STATEMENT OF
JUNE THORMODSGARD
CHIEF SCIENTIST FOR LAND SCIENCES
EROS DATA CENTER
U.S. GEOLOGICAL SURVEY
U.S. DEPARTMENT OF THE INTERIOR
BEFORE THE
FOREST AND FOREST HEALTH SUBCOMMITTEE
OF THE
COMMITTEE ON RESOURCES

AUGUST 31, 2005

Introduction

Thank you, Mr. Chairman for the opportunity to discuss scientific activities of the U.S. Geological Survey (USGS) relevant to land management issues of the Black Hills forest and rangeland ecosystems. My name is June Thormodsgard. I am the Chief Scientist for Land Sciences at the U.S. Geological Survey's Earth Resources and Observation Science (or EROS) Data Center in Sioux Falls, South Dakota.

The USGS is a federal science agency within the Department of the Interior that conducts research and technology development for geology, water resources, biological resources and geographic analysis. At EROS, the USGS focuses on acquisition and management of the nation's land remote sensing satellite data, the use of these data for various scientific activities, and geographic analysis and monitoring, including fire science. The USGS does not conduct these projects alone. We partner with other federal agencies, non-governmental organizations, and private companies. Currently, the USGS is engaged in several important fire research activities that are designed to provide data and tools to land managers in support of their land management and conservation decision-making. LANDFIRE

One of the projects that USGS is actively engaged in is the Landscape Fire and Resource Management Planning Tools Project, also referred to as the LANDFIRE project . LANDFIRE is a national project to generate comprehensive landscape-scale maps of vegetation, fire frequency, change in fire frequency, and fuel characteristics of the entire United States. This project is managed by the USDA Forest Service and the Department of the Interior, and conducted primarily by scientists from the Forest Service Missoula Fire Sciences Lab, the Nature Conservancy, and the USGS EROS Data Center. This interagency project is designed to provide geo-spatial data layers in a consistent manner across all ownerships nationwide. These nationally standardized layers can be processed by land managers to help them prioritize fuel treatment projects to reduce fire hazards, identify where the most severe fire risks to local communities are located, identify where to restore impaired fire-dependent ecosystems, analyze natural resources and associated wildfire risk, and enhance their knowledge of local fire behavior to improve firefighting safety. These layers will provide managers with the data to plan and implement projects in a collaborative, landscape-scale, cross-boundary, interagency manner. These are key issues under the National Fire Plan, the Healthy Forest Restoration Act and agencies' 10-year comprehensive strategy for fire management. As such, the project serves a broad range of stakeholders including national policy makers, federal land managers, incident commanders, and organizations and private citizens who care about the overall health of our forests, rangelands, and the environment. LANDFIRE is an important environmental and natural resources project for the nation. For this project, the USGS involvement brings a high degree of scientific and technical sophistication achieved through accumulation of over three decades of research investment in satellite data management and operation, remote sensing/mapping techniques, geographic analysis, Internet based GIS, and computer technology. USGS responsibilities include 1) providing Landsat imagery to serve as the physical basis for mapping vegetation, wildland fuel characteristics, and ecosystem conditions, 2) delivering maps of detailed topography, land cover, and vegetation characteristics (such as forest composition, canopy cover, and canopy height), and 3) distributing LANDFIRE maps via the Internet in order to get data in users' hands in the most convenient way. LANDFIRE as a national project began in 2004 and is scheduled to be completed in 2006 for federal lands in the western US (from the Rocky Mountains west), 2008 for the eastern US (from the Central Plains east), and 2009 for Alaska and Hawaii. Project scheduling and prioritization are based on many factors, such as national fuel treatment priorities. For the Black Hills area and the rest of South Dakota, we estimate that the mapping will be conducted sometime between 2006 and 2007. While LANDFIRE is not yet available for the Black Hills, we envision the following benefits that the project will provide to the Black Hills community: L ANDFIRE data can be applied to address local management questions and can be integrated with local knowledge. Scientists learned this lesson from a demonstration project in southern Utah, where we used decision support tools to evaluate fire hazards near a number of local communities in the area. The information derived provided a sound scientific basis for decision-making in prioritizing fuel treatment plans. LANDFIRE data can be used effectively to improve understanding of fire behavior and fire effects in

support of incident command decision-making across land ownership boundaries. In 2003, LANDFIRE provided technical support for more than 20 fires occurring in western Montana. Fire behavior predictions matched well with actual fire spread. More significantly, LANDFIRE served as an integrating tool for the otherwise fragmented data and information coverage available for the area. When USGS produces ecologically and biophysically significant landscape data, the results can be used for various environmental assessments. Recent applications include mapping cheatgrass and other invasive species, and risk mapping for forest insects and diseases. LANDFIRE data may also prove useful in agency efforts to combat the ongoing pine beetle infestation in the Black Hills area.

National Burn Severity Mapping

Now, allow me to call your attention to another important fire science project being conducted at USGS. The national burn severity mapping project will begin in October of this year. Research efforts by USGS scientists, together with support from the National Park Service, have resulted in a robust method to use satellite imagery to quantify size, spatial patterns, frequency, and the overall environmental effect of wildfires. Working with our partners within the National Park Service and the Forest Service, USGS provides federal land managers with two burn severity services:

▪ First we provide burned area emergency response (or BAER) teams with rapid mapping support for their tasks to minimize post-fire hazards of downstream flooding, landslides, and soil erosion. In 2000, USGS worked with the Black Hills National Forest to map the Jasper Fire burn severity. Within two days of the fire's containment, a burn severity map was produced from satellite imagery. This map, included here as Exhibit A, was used by the Forest Service to estimate timber mortality rate and for post-fire management and conservation actions.

▪Second, USGS conducts extended assessments to monitor vegetation recovery and long-term fire effects. The assessment generally occurs one year after the initial fire and subsequent years afterwards if necessary. Research in this area has led to a nationwide effort to produce a fire atlas of all fires (meeting minimum fire size requirement) occurring from 1982 to present then updating yearly through 2010. With this timeframe, we will be able to track trends in burn severity throughout these years and analyze patterns and differences by vegetation types, management practices and other ecological or socio-economic factors. Such analysis will be useful in assessing effects and effectiveness of the National Fire Plan, the Healthy Forest Restoration Act, and other land management policies. Besides the national applications, other intended uses of the time series of burn severity include updating fuel maps or assessing fuel treatment options by land management units (i.e., national forests or national parks). Key to this national fire monitoring effort is the existence of a Landsat data archive.

Exhibit B is a Landsat image of the Black Hills, showing that a total of 22 fires spanning 23 years (1983-2005) burned more than 265,000 acres of Black Hills' forest and grasslands. This averages one fire per year and approximately 12,000 acres per fire. These numbers confirmed that the Black Hills is following the national trend in terms of increased number of fires and size of fires in recent years: 10 fires in the last 6 years (2000-2005) as compared to 12 fires in the previous 17 years.

The USGS looks forward to developing a fire atlas of the Black Hills area. The fire atlas, as a set of records of recent fire activities and changes in vegetation communities in the Black Hills will help understand relations between fire occurrence and past or potentially future land management or conservation practices in this area. As six year effort, the fire atlas is part of the FY 2006 budget and will be funded by the National Park Service and the U.S. Forest Service.

Additional USGS Capabilities in Fire Science

Before closing, I would like to emphasize that current fire research activities at EROS summarized above represent only a small portion of the total fire science portfolio and capacity within the USGS. The USGS sustains a broad program of fire research, some focused on forest ecosystems, but much focused on other ecosystem types (woodland, shrub-steppe, chaparral, grassland, and desert ecosystems) found on DOI and other public and private lands throughout the United States. This broad research portfolio provides reliable scientific information that helps land managers better understand the ecological context of fire; historical fire regimes and effects of human actions on fire regimes; effects of fire on soil, water and biological resources; fire risks to human communities and natural resources; and effective techniques for managing and restoring ecosystems and watersheds impacted by fire.

All four of USGS's major disciplines take part in this research. Scientists in the USGS Geography discipline develop a variety of additional mapping and geospatial tools and products and remote sensing applications that directly support fire managers on the ground. Scientists in the Biological Resources discipline conduct a wide array of research focused on understanding the history and ecological role of fire in diverse ecosystems and biophysical settings; fire effects on vegetation and wildlife communities; fire behavior and risk in relation to climate variability and biomass or fuels structure; the relation of fire to invasive species such as cheatgrass; and techniques to monitor effectiveness of restoration treatments following fire. Research by scientists in the Geology discipline seeks to clarify the relation between fire severity and the occurrence and risks

of post-fire floods, landslides and debris flows to human communities. Finally, studies in the Water Resources discipline focus on fire effects on runoff, water quality, and erosion; on developing and monitoring effectiveness of watershed rehabilitation treatments following fire; and on rapid deployment of hydrologic data collection networks following wildfire. This large portfolio of fire research within the USGS provides direct support to the National Fire Plan and the Healthy Forest Restoration Act.

Thank you, Mr. Chairman for the opportunity to present this testimony. I will be pleased to answer questions you and other members of the panel might have.