Forest Health Monitoring Fire Evaluation Monitoring Proposal
Year 4 Funding for FY-2004

Proposal title: Assessing the contribution of down and standing deadwood biomass and decay on fuels and wildland fire risk across the southeastern United States

Station: Southern Research Station
RWU and Location: SRS-4852, Raleigh, NC

Background: The President's National Fire Plan is concerned that fuel loads are reaching hazardous levels that can lead to widespread catastrophic wildfires in forest ecosystems and the forest/urban interface. Land managers need tools to enable them to classify, estimate, and monitor fuel loading, and to predict wildfire risk and behavior based on inputs of fuel, weather, and topography for a specific location. With this information land managers will be better able to allocate limited resources to minimize the potential for catastrophic fire and protect the American public.

As a component of the National Fire Plan, SRS-4852 has received annual FY 2001- 2003 funding to implement an east-wide research project entitled, "Assessing wildfire risk for forested ecosystems and human populations across the eastern United States". As part of this research effort, we intend to develop county estimates of standing and down deadwood biomass for the eastern U.S. from FIA data and methodology developed from the down deadwood data. Empirical models of down deadwood developed for the northeastern U.S. will be validated using data from existing literature for the southern U.S. and new data from forest industry and university researchers.

We intend to link our existing National Fire Plan funding and research project with our FHM project to provide field plot validated estimates of standing and down deadwood for the southeastern U.S. This project will be linked with the efforts of a proposal from the Northeast and North Central FHM regions. Dr. Linda Heath, NE-4104, is utilizing down deadwood data from FHM plots in the NE and NC regions to field validate regional estimates at the county scale. This activity will be coordinated with SRS-4852 to provide east-wide FHM field plot validated estimates of standing and down deadwood at the county scale.

Forest Health Monitoring Project

Forest species, stand age, and management practices all influence wildland fire potential by affecting the fuel load quantity and quality. However, there is a limited understanding of how much coarse, medium, and fine woody fuel is available for wildfires across eastern U.S. forests, and the contribution of litter, shrub, and herbaceous biomass to wildland fuel loads.

Proposed Year Four Tasks:

Task 1. The Southern Group of State Foresters (SGSF) is supporting ongoing fire management planning and wildland fire risk analysis in each community, county, congressional district, and fire response zone of the organization's 13 southern U.S. states. SRS-4852 is collaborating with Space Imaging Corporation in the development of the Wildland Fire Risk Assessment System (WFRAS) funded by the SGSF and the National Fire Plan. The member states are Alabama, Arkansas, Mississippi, Florida, Georgia, Kentucky, Louisiana, Virginia, Texas, Tennessee, South Carolina, North Carolina, and Oklahoma. The organization also includes the U.S. Forest Service's Region 8 Office in Atlanta. The wildland fire

risk assessment methodology is employing both geographic information systems (GIS) and remote sensing technologies. It is a well-defined and repeatable process for describing fuels and analyzing wildland fire risk to suit any scale of operation, including wildland and wildland urban interface areas. The wildland fuels are mapped using 30-meter resolution Landsat Thematic Mapper imagery as a baseline. Space Imaging is working with SRS-4852 to acquire wildfire fuel loading for all counties in southeastern forests. SRS-4852 has been working for three years in conjunction with Forest Health Monitoring (FHM) to measure and map fuel loading in the eastern United States. The goal has been to incorporate the best wildland fire science available for fire protection planning. Once the WFRAS project is completed, each state will be better equipped to communicate wildland fire risks to the public. The WFRAS will give fire professionals and other stakeholders a dynamic set of tools for evaluating site-specific fire risks in a consistent manner across the region, with the ultimate goal of reducing the tremendous human and property loss caused by wildfire. We will work with Space Imaging to incorporate all DDW data and map products from the first three years of our FHM study into the WFRAS.

Task 2.   The wildland / urban interface is that area where human improvements such as homes farms come in contact with the wildlands. The problem is not restricted to western states. Wherever there are people living in or adjacent to wildland areas there is the threat of wildfire. Urban expansion has driven the increased building of homes in wildland areas thoroughout the southeastern U.S.   Many homeowners desire to have a few acres of land and a nice secluded home outside of town. What these homeowners fail to recognize is the increased danger from wildfire in these areas. People that move out to the country often take with them their city values and often these values are in conflict with wildfire protection. The southern State Foresters have recognized this problem and initiated Wildland Urban Interface (WUI) and FireWise Community programs in all 13 southeastern states.   These groups have asked SRS-4852 to assist them by providing technology transfer of remotely sensed landcover, fuel loading, and fire risk data and map products. As a pilot, we have provided this information developed from our FHM study for Jefferson, Shelby, Baldwin, and Mobile Counties in Alabama to Julie E. Shiyou-Woodard, South Alabama Regional Planning Commission, and Joe Lynch, City of Clay FireWise Community. SRS-4852 proposed to respond to a request from the Southern Group of State Foresters FireWise Communities to provide data and map products from our FHM study.

Task 3. All down deadwood (DDW) will be analyzed from 2003 FHM P3 plots in the southeastern U.S. for comparison to our ongoing National Fire Plan east-wide study to estimate live and deadwood biomass at the county level. The FHM DDW data will be used to validate or refine county and/or map based estimates of standing and down deadwood developed during three years of this project.   Algorithms will be refined to spatially scale estimates of coarse and fine woody materials, litter, shrub, and herbaceous biomass. A simple tree-level FIA database for a few key tree and plot measurements will be developed to allow flexible recompilation of the data for ecological needs. All results will include confidence intervals calculated from appropriate variance calculations, which will require statistical study. This work will advance the analysis of P3/P2 data in a proper statistical context.

Task 4. Standing and down deadwood will be modeled for all counties in the 13 southeastern states. Tabular data, GIS map displays, and metadata will be produced annually as products for FHM. Deadwood estimates will be displayed with live forest biomass and landcover obtained from Landsat Thematic Mapper data for the region. DDW models developed in the first three years will be validated with 2003 FHM plots in the southeastern U.S. Any appropriate

changes to the model will be implemented as a result of additional analysis of the 2003 FHM plot data.

Task 5. We propose to continue to refine the model algorithms and estimates of deadwood, litter, shrub, and herbaceous biomass with subsequent years of FHM deadwood data for the eastern U.S and expand the effort to the western U.S.   FHM will be provided with implementation methodology to update deadwood estimates with future FHM plot data following completion of the research implementation phase of this study.

Additional staffing and skill needs:
David C. Chojnacky, USDA Forest Service Inventory Enterprise Unit, will contribute to modeling estimates of down deadwood utilizing P2 and P3 FIA plot data.

Linkage with Ongoing Fire Research:
In FY 2001-2003, SRS-4852 was awarded funding from the President's National Fire Plan to implement a research project entitled, "Assessing wildfire risk for forested ecosystems and human populations across the eastern United States". This project will use satellite imagery (Landsat Thematic Mapper data) and USGS digital elevation models for the eastern U.S. to assess vegetation land cover, forest canopy parameters, and topography from the 30 m to 4 km^2 resolution. Live tree biomass will be augmented with estimates of coarse woody debris modeled from available FIA variables. Diameter-based forest biomass equations (including prediction error capability) will be used to estimate total forest carbon for the eastern U.S. from the FIA database. The research will also use remotely sensed land cover at 30 m resolution in conjunction with fuel loads in high wildfire risk areas to assess and map likely forest fire corridors and urban and suburban areas at risk from fire and/or smoke. High-resolution census data will be used in conjunction with land cover and fuel load data to identify areas where risk of fire is likely to coincide with communities. The FHM funding will be used to expand the scope of this research project to provide critical field plot validation data for regional data analysis and modeling of forest biomass and fire risk, and to address FHM science and policy questions.

Partners
The following individuals and organizations have agreed to serve as collaborators.

- Southern Group of State Foresters
- Southern States WUI programs and FireWise Communities

FHM Budget and Cost Sharing:

Resources		Budget ($/yr)
Scientists	2	44,000
Cooperative Research	1	36,000
Other (Travel)		5,000
Total		85,000

Annual funding requested for year 4: $85,000

Cost sharing: National Fire Plan annual funding of $341,000 to SRS-4852

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