

## Appendix B: Research Work Unit Charters

### **RESEARCH WORK UNIT CHARTER.**

#### **SRS-4703 – Forest Operations**

**Auburn, AL**

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The Mission of our Research Unit is to *provide the science and technology necessary for economically and ecologically viable forest operations for sustainable forest management.* Forest operations are the critical connection between the forest management plan and the realization of desired future conditions. Forest operations are the physical actions which change the forest, altering structure, composition, condition, or value in order to meet society's needs for clean air and water, forest products, wildlife, recreation, and other benefits. Forest operations also include the development and use of the infrastructure, primarily roads and trails, that support value recovery. On every type of forest ownership, the forest operation is the tool selected by the land manager to shape the future and provide value and benefits in the present. Forest operations are the source of both the benefits of management and the negative impacts. Forest operations generate value for society through improved forest conditions and product outputs. They also impact ecological processes and leave an imprint on the landscape. As part of the Forest Values, Use and Policy Science Area, this basic area of research will help define the economic values and technical feasibility of a wide range of tools for forest resource management.

#### **Problem 1. Forest operations technology**

Selecting appropriate forest operations to achieve management goals requires better information about the performance, cost, and operational ranges of new and existing forest operations systems.

Problem 1a. Production and cost studies. The objective is to evaluate performance of systems with respect to variables of management prescriptions and operational conditions. This information is critical to a wide range of other applications including modeling and resource assessments. Studies will focus on harvesting productivity and costs for thinning, mechanical fuel treatments, biomass recovery and utilization.

Problem 1b. Improve technology to meet management needs. This area of study takes evaluation of management requirements and translates it into engineering functional specifications for system improvements. Studies will focus on effect of payload capacity and product form to improve efficient recovery of biomass, specification of operations appropriate for WUI treatments, design of operations to enhance carbon sequestration, design of operations for treatment of invasives, and assessment of net energy consumption.

Problem 1c. Human factors in forest operations. People operate equipment and to a large part constrain the performance of the system. This area of work evaluates physical workload, safety issues, design of work tasks, training, and decision-making with the goal of better integration of people into forest operations.

#### **Problem 2. Ecological effects of forest operations**

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A critical management problem is the inability to effectively implement vegetation management on vast acreages of the Nation's forestland due to perceived ecological impacts. A lack of scientific knowledge about forest operations effects and/or a lack of technically and economically feasible operations that meet ecological requirements are a primary constraint on the ability to manage forest resources. Ecological effects must also be studied across the full range of temporal and spatial scales.

Problem 2a. Soil impacts. Operations can affect soil physical and chemical properties both adversely and favorably. Studies in this area will examine the interactions between operations and forest soils, including compaction, hydraulic properties, nutrient cycling and depletion, microbial communities, and carbon flow. Studies will define the magnitude of effects to help quantify total costs of management alternatives.

Problem 2b. Water quality. Forest operations disturb soil, alter drainage patterns, create concentrated flows. Erosion from forest operations can lead to impaired water quality. This area of study examines the effect of a wide range of forest operations at all scales on erosion processes and water quality impacts. Studies include effectiveness of BMP's, quantify impacts of management alternatives, development of mitigation measures to reduce erosion or transport. This information will inform the development of guidelines and policy to manage water quality.

Problem 2c. Additional effects. Operations also impact vegetative communities and structure, esthetics, wildlife, and forest health. This line of work evaluates the interactions among management tools and a wide range of responses. Studies include effect of management alternatives on invasives, visual quality, recreational value, insect and disease risk, and habitat condition. This specific research area relies on strong partnerships with other Science Areas.

### **Problem 3. Forest operations management systems**

The organization and management of forest operations has a significant effect on performance and cost. Policy and regulation may constrain alternatives or impose additional operational costs.

Problem 3a. – Decision tools. The primary objective of this line of work is to develop models and tools to improve selection among alternatives and to estimate operational outcomes in the planning stages. Studies will develop cost estimating algorithms, optimization programs, spatially explicit project planning, including erosion and hydrologic models.

Problem 3b. – Business management. Engineering cost analyses typically ignore total cost of operation that are a function of business requirements. Overhead and profit are necessary to maintain financially healthy enterprises. Actual operational costs reflect risk and market factors. Studies include evaluation of project and bid estimates, business structures of forest contractors, workforce development, tax effects, financial assessments.

Problem 3c. – Policy and regulation. Management options can be constrained by policy or regulation. This can lead to a variety of cost impacts. This line of work seeks to identify the interaction among policy requirements and operational alternatives. Studies include effect of carbon policy, water quality regulations, WUI ordinances, energy policy.