable land managers to better predict changes in upland hardwood forest structure and composition resulting from natural or silvicultural disturbances.

Anticipated outcomes in Problem 1:

We will develop a tool for land managers to better predict species composition and productivity in relation to environmental gradients across landscapes in upland hardwood-dominated forest ecosystems.

We will provide models and information to enable land managers to better predict and control changes in the stand structure and species composition in upland hardwood-dominated forest vegetation.

We will provide information to land managers on how prescribed fire in upland hardwood-dominated forests affects species composition, stand structure, fuel loading, and residual tree health.

We will provide land managers prescriptions needed to artificially regenerate oaks, American chestnut, and other hardwood species across a range of site conditions and nursery seedling qualities.

We will work with partners to help develop a model to simulate stand development and forest growth in response to both planned and unplanned disturbance, that applies to upland hardwood-dominated forests in the South.

We will build upon a growing knowledge base of forest ecology and silviculture that may be used by land managers and research scientists.

Problem 2.

We need more information on wildlife responses to silvicultural or other disturbance-induced changes in vegetation composition, habitat structure, and food resources, and improved techniques for wildlife inventory and monitoring. Obtaining this knowledge will enable land managers to improve conservation and management strategies and practices for wildlife communities and endangered species in upland hardwood-dominated forests and associated ecosystems in the southern Appalachians.

Problem 2a. We have an incomplete knowledge of how habitat modification and climate change affect populations, habitat quality, and habitat use by neotropical migratory birds at the stand and landscape level. A fuller understanding will enable land managers to better develop and implement effective conservation and management strategies for neotropical migratory birds in upland hardwood-dominated forests and associated forest types in the southern Appalachians.

Problem 2b. We need to develop effective methods to inventory and monitor bats, and obtain fundamental knowledge on bat population trends, habitat requirements, and factors affecting

habitat use and quality at the stand and landscape level. This understanding will enable land managers to better develop and implement effective strategies for bat conservation and management.

Problem 2c. We need more information on reptile, amphibian, and small mammal population trends, habitat requirements, and how natural or silvicultural disturbances affect habitat use and quality. This information will enable land managers to better develop and implement strategies for effective conservation and management of reptiles, amphibians, and small mammals in upland hardwood-dominated forests.

Problem 2d. We do not fully understand how different silvicultural and natural disturbances affect food resources for wildlife, such as fleshy fruit, hard mast, and invertebrate prey, or how availability of these food resources vary over time and landscapes. Improved knowledge will enable managers to more effectively manage food resources for wildlife communities at a landscape level in upland hardwood-dominated ecosystems.

Anticipated outcomes in Problem 2:

We will develop information on how habitat modification and climate change affect populations, habitat quality, and habitat use by neotropical migratory birds at the stand and landscape level.

We will develop more effective methods to inventory and monitor bats.

We will provide information to land managers, land planners, and wildlife biologists on bat population trends, habitat requirements, and factors affecting habitat use and quality at the stand and landscape level that can assist in land management planning for effective bat conservation and management.

We will provide information to wildlife biologists and land managers and planners on reptile, amphibian, and small mammal habitat requirements, and factors affecting habitat use and quality, that can assist in land management planning for wildlife conservation and management.

We will provide land managers and land planners with models for evaluating and quantifying forest food resources such as acorns and fleshy fruit.

We will provide guidelines to land managers and land planners on how different silvicultural and natural disturbances affect food resources for wildlife, such as fleshy fruit, hard mast, and invertebrate prey, and how availability of these food resources varies over time and across landscapes.

We will build upon a growing knowledge base of wildlife ecology that may be used by land managers and research scientists.

Environmental considerations: The program of research proposed in this Research Work Unit charter includes research activities that are generally limited in context and intensity and are not expected to have a significant effect on the quality of the human environment. The environmental effects of specific actions will be considered during the development of study plans, as well as the existence of extraordinary circumstances related to any proposed action, and categorical exclusion

will be documented as a part of the study plan according to FSH 1909.15, Chapter 30. For research involving the use of toxicants, environmental considerations will be evaluated within individual study plans, or by Environmental Assessments or Environmental Impact Statements prepared with or reviewed by the cooperating District or Forest staffs. For research having the potential to affect a plant or animal species that is federally listed as endangered or threatened or proposed for such listing, the RWU will consult with the U.S. Fish and Wildlife Service as per Section 7 of the Endangered Species Act of 1973, as amended.

Key Cooperators and Partners:

Government

Ozark-St. Francis NF	William B. Bankhead NF	Cherokee NF
Daniel Boone NF	Nantahala-Pisgah NF	GW-Jefferson NF
Chattahoochee NF	Black Hills NF	Francis Marion/Sumter NF
NFS-Region 8	NFS-Savannah River	Taliedaga NF

Dr. Kurt Gottschalk, NRS; Dr. Gary Miller, NRS; Dr. Steve Shifley, NRS; Dr. Mark Twery, NRS; Dr. Dan Dey, NRS; Dr. Linda Joyce, RMRS; Dr. Wayne Sheppard, RMRS (Retired); Dr Jim Vose, SRS; Dr. Bob Rummer, SRS; Dr. Emile Gardiner, SRS; Dr. Tom Waldrop, SRS; Dr. Dana Nelson, SRS; Dr. Jim Guldin, SRS; Dr. Kris Connor, SRS; Dr. David Cleland, R9&NRS; Dr. Dan Yaussy, NRS.

Alabama State Lands Division, Tennessee Division of Forestry, Kentucky Division of Forestry, North Carolina Division of Forest Resources, South Carolina Forest Service, Georgia Forestry Commission, Virginia Division of Forestry, North Carolina Wildlife Resources Commission, Tennessee Wildlife Resources Agency, North Carolina Department of Environment and Natural Resources, United States Geological Survey, North Carolina Division of Water Quality, The North Carolina Arboretum, U.S. Department of Energy, Joint Fire Sciences Program (BLM), Congaree National Park, U.S. Fish and Wildlife Service, Alabama Forestry Commission, Natural Resources Conservation Agency, City of Huntsville, U.S. Army Garrison Redstone Arsenal, Arkansas Division of Forestry, National Park Service, Blue Ridge Parkway, Great Smoky Mountain National Park, U.S. Environmental Protection Agency.

Colleges and Universities

Clemson University, North Carolina State University, Duke University, University of Tennessee, Alabama A&M University, University of the South, University of Kentucky, Purdue University, University of Missouri, Mississippi State University, Eastern Kentucky University, University of Florida, Western Carolina University, Mars Hill College, Warren Wilson College, University of North Carolina at Asheville, Virginia Tech, University of North Alabama, Jacksonville State University, Auburn University, University of Alabama

Other

Stevenson Land Company, The Nature Conservancy, American Chestnut Foundation, North Alabama Treasure Forest Landowners, Society of American Foresters, Hayes Nature Preserve, Platte River Whooping Crane Trust, Archbold Biological