

Appendix D

RESEARCH WORK UNIT CHARTER

SRS-4854, Eastern Forest Environmental Threats Assessment Center

Unit Locations: Asheville, NC; Raleigh, NC; and Research Triangle Park, NC

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Mission

The mission of the Eastern Forest Environmental Threat Assessment Center (EFETAC) is to generate knowledge and tools needed to anticipate and respond to environmental threats. The most serious threats to forests, and the benefits they provide, inevitably involve complex factors interacting at multiple scales. EFETAC's challenge is to maintain a holistic and integrated research program to tackle these complex issues. EFETAC is further charged to deliver knowledge to forest landowners, managers, and scientists in a timely, useful, and user-friendly manner. **The Eastern Forest Environmental Threat Assessment Center's mission and governance are more completely described in its chartering document dated January 10, 2005. That document is also included as *Appendix E* to this Science Area Charter.**

Organization

EFETAC comprises three teams, each with regional, national, and international responsibilities. The **Threat Assessment** team emphasizes integrated approaches to detecting, predicting, and assessing threats to forest health; the **Southern Global Change Program (SGCP)** team develops conceptual and functional bases for understanding and mitigating forest ecosystem responses to climate change; and the **National Forest Health Monitoring Research** team develops new monitoring protocols and analytical tools in addition to performing national scale analyses and reports on the health and sustainability of the Nation's forests. EFETAC works closely with its counterpart center in Prineville, Oregon, the Western Environmental Threat Assessment Center (WETAC), coordinating approaches to common problems. EFETAC differs from WETAC in its greater focus on private lands and a greater emphasis on hardwoods (See Appendix E)

Problem 1. Forest Health Monitoring Research

Tracking the health of forest ecosystems is a legal mandate essential to effective management. Distinguishing symptomatic changes in forest structure, composition, and productivity from natural variation is a challenge at scales ranging from individual stands to regional landscapes. The Forest Health Monitoring Program is a national collaborative effort involving State and Federal agencies to monitor long-term trends in forest conditions and productivity. Continued improvement is needed to overcome key scientific obstacles and to demonstrate technical advances for implementation.

Problem 1a. Key elements are needed to improve existing monitoring systems and to develop new sampling and survey designs, measurement techniques, and estimation procedures for forest survey and inventory.

Problem 1b. Protocols are needed to integrate data, models, and interpretation techniques to assess forest health and conduct risk assessments and analyses at multiple scales.

Problem 1c. Protocols are needed to utilize spatial analyses and principles of landscape ecology in forest health monitoring and assessment, including interactions between nature and society.

Problem 1d. Protocols are needed to utilize data from long-term comprehensive monitoring of key ecosystem processes and components in forest health assessments.

Problem 1e. An automated system is needed for processing satellite imagery that detects disturbances in forested systems.

Problem 2. Forest Ecosystem Responses to Global Change

Extensive burning of fossil fuels has increased atmospheric concentrations of carbon dioxide and other greenhouse gases well beyond historical levels. Such changes have accompanied increased global temperatures, suggesting a substantively altered world climate. Although the implications of climate change for forests are not fully understood, they are very likely to be profound and pervasive. Climate change can exacerbate threats from other sources, further confounding understanding and the search for solutions. Innovative mitigation strategies based on sound scientific principles are needed to reduce the negative consequences of climate change.

Problem 2a. Better documentation and quantification of climate-induced changes in forests and forest resources are needed (experimentation and observation).

Problem 2b. The ability is needed to project how climate change will impact forests and forest resources and interact with other threats (prediction).

Problem 2c. Knowledge is needed to develop and implement strategies that will reduce negative climate change impacts on forests and forest resources (mitigation and adaptation).

Problem 3. Impacts of Biotic Invasion, Other Stresses, and Their Interactions

Although individual impacts of some stresses on forests are well known, many important stresses have received less attention. Furthermore, combinations of multiple stresses interact in complex ways, often defying efforts to experimentally measure cumulative effects. Further understanding can be gained by investigating important new stresses on forest ecosystems and by developing and demonstrating models that integrate effects of multiple stresses.

Problem 3a. Invasive species are progressively—and sometimes radically—altering the species composition and dynamics of forests; knowledge of species invasiveness and

habitat invasibility as well as development of user-friendly predictive tools for early warning/prevention/spread and effective control methods are critically lacking.

Problem 3b. Losses of forest cover through land-use conversion and changes in forest ownership have far-reaching influences on the susceptibility of forests to other threats and on management capacity to respond.

Problem 3c. Wildland fire is both a social and ecological issue that currently demands inordinate management attention, yet conflicts continue to escalate.

Problem 3d. Airborne pollutants such as nitrates, sulfates, and ozone interact with each other and other stressors, in ways that are poorly understood, to exacerbate effects on forests and forest resources.

Problem 4. Integrated Risk Assessment

Managing forest threats is ultimately about managing competing risks, where risk is defined as the probability of loss. Quantitative risk assessment is a formal body of science that is becoming increasingly commonplace and important in forest management. In risk assessment, ecological and socioeconomic knowledge are combined with mathematical rigor to quantify risk and illuminate trade-offs inherent in alternative course of action.

Problem 4a. Adoption of formal risk assessment methods in forest management is hindered by the lack of training among managers and accessibility of easy-to-use tools and information.

Problem 4b. Risk can be difficult to quantify effectively or communicate to land managers and the public, especially when it involves multiple interacting components and conflicting values.

Problem 4c. A major challenge in environmental risk assessment is translating knowledge and quantifying risk across multiple spatial and temporal scales or ecological levels of organization (e.g., extrapolating effects on individuals to populations).

Problem 5. Collaborative Science Delivery Efforts

Understanding and addressing forest threats effectively involves concerted efforts among multiple stakeholders. Thus, it is increasingly necessary to exchange information, technology, and resources among internal and external customers and partners quickly and efficiently. Technological innovation is needed to improve sharing of data and knowledge with individuals and organizations in a manner that is accurate, user-friendly, and beneficial.

Problem 5a. Web-based tools are needed to ensure widespread distribution of products and services.

Problem 5b. Improved forest health and sustainability reports are needed for national and international assessments.

Problem 5c. Continued publication development and presentation opportunities are necessary to maintain Center credibility and encourage long-term collaboration.

Problem 5d. Improved analytical tools need to be developed and transferred to analysts responsible for regional, national, and international assessments of forest health and sustainability.