

**SRS-4155 Center for Bottomland Hardwoods Research**  
**Stoneville, Oxford and Starkville, MS; Hot Springs, AR**  
**Project Leader: Theodor D. Leininger**

**Mission:** To provide the scientific basis to manage southern bottomland hardwood and wetland forests and associated stream ecosystems for a sustained yield of forest products and other desired values.

**Problem 1. Regeneration and restoration biology**

Bottomland hardwood forests supply critical benefits that are fundamental to ecosystem health at multiple scales and they can protect freshwater resources and habitat for terrestrial and aquatic fauna of national and international significance. Information on hardwood seeds, seedling quality and stand regeneration and restoration methods can insure sustained yields of desired goods and services sought from forested landscapes.

**Problem 1a. Scientifically sound regeneration treatments are needed.**

Unit will develop methods to predict the effects of regeneration treatments on species composition and stand structure, with emphasis on oaks.

**Problem 1b. Seed storage physiology of key hardwood species is poorly understood.**

Unit will study the physiology of recalcitrant or desiccation-sensitive hardwood seeds to improve storage methods.

**Problem 1c. Reproductive biology and germination requirements are lacking.**

Unit will study relationships between flower and seed production and quality in key bottomland hardwood species.

**Problem 2. Stand management and forest health**

The utilization and value of hardwoods in the southeast continue to increase along with national and international demand for hardwood lumber and pulpwood. Forest managers need improved silvicultural systems and better information on growth and yield, stand development, and the management of insect and disease problems to provide sustained yields of multiple-use benefits from bottomland forests.

**Problem 2a. Effective silvicultural guidelines and quantitative tools are needed.**

Unit will develop tools to predict stand growth and development to manage bottomland hardwood and wetlands forests for sustainable yields of forest products.

**Problem 2b. Impacts of insects and diseases on bottomland forests need improvement.**

Unit will develop management guidelines for healthy bottomland hardwood and wetland forests will be improved by the unit's production of knowledge about insect and disease problems.

**Problem 3. Ecology of aquatic and terrestrial fauna**

Streams and associated riparian ecosystems of the southeastern United States provide important habitats for the most diverse terrestrial and aquatic fauna on the continent. Forested watersheds in the region often serve as the last refugia for many sensitive species of birds, non-game fishes, mussels, crayfishes and other riparian-dependent wildlife. It is important that research approaches to management of forest ecosystems treat these non-game animals, whether aquatic or terrestrial, as integral components and critical ecological benefits of the management process.

**Problem 3a. Sampling and monitoring techniques for aquatic and terrestrial fauna are needed.**

Unit will develop methods for sampling and monitoring at a variety of spatial and temporal scales to enable the monitoring of trends of abundance and distribution for various organisms of interest.

**Problem 3b. Factors affecting community ecology and diversity are poorly understood.**

Unit will develop information on the effects of landscape-scale processes, local processes, and historical events, including biotic and abiotic factors, on the distribution, abundance, and ecology of aquatic and terrestrial organisms.

**Problem 3c. Population biology issues for management and conservation need clarification.**

Unit will study population dynamics, including recruitment, mortality, migration/immigration, and population growth rates, to provide better predictions and evaluations of the long-term influence of land management activities and nonnative species invasions on aquatic and terrestrial species.

Problem 3d. Life histories, distributions, and autecology of some organisms are poorly defined

Unit will study life histories and distributions of poorly studied species in the southeastern U.S. to provide the ability to evaluate possible responses of these species to land-use activities and nonnative species invasions.

Problem 3e. Aquatic-terrestrial linkages need to be better understood to improve management.

Unit will study aquatic-terrestrial linkages that occur at the interface between land management and aquatic ecosystems in forested wetlands and bottomland streams.

**Problem 4. Ecological processes and restoration**

At the landscape scale regional hydrologic cycles and floodplains are influenced by the ways in which upland, bottomland, and wetland forests are managed and/or restored. A quantitative understanding of the dominant physical, chemical, and biological processes that define specific upland, bottomland, and wetland forest types is needed to facilitate efforts to manage these ecosystems, as well as to restore them on lands that were converted to agriculture. Techniques are needed for restoring mixed species stands, including understory and midstory species; for establishing and maintaining populations of rare and endangered flora and fauna; and for restoring riparian and aquatic communities lost when river systems were modified.

Problem 4a. Ecological processes in bottomland hardwood forests are poorly understood.

Unit will study biological productivity and nutrient cycling processes within bottomland hardwood systems and their linkages with adjacent upland or aquatic systems. The potential storage of carbon in biotic and abiotic components of wetland ecosystems is potentially large and will be studied for the benefit of conservation programs.

Problem 4b. Effective management practices for bottomland hardwood forest ecosystems are needed

Unit will study effects of management practices on bottomland hardwood forest systems to provide managers with techniques to manage forests, and associated aquatic ecosystems, in ways that will sustain these systems.

Problem 4c. Techniques for restoration of bottomland hardwood systems are needed.

Unit will continue developing techniques to restore bottomland hardwood forests on abandoned agricultural fields and examine economically viable ways of restoring lands that have been heavily degraded including alternative forest restoration methods such as the use of nurse crops.

Problem 4d. Improved understanding of bottomland hardwood and wetland forest hydrology is needed.

Unit will provide managers, private forest landowners, and investors with a better understanding of the regional water balance and how hydrologic processes affect afforestation in the Lower Mississippi River Alluvial Valley.

Problem 4e. Improve the understanding of upland hydrologic processes and linkages to lowland forests.

Unit will study hydrologic processes associated with upland forests and their management and improve the understanding at the landscape scale of the hydrologic linkages between upland and bottomland forests.

**Environmental consideration:** Most of the proposed research activities to be conducted under each of the problem areas outlined in this Research Work Unit Description are 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 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 Partners:**

USDOI Fish and Wildlife Service  
USDA Natural Resources Conservation Service  
USDOD Army Corps of Engineers  
Southern Hardwood Forest Research Group  
The Nature Conservancy  
Mississippi Forestry Commission  
Mississippi State University  
Mississippi Department of Wildlife, Fisheries and Parks