Research Supporting Sound Decisions

Joint Fire Science Program

2004 BUSINESS SUMMARY

A REPORT HIGHLIGHTING THE ACCOMPLISHMENTS OF THE JOINT FIRE SCIENCE PROGRAM IN FISCAL YEAR 2004

The Joint Fire Science Program

The Joint Fire Science Program (JFSP) was authorized and funded by Congress in 1998 to provide scientific information and tools in support of fuels and fire management programs. The program is a partnership of six Federal wildland management and research agencies, including the United States Department of Agriculture's Forest Service and the Department of the Interior's Bureau of Indian Affairs, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey. An appointed 10-member governing board, representing the partner agencies, provides program oversight and management. Further information on the JFSP and its funded projects and products are available on the Internet at http://jfsp.nifc.gov.

Cover satellite image courtesy of Jacques Descloitres (MODIS Land Rapid Response Team, NASA GSFC) through Earth Observatory. The image "Fire and Heavy Smoke in Alaska" can be accessed at http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php3?img_id=4675.

This document was produced through an interagency effort. Publishing services were provided by the BLM National Science and Technology Center Branch of Publishing Services. The following BLM publications indexing number has been assigned for tracking and administrative purposes only:

BLM/FA/GI-05/006+9217

This document is available on the Internet at http://jfsp.nifc.gov.

Suggested citation:

Joint Fire Science Program. 2005. Joint Fire Science Program 2004 Business Summary. BLM/FA/GI-05/006+9200. Denver, Colorado. 44 pp.

Contents

Executive Summary

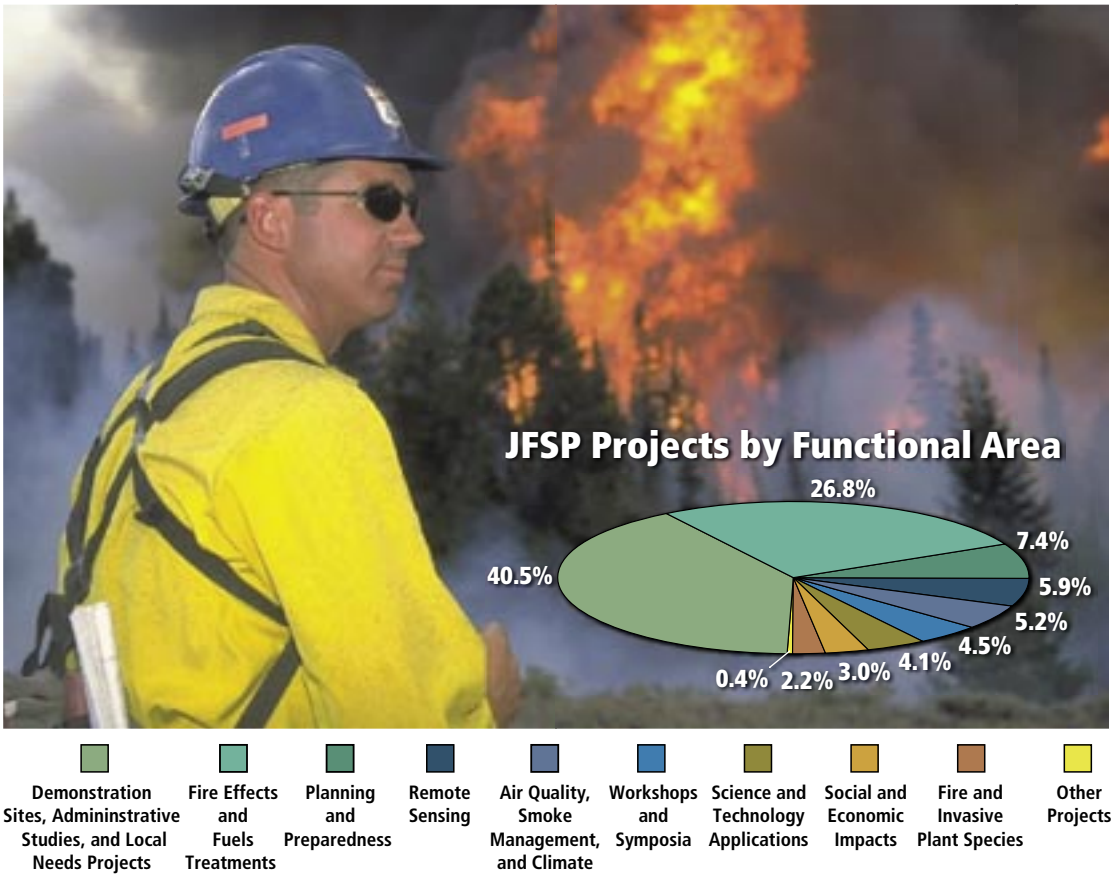
JFSP-funded projects are helping to improve the overall effectiveness of wildland fire management by providing the scientific information and tools necessary to integrate fire into land and resource management plans and their implementation.

The Joint Fire Science Program (JFSP) was established in 1998 to provide scientific information and tools in support of fuels and fire management programs. Since its inception, the JFSP has issued 15 announcements for proposals, received 930 proposals, and funded 273 projects. In 2004, the JFSP funded 43 new research and science application projects. The results from these projects are being made available to public land managers, private landowners, and other users.

In setting priorities for funding, the program strongly emphasizes meeting the information and analysis needs of the management community. JFSP projects stress manager-scientist partnerships, and place substantial emphasis on technology transfer. These partnerships are helping to ensure that urgent research needs at the field level are being met. Furthermore, the Program facilitates and supports collaboration among National Fire Plan research coordinators, the U.S. Geological Survey, and research scientists working on related projects to help ensure compatibility, efficiency, and mutually beneficial products, with minimal redundancy.

Resource managers are increasingly challenged by the need to justify decisions and apply scientifically sound solutions to complex problems identified at national and regional levels during both the planning and implementation of resource management strategies and on-the-ground projects. The JFSP has long recognized that investments in wildland fire science need to be accompanied by an emphasis on interpreting and delivering science information to people in the field.

JFSP-funded projects are helping to improve the overall effectiveness of wildland fire management by providing the scientific information and tools necessary to integrate fire into land and resource management plans and their implementation. Researchers and managers have communicated results and new tools to on-the-ground users through published papers, field trips with managers, participation in workshops and symposia, training sessions, the development of Web pages for posting current and relevant project information, and other technology transfer media.

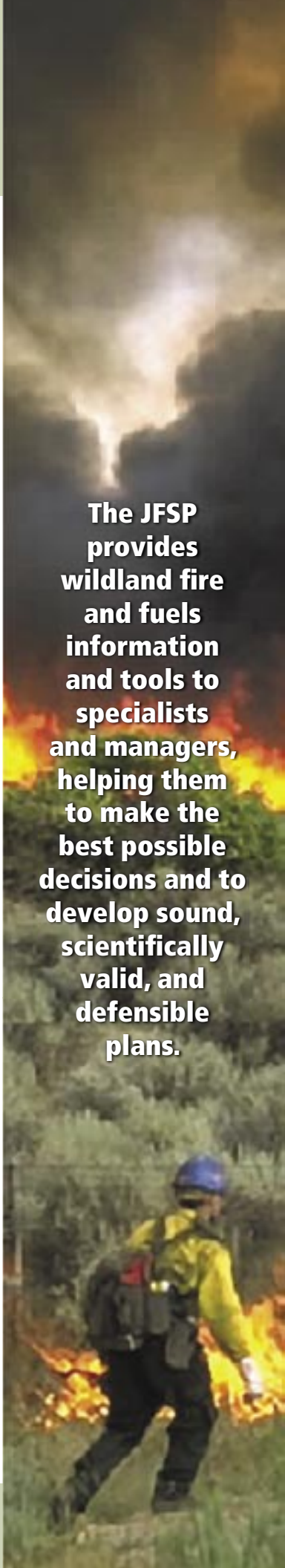


Introduction

The 2004 wildland fire season in the United States, though widely considered "quiet" in the lower 48 States, resulted in over 7 million burned acres, more than twice the past 10-year annual average. Of the yearly total, more than 6 million acres burned in Alaska from June through August—an all-time record. Substantial drought in the boreal forests of Alaska led to complete consumption of the peat-laden forest floor in many areas. Smoke from these fires blanketed much of the United States and the Canadian Arctic and sub-Arctic.

Although the number of fires remains reasonably constant from year to year, the burned acreage has been double the 10-year annual average in 4 of the past 5 years. In addition, the current 10-year annual average is higher than in previous 10-year periods. Although there is debate concerning the causes, it is clear there is a trend toward an increasingly larger annual burned acreage. The increasing volume of fuels in many ecosystems, when combined with drought, is a critical factor in the spread of wildland fires and their resistance to control.

The National Fire Plan (NFP), administered by the USDA Forest Service, funds treatments for the reduction of fuels both in wildland areas and in the wildland-urban interface. In trying to meet NFP goals and integrate them into larger goals for land management and community protection, managers are increasingly challenged to justify treatments and to address questions concerning the effects of increased levels of fuels treatments, post-fire rehabilitation treatments, and altered fire regimes on threatened and endangered species, invasive plant species, wildlife habitat, air quality, and similar areas of concern. The Joint Fire Science Program (JFSP), a partnership of six Federal wildland management and research agencies, supports applied research to address these and other complex issues facing land managers as they predict, mitigate, and respond to wildland fire and its effects on the landscape and on communities. The JFSP provides wildland fire and fuels information and tools to specialists and managers, helping them to make the best possible decisions and to develop sound, scientifically valid, and defensible plans.



The JFSP provides wildland fire and fuels information and tools to specialists and managers, helping them to make the best possible decisions and to develop sound, scientifically valid, and defensible plans.

The Role of Science and Technology in Wildland Fire and Fuels Management

The JFSP has long recognized that investments in wildland fire science need to be accompanied by an emphasis on science interpretation and delivery.

The Management Dilemma

Resource managers' information needs range from support for local decisions in project implementation to the development and implementation of regional and national strategies and policies and evaluations of their effects. The Joint Fire Science Program (JFSP) takes a balanced approach to serving these needs by supporting projects that range from developing local ecosystem specific information to those providing regional and national level information and decision tools. This need for science-based decision making has always existed, but the demand is increasing as management agencies strive to take proactive approaches to addressing fuels problems and restoring fire-adapted ecosystems.

The need for new information and tools also is increasing as treatments are applied in visible wildland-urban interface areas and across larger areas of the landscape. New issues continually arise, such as the response of invasive plant species to fuels treatments, the impacts of fuels treatments on carbon storage, the best ways of interacting with communities in the wildland-urban interface, or the impact of landscape-level fuels and restoration treatments on wildlife habitat or on endangered or threatened plant and animal species. As researchers develop new information and tools to address these and other emerging issues, it is critical to rapidly and effectively transfer these advances to managers so that decisions can be based on the best available science.

Science and Technology Transfer Emphasis

The JFSP has long recognized that investments in wildland fire science need to be accompanied by an emphasis on science interpretation and delivery. Program success is not measured by how many research projects are funded or how many research papers are generated, but how critical information from research efforts is successfully being conveyed to resource managers and end users with the expressed purpose of improving management decisions. The research community, including federal, university, nonprofit organizations, and others recognizes the urgent need to identify and develop information and decision-support tools for addressing land management issues as quickly and efficiently as possible.

Joint Fire Science Program Approach

The JFSP requires federal agency participation in all JFSP-funded projects, and strongly encourages inclusion of federal land managers on project teams. JFSP projects stress scientist-manager partnerships, along with substantial emphasis on technology transfer. Recent JFSP projects have involved all the JFSP partner agencies, other federal agencies (such as the National Aeronautics and Space Administration and USDA Agricultural Research Service), nearly 50 universities, state and local agencies (such as the St. John's Water Management

District in Florida and the Kenai Borough in Alaska), and non-profit groups (such as Tall Timbers Research Station, the Alaska Tanana Chiefs, and The Nature Conservancy). Several for-profit companies also have contracts to complete parts of projects. The JFSP has funded research projects in 48 states, Puerto Rico, and the District of Columbia. These scientist-manager partnerships are actively pursuing solutions to the problems land managers face and are helping to ensure that urgent research needs at the field level are being met.

Joint Fire Science Program Guidance

The JFSP works within overall program guidelines set by Congress, in the annual Appropriations Acts for the Department of the Interior and related agencies. In addition, program objectives and priorities strongly support National Fire Plan (NFP) implementation and assessment.

The JFSP guidance includes four original principal purposes all related to wildland fuels: fuels inventory and mapping; effects of fuels treatments; scheduling of fuels treatments; and monitoring and evaluation. Subsequent guidance in 2001 included added emphasis on postfire stabilization and rehabilitation, aircraft-based remote sensing, "rapid response" projects to capture time-sensitive data on active or very recent wildland fires or postfire rehabilitation projects, local science information needs, and increased emphasis on technology transfer and response to the NFP.

Program goals and priorities are developed through discussions and input from stakeholders, agency fire directors, field managers, technical specialists, policymakers, and the science community and are described in more detail in the JFSP Plan submitted to Congress in January 1998 and internal program documents.

Joint Fire Science Program Projects for 2004

In 2004, the JFSP funded 43 new research and science application projects, several workshops, and the fifth year of the "Fire and Fire Surrogates" project, which is assessing the ecological consequences of four alternative fuels reduction treatments. Substantial effort was also invested in enhancing and improving the Program's administrative data base. Funded projects included support for areas such as science delivery and application, wildland fuels management, postfire stabilization and rehabilitation, local research needs, demonstration sites, aircraft-based remote sensing applications, and rapid response projects. All projects funded in 2004 supported the key points in the NFP as well as JFSP program guidance. A list of FY 2004 projects is included in Appendix A and a list of all JFSP projects from FY 1998 through FY 2003 is included in Appendix B.

A coordinated interagency direction and approach to science and technology integration should increase the effectiveness, adoption, and application of science information; reduce duplication of efforts; and improve management decisions.

Joint Fire Science Program Accomplishments and Highlights

Science Delivery and Application

Researchers and managers supported by the Joint Fire Science Program (JFSP) communicated results and new tools to users through published papers, field trips with managers, participation in workshops and symposia, training sessions, development of Web pages for posting current and relevant project information, and other technology-transfer media. Some of the highlights follow.

Science Delivery and Applications Workshops

The JFSP hosted a Science Delivery and Applications Workshop in May 2004 in Boise, Idaho, to assess the state of current wildland fire technology transfer efforts, determine how to provide leadership in science delivery and application of technological advances, and establish networks to leverage science delivery efforts among different organizations and agencies. This workshop was attended by over 20 science delivery specialists from a variety of organizations including the USDA Forest Service (FS), Bureau of Land Management (BLM), U.S. Geological Survey (USGS), Aldo Leopold Wilderness Research Institute, National Center for Atmospheric Research, National Association of State Foresters, U.S. Air Force (Federal Laboratory Consortium Representative), and the University of Idaho.

A second workshop, held in October 2004 in Athens, Georgia, expanded on the Boise workshop to update over 30 participants on the progress of science delivery efforts that included Internet decision support tools, such as the Fire Research and Management Exchange System (FRAMES); an overview of the "Service Center" concept to support fire and fuels technology; and the Fuels Synthesis Project, an effort to synthesize current fuels information into publications and decision tools for fuels managers.

Accelerating Interagency Science Delivery and Application

An ad hoc group of technology transfer specialists began crafting a "Strategic Plan to Enable Interagency Cooperation for Wildland Fire Science and Technology Integration" during the May workshop. This "white paper" aims to create an interagency plan to speed the adoption of promising fire and fuels science and technology. A coordinated interagency direction and approach to science and technology integration should increase the effectiveness, adoption, and application of science information; reduce duplication of efforts; and improve management decisions.

JFSP Project Highlights

The first monthly issue of the JFSP Project Highlights newsletter was developed and distributed in May 2004 to a wide variety of researchers and managers. These short "snapshots" highlight recent program deliverables and project accomplishments and are mailed to approximately 450 recipients. The newsletter is also available online at the JFSP website (http://jfsp.nifc.gov), along with other information on products and deliverables, and project information.


JFSP Project Highlights

Research Supporting Sound Decisions

New Release of FEPS (Fire Emission Production Simulator) Replaces and Enhances the Emissions Production Model

Field Visits

The JFSP Governing Board and staff believe that field visits to view and discuss JFSP-funded projects will yield a greater understanding and appreciation for scientist and manager issues and concerns, improve opportunities for transferring research information to end users, and better enable the Governing Board to monitor research progress.

JFSP staff and invited managers and scientists visited "Hungry Bob," one of the Fire and Fire Surrogate project sites (Project 99-S-01) on the Wallowa-Whitman National Forest, in October 2004. The field trip provided an opportunity for Program Office staff to review research progress with scientists and managers from the FS, U.S. Fish and Wildlife Service (FWS), and BLM. These discussions at Hungry Bob prompted Fire and Fire Surrogate investigators to invest more resources in science delivery and application. Managers attending the Hungry Bob field trip remarked that new information provided by Fire and Fire Surrogate project scientists both confirmed and clarified their personal observations about fire behavior and fire effects on vegetation. The program staff and Board plan to visit two or three project sites each year.

The field trip provided an opportunity for Program Office staff to review research progress with scientists and managers…

Projects supported by the JFSP have played an important role in developing practical applications now being used by managers.

From Research to Application

Projects supported by the JFSP have played an important role in developing practical applications now being used by managers. Many of these applications have been developed through collaboration between JFSP and FS National Fire Plan (NFP) research and base research programs in the FS and Department of the Interior (DOI).

Postfire Emergency Stabilization Treatment Effectiveness—Research Data Guides Land Management Decisions

Burned Area Emergency Rehabilitation (BAER) program specialists have long sought monitoring tools to determine if post-fire erosion mitigation treatments were meeting erosion reduction goals. The JFSP has supplemented NFP funding of the **Risk Assessment of Fuel Management Practices on Hillslope Erosion Processes** (Projects 98-1-4-12 and 01-3-2-08) since 1998. This innovative "rapid response" approach to monitoring has enabled scientists to install post-fire erosion monitoring equipment within weeks following wildfire containment. Using a "paired watershed" approach after nine large wildfire incidents in Washington, California, Nevada, Montana, and Colorado, scientists compared the sediment yields from treated watersheds with similar, untreated control watersheds. This approach has provided the data needed to determine the effectiveness and limitations of several rehabilitation treatments. For example, once 10-minute rainfall intensity reaches approximately 2 inches per hour, contour-felled logs quickly become overwhelmed and lose their ability to store sediment, while mulch treatments can still reduce runoff and significantly reduce erosion. Based on these findings, BAER team professionals are adapting and changing their postfire erosion mitigation strategies. The use of contour-felled logs has declined from an annual expenditure of $14 million in 1996 to $2.1 million in 2002 for years of comparable burned acreage. After the 2002 Hayman Fire in Colorado, rehabilitation specialists refined the treatment plan so that straw mulch was applied to 8,000 acres and contour-felled logs were selectively applied on only 200 acres.

Additional Information:
http://forest.moscowfsl.wsu.edu/people/engr/probichaud.html

Fire and Fuels Extension to the Forest Vegetation Simulator—Modeling Change in Fire Behavior through Time

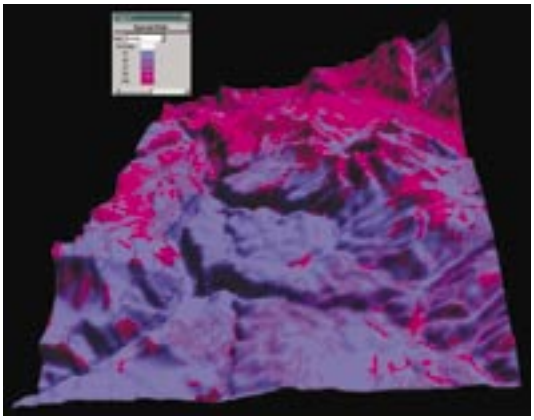
Natural resource managers have used the Forest Vegetation Simulator since the early 1970s to predict tree, stand, and forest-level attributes such as tree diameter growth and crown cover. However, this widely-accepted individual-tree modeling system lacked the capability to predict the fire behavior consequences of silvicultural treatments. To fill this knowledge gap, the JFSP supported development of a **Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator** (Project 01-1-7-07). FFE users can now predict changes in fire behavior through time as a function of forest composition and structure and management actions such as fuels treatments and reforestation.

The Coronado National Forest is using the FFE to compare the effects of alternative forest treatments on fire hazard, fuels loading, species composition, and stand structure. Klamath Falls Resource Area BLM fire managers use the FFE to estimate crown fire hazard in late successional reserves, and Rocky Mountain National Park ecologists use the FFE to examine the effects of past mechanical fuels treatments on forest structure and fire behavior.

Additional Information:
http://forest.moscowfsl.wsu.edu/4155/ffe-fvs.html

FlamMap—Spatial Analysis of Landscape-Scale Fire Behavior

Fuels management treatments can reduce the undesirable consequences of wildfires most successfully if wildfire behavior is modified at the landscape scale. **FlamMap** (Project 01-1-3-21), creates maps of potential fire behavior characteristics (such as rate of spread, flame length, and crown fire activity) and environmental conditions (such as dead fuels moisture, mid-flame wind speeds, and solar irradiance) over an entire landscape. FlamMap incorporates the fire behavior models used in FARSITE, NEXUS, and BehavePlus to enable fire managers to gain a landscape-scale perspective of fire behavior. FlamMap can help managers predict how alternative fuels treatments modify fire behavior at varying spatial scales.



A prototype of FlamMap was developed in support of the Tahoe Basin project, where it has been used to calculate potential fire behavior under different historical fire weather conditions as part of a fire susceptibility analysis. The Southern Group of State Foresters now uses FlamMap to assess fire risk across 13 southern states as part of the Southern Fire Risk Assessment Project. FlamMap has also been used for hazard assessment on the Boundary Waters Canoe Area, the Sierra Framework Environmental Impact Statement (EIS), the SAFEForests Model developed at Oregon State University, and Florida's Wildland Fire Risk Assessment System.

Additional Information:
http://fire.org/nav.mas?pages=JFSP&mode=11

Supporting Implementation and Monitoring of the National Fire Plan

One of the first projects supported by the JFSP was **Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management** (Project 98-S-02). This project characterized and mapped historical natural fire regimes and current vegetation conditions nationwide at a coarse (1 km resolution) scale. The project also developed an index to describe departure from historical fire regimes (condition class) for use in national-level fire management planning. Initial data and maps of fuels types, historical natural fire regimes, and condition classes for the conterminous United States were completed and made available on the Internet in 1999, with an updated, peer-reviewed report published in 2002.

The data developed and analyzed by this project integrated biophysical information and pre-existing remotely sensed products related to fire regimes at a national level for the first time. The project incorporated analysis of disturbance and successional processes, including development of stylized successional pathways for unique combinations of historical fire regime and potential natural vegetation. Seven regional panels of expert ecologists, silviculturists, and fire managers reviewed and refined the spatial data layers, developed succession pathways, and assigned fire management condition classes.

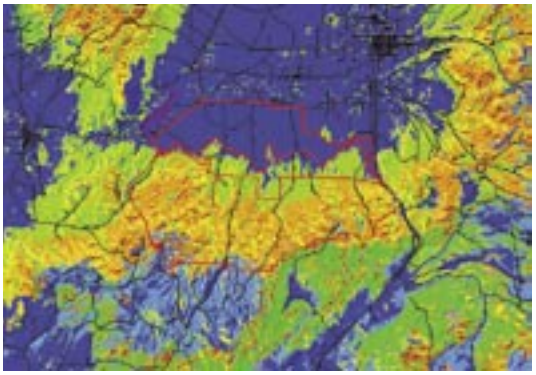
The data developed by this project were intended for national, programmatic, and strategic planning, and have been widely used by federal land managers, states, and other non-governmental organizations in fire and fuels management planning, assessments of ecosystem health, and risk assessments. The results of this project have been used to provide background to Congress and the Administration on changes in historical fire patterns in support of the implementation of the NFP. The Fire Regime Condition Class system developed by this project has been implemented nationally by DOI agencies and the Forest Service for reporting all hazardous fuels reduction accomplishments under the NFP.

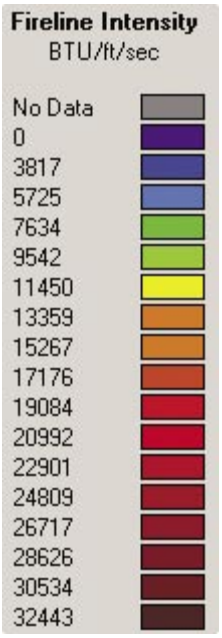
Additional Information:
http://www.fs.fed.us/fire/fuelman

Providing a Foundation for LANDFIRE

LANDFIRE is a 5-year, multi-partner wildland fire, ecosystem, and fuels mapping project that is being implemented nationwide to generate consistent, comprehensive, landscape-scale maps and data describing vegetation, fire, and fuels characteristics across the United States. These maps are being produced at scales fine enough for prioritizing and planning specific hazardous fuels reduction and ecosystem restoration projects.

Researchers gained valuable experience in developing and validating large landscape-level data sets on fuels and vegetation sampling and modeling for a large region…





Projects supported by the JFSP provided essential foundations for this project in several ways. **The Southern Utah Fuels Management Demonstration Project** (SUTAH), which was started in 1999 (Project 99-1-3-29), was the initial proof of concept that the goals and objectives of LANDFIRE were achievable on a broad scale, and it provided essential baseline data for estimating the costs and timeline for LANDFIRE. Researchers gained valuable experience in developing and validating large landscape-level data sets on fuels and vegetation sampling and modeling for a large region (15 million acres) with high variability in vegetation (desert to alpine), ownership (national parks and monuments, national forest, BLM, Indian reservation, private, and state), and land use (agriculture to subdivision to wilderness).

The successful methods of SUTAH were incorporated into LANDFIRE, and weaknesses that were identified led to the development of improved procedures. Field methods pioneered in SUTAH were either incorporated directly into the JFSP-funded FIREMON (**Monitoring Fire Effects at Multiple Scales: Integrating Standardized Field Data Collection with Remote Sensing to Assess Fire Effects,** Project 00-1-3-19) field sampling protocols, or were used to identify better ones. Subsequently, the FIREMON sampling and data management protocols were also incorporated into LANDFIRE procedures. SUTAH field plot data were used to improve LANDFIRE vegetation classification methods. Computing infrastructure and staff training from SUTAH are being used directly in LANDFIRE. The handling of large data bases and complex vegetation and terrain provided insights on how fuels and vegetation vary in time and space and how to quantify and model those variations. One lesson learned in SUTAH was that effective technology transfer takes considerable interaction with managers. This was valuable for scoping and budgeting for LANDFIRE technology transfer.

The SUTAH and FIREMON projects funded by the JFSP helped develop a skilled workforce that was able to train and lead subsequent LANDFIRE employees, provided essential computing infrastructure that is being used in LANDFIRE implementation, and provided data, information for development of field methods and remote sensing analysis, and models that have been incorporated into the LANDFIRE project.

Additional Information:
SUTAH:
http://www.firelab.org/fep/research/sufm/home.htm
LANDFIRE: http://www.landfire.gov
FIREMON: http://www.fire.org/firemon/default.htm

Developing the Capability for Financial Analyses of Fire Hazard Reduction Activities

Work initiated under the JFSP in 1999 provided the basis for many of the analytical tools that are used today to conduct both broad-scale and fine-scale financial analyses on the economics of fuels hazard reduction treatments.

The initial JFSP-funded project supported the development of techniques for sorting, categorizing, and analyzing Forest Inventory and Analysis (FIA) plot level data and applied these techniques to assess the potential financial return and wood product outputs from a variety of hypothetical, silvicultural prescriptions in Montana and New Mexico (**Assessing the Needs, Costs, and Potential Benefits of Prescribed Fire and Mechanical Treatments to Reduce Fire Hazard,** Project 99-1-1-01).

The techniques developed by this JFSP project were subsequently used in the Western Biomass Assessment, which was the first attempt to evaluate at a broad scale the amount and type of wood that could be produced by implementing a large-scale fire hazard reduction program. Modifications of these techniques were then used in an analysis of the potential revenues from fire hazard reduction treatments in the Blue Mountains of northeastern Oregon (requested by the governor). Funding from the NFP and the Pacific Northwest Research Station (PNW) FIA unit was then combined to extend these

techniques to develop FIA BioSum, a strategic planning tool that uses objective measures like changes in torching and crowing index to judge the effectiveness of fire hazard reduction treatments and to evaluate the economics of alternative scenarios for processing the harvested biomass.

Many of the concepts demonstrated during the original JFSP study and the development of FIA BioSum were incorporated into the Fuel Treatment Evaluator (FTE), a tool that allows users to basically "draw a circle on a map," supply a silvicultural prescription, and obtain an estimate of the amount of wood that could be produced from fuels treatments in that area. The FTE was developed by the North Central Research Station (NC) FIA unit in collaboration with the Forest Products Lab and the PNW Station using NFP funding. Further funding from the Hazardous Fuels Program administered under USDA FS Fire and Aviation Management was used to develop a user-friendly financial analysis tool known as My Fuel Treatment Planner. This tool is available on the Internet and designed for use by GS-7–11 fuels planners, requires no background in economics or wood utilization, and requires a minimum of training.

Additional Information:
My Fuel Treatment Planner is available at http://www.fs.fed.us/fire/tech_transfer/synthesis/economic_utilization_team/economic_utilization_index.htm

Predicting Smoke Trajectories for Fire Planning and Air Quality Assessment

The FS, DOI, Environmental Protection Agency (EPA), and National Oceanic and Atmospheric Administration are collaborating on implementation in FY 2005–2006 of the BlueSky/Rapid Access Information System (RAINS) in the Western United States. This system is built on BlueSky, a modeling framework designed to predict cumulative impacts of smoke from forest, agricultural, and range fires. The BlueSky smoke modeling framework combines state-of-the-art fuels mapping, fire behavior, emissions, meteorology, and dispersion models to generate the best possible predictions of smoke impacts across the landscape. BlueSky output products are being created by regional Fire Consortia for the Advanced Modeling of Meteorology and Smoke (FCAMMS). The FCAMMS are nationally coordinated through the FS, and receive support from the NFP and the JFSP (**Forecasting of Fire Weather and Smoke by Using Vegetation Atmosphere Interactions,** Project 03-1-3-02; **Assessing the Value of Mesoscale Models in Predicting Fire Danger,** Project 01-1-6-07).

Development of the BlueSkyRAINS system has been primarily supported by NFP research, EPA, and other sources. However, without significant support from the JFSP, the award-winning BlueSky component of this program would not have been developed so quickly or become so relevant. For example, the Ventilation Climate Information System (VCIS), funded by the JFSP in 1998 (**Assessing Values of Air Quality and Visibility at Risk from Wildland Fire,** Project 98-1-4-14), provided the computing platform on which BlueSky was originally developed. The computing platform, a linux cluster, was unique at the time and paved the way for a new generation of high-resolution modeling in nationally coordinated centers through the FCAMMS. In addition, BlueSky's Web-based delivery system was modeled after VCIS, which like BlueSky is an award-winning project. Direct funding from JFSP for BlueSky and BlueSkyRAINS is supporting ongoing validation, improvements, and training, including:

- ✓ A technology transfer project to improve BlueSkyRAINS online help features and to develop online tutorials and training programs (**Development of Training Resources for Application of BlueSkyRAINS in Smoke Management and Fire Operations**, Project: 04-4-1-04)
- ✓ Validation of BlueSky for the North Carolina Coastal Plain forests through comparisons with smoke measurements from prescribed fires. (**Development and Demonstration of Smoke Plume, Fire Emissions, and Pre- and Post-Prescribed Fire Fuel Models on North Carolina Coastal Plain Forest Ecosystems**, Project 04-2-1-80)
- ✓ Development of an automated system for verifying BlueSky's predictions (**Automated System for Evaluating BlueSky Prediction of Smoke Impacts on Community Health and Ecosystems**, Project 03-1-3-09)

Additional Information:
http://www.fs.fed.us/bluesky and http://www.blueskyrains.org

Although these investigations are not yet complete, research results are already helping shape manager responses to wildland fire and fuels problems.

Selected FY 2004 Research Accomplishments

JFSP-funded research is producing new information and tools for use by fire and fuels managers, agency administrators, and decision makers. Areas of research have included rapid response to assess fuels consumption and smoke production under a variety of moisture and fire conditions; modeling changes to canopy conditions to assess ecological and management implications; optimizing landscape treatment alternatives; assessing the historical role and contemporary uses of prescribed fire; the effects of fire and rehabilitation seeding on wildlife habitat; and the consequences and correlates of fire in wetlands. The JFSP Governing Board's main focus is on ensuring that program funding continues to be directed at priority science needs and that the resulting information and technology are transferred to the end users. The following narratives are examples of ongoing JFSP projects that have yielded tangible accomplishments in 2004. Although these investigations are not yet complete, research results are already helping shape manager responses to wildland fire and fuels problems.

Researchers Respond to the Extreme Fire Season in Alaska

Forest fires are a dominant ecological force shaping the distribution and structure of Alaska's boreal ecosystems. About once a decade, Alaska experiences a major fire year (more than 1 million acres burned). Under prolonged drought, the deep organic layers become dry and the fire season can extend well into the summer months. The resulting fires can be very difficult to control and have severe ecological and public safety consequences. Scientists from three JFSP-funded projects responded rapidly and efficiently—sharing planning, information, and logistical support and co-locating field activities to take advantage of the unusual wildfire activity in the summer of 2004. This collaboration, led by researchers from the FS PNW Research Station, University of Idaho, and

Yale University, extended and strengthened existing research efforts to:

- ✓ Assess forest floor consumption and smoke emissions from wildland fires burning in boreal forest fuel types in Alaska (*Project 03-1-3-08*)
- ✓ Refine and develop fire management decision support models through field assessment of relationships between stand characteristics, fire behavior, and burn severity (*Project 04-2-1-96*)
- ✓ Assess the causes, consequences, and spatial variability of burn severity (*Project 03-2-1-02*)

Researchers were able to obtain data from five wildfires near the towns of Chicken, Tok, Northway, and Eagle. Plots encompassed a range of fire behavior, including backing fires and moderate to intense crown fire. The teams obtained data on fire behavior, fuels consumption, emissions, fire severity, and other factors for a range of vegetation types and burning conditions for use in the three projects listed previously.

The success of this research was largely due to the cooperation of the Alaska Fire Service (AFS), State of Alaska, and incident command teams, who provided tactical and logistical support to the research teams.

Multi-Century Fire Modeling Over Landscape Gradients

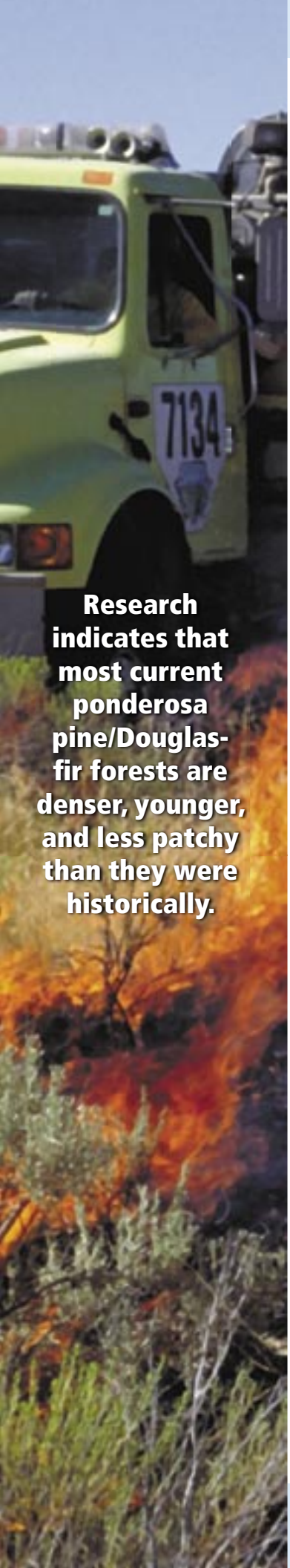
This study modeled changes in canopy fuels and crown fire potential over a 160-year period from 1880–2040 on the North Rim of Grand Canyon National Park in northern Arizona. The study spanned a 500-meter gradient in elevation from ponderosa pine forests through higher elevation mixed conifer, aspen, and spruce-fir vegetation types.

Forest change was simulated at 10-year intervals using the Forest Vegetation Simulator (FVS). Simulations were initialized with reconstructed 1880 conditions and then run until 2040. Simulations for the year 2000 were within +20 percent of actual field data collected from 1998–2002 for tree density and basal area. The Nexus Fire Behavior and Hazard Assessment System was used to model fire behavior under extreme (90th and 97th percentile) weather conditions. The project focused on crown fire behavior, measured by the crowning index (CI), which is the wind speed at which active canopy burning could be sustained.

Findings from this research showed that:

- ✓ The most dramatic increases in projected canopy biomass and bulk density were at the higher elevation sites, where canopy biomass increased 279 percent.
- ✓ Very high wind speeds were required for crown fire spread at all sites in 1880. However, as vegetation composition and structure change through time, the predicted wind speed needed to sustain a crown fire would drop 23 percent to 86 percent by the year 2040.
- ✓ A third of the landscape was susceptible to crown fire spread at a wind speed of 45 km/h (28 mi/h) or more in 2000, compared to less than 6 percent of the landscape in 1880. (Winds of 45 km/h or more are common as gusts and occasionally as sustained winds in northern Arizona during severe fires.)

This study has numerous ecological and management implications. The historical shift toward moist-site species is likely to have lowered crown base heights, facilitating an increase in crown fire initiation. The data also suggest that in ponderosa pine-dominated sites, even if fires result in a substantial reduction of canopy biomass (up to 40–50 percent), the resulting forest conditions could still be within range of historical conditions as long as the older trees survived (*Project 99-1-3-11*).



Research indicates that most current ponderosa pine/Douglas-fir forests are denser, younger, and less patchy than they were historically.

FIREHouse—The Northwest Fire Research Clearinghouse

The Northwest Fire Research Clearinghouse (FIREHouse) is a Web-based project to provide data and documentation on fire science and technology relevant to Washington, Oregon, and Idaho. The goal of FIREHouse is to provide "one-stop shopping" for resource managers, decision makers, scientists, students, and others who want access to research results in order to understand and manage fire and fuels on public lands.

FIREHouse is a collaborative project between the FS PNW; the University of Washington; the North Cascades National Park; and the National Biological Information Infrastructure. It is also coordinating with other regional and national efforts to develop Web-based information portals for wildland fire management, including the Southern Fire Science Portal project team (*Project 04-4-1-34 funded in 2004*) and the Fire Research and Management Exchange System (FRAMES) at the University of Idaho to help facilitate consistency and interoperability. For each project posted on FIREHouse, the goal is to provide, as applicable, online access to: metadata; publications; bibliographic information, proposals, and study plans; links to other sources of fire information; information about technology transfer and applications in resource management; and an educational component that uses common language and graphics to explain important findings. FIREHouse currently includes information on close to 50 research projects as well as links to fire applications and tools, external fact sheets, websites, proposals, study plans, and online publications. Over 300 fire-related projects are being prepared for posting to the FIREHouse website or other geographic portals (*Project 03-4-2-06*).

Optimizing Landscape Treatments for Reducing Wildfire Risk and Improving Ecological Sustainability of Ponderosa Pine Forests in Mixed Severity Fire Regimes

Studies on ponderosa pine in the Colorado Front Range illustrate that historical forest landscapes were shaped by mixed severity fires and by spatial and temporal patterns of tree recruitment. These findings have resulted in new guidelines for ponderosa pine management that suggest that complex, patchy landscape patterns were more frequently encountered than were the open, park-like forests described in the historical Southwest.

Millions of acres of ponderosa pine in the Front Range lost their historical landscape structure through grazing, logging, fire suppression, and tree planting. In addition, urbanization during recent decades created extensive wildland/urban interface issues. Recent major fires, capped by the Hayman fire in 2002, illustrate the poor ecological condition of current forests and the threat catastrophic fires pose to human lives and property. There is a clear need for both restoration of ecologically sustainable ponderosa pine conditions, and removal of fuels hazards created by the current forest structure. However, much more land warrants treatment than can be accomplished in a reasonable amount of time. Thus, the development of guidelines for selecting priority areas to be treated in the early stages of restoration and fuels management is critical.

Research on historical ponderosa pine landscape conditions in the Upper South Platte watershed has provided insights into the characteristics of sustainable landscape conditions. Research indicates that most current ponderosa pine/Douglas-fir forests are denser, younger, and less patchy than they were historically. Scientists are incorporating input from related studies, including the use of state-of-the-art remote sensing technology to produce highly detailed maps of current landscape conditions, and analyses of treatment placement and patterning using state-of-the-art fire behavior mapping focused on minimum travel time pathways for fire spread. Simulation

models for ecological processes and conditions are being parameterized and data layers are being assembled for both simulation and optimization modeling. Together, these studies are identifying specific sites for vegetation and fuels treatment in order to achieve acceptable improvement in ecological conditions and protection of lives, property, and watershed resources. This research is guiding implementation of vegetation treatments on tens of thousands of acres in the Upper South Platte watershed and supporting advanced planning of treatment alternatives for approximately 1 million acres (*Project 01-1-3-22*).

The Historical Role and Contemporary Uses of Prescribed Fire in Southern Appalachian Ecosystems

Prescribed fire is increasingly used in the southern Appalachians to reduce fuels loads and restore ecosystem structure and function. This study is documenting and synthesizing information on historical and contemporary fire regimes, and evaluating the effects of prescribed fire on ecosystem structure and function along a gradient from dry-site, pine-hardwood to moist-site, mixed-hardwood ecosystems in the southern Appalachian region. The study design is based on the premise that knowledge of historical fire regimes, combined with understanding of ecosystem fire effects, can lead to significant improvements in the application of prescribed fire and in the understanding of fire effects.

In the southern Appalachians, strong topographic and soils variation creates gradients that determine vegetation composition, net primary productivity, and susceptibility and response to disturbance. To fully understand the potential uses and effects of fire in the southern Appalachians, studies need to be conducted across vegetation and climatic gradients. Scientists are using a combination of ongoing and new research sites to assess short- and long-term responses along these gradients. To evaluate watershed fire effects, scientists at the Coweeta Hydrologic Laboratory are conducting detailed studies on the effects of prescribed fire on ecosystem processes, such as net primary production, nutrient and carbon cycling, and vegetation dynamics (regeneration, compositional changes, mortality, diversity) in multiple forest types.

A detailed analysis of FS and State Forest Service fire records, combined with Cherokee Indian Tribal records, will document historical and contemporary fire regimes, both wildfire and prescribed fire, in the southern Appalachians. To characterize historical fire regimes, researchers have interviewed tribal elders about historical burning practices, determined the location and size of Cherokee towns to identify areas where Native American use of fire was most likely, and determined patterns of cause, magnitude, and recurrence of fire events for the southern Appalachian region from the late 1800s to the present based on written historical information.

This project uses a proactive and multiphased approach for technology transfer, including informal tours of prescribed burn study sites with natural resource managers, user groups, and members of the scientific community (*Project 01C-3-3-01*).

Effects of Fire and Rehabilitation Seeding on Sage Grouse Habitat in the Pinyon-Juniper Zone

Since settlement of the Intermountain Region of the United States by Europeans 130 years ago, major changes in vegetation have occurred that include increases in woody species, exotic annuals, and perennial weeds. Expansion of pinyon and juniper species into sagebrush ecosystems is altering the structure and composition of sagebrush communities and resulting in increased fire frequency, severity, and size throughout much of the Western United States. These changes are having negative effects on both sagebrush communities and sagebrush obligates, including the sage grouse, a species that is under consideration for listing as threatened or endangered. Fire management plans, at both the local and regional level, need to consider the effects of proposed actions, including prescribed fire on sage grouse habitat. This research is examining the effects of prescribed fire and rehabilitation seeding on sage grouse habitat in the pinyon-juniper zone.

Fire management plans, at both the local and regional level, need to consider the effects of proposed actions, including prescribed fire on sage grouse habitat.

…project scientists are examining the ecological effects of fire in wetlands and the circumstances making extensive smoldering fires "more" or "less" likely.

Research to date has revealed that:

- ✓ Spring burns can affect soil infiltration, soil ammonium and nitrate levels, and lead to an increase in ortho-phosphate and certain micronutrients. These changes did not appear to affect the nutrient contents of plants used by sage grouse.

- ✓ Higher elevation plots exhibited proportionately greater increases in herbaceous cover and biomass than lower elevation plots after the burn, and low and intermediate tree cover plots had significantly greater herbaceous cover and biomass than high cover plots before and after the burn.

Information from this project is being used to develop guidelines for managing fire and determining appropriate rehabilitation procedures for sage grouse habitat within the pinyon-juniper zone, and to evaluate the probability of sage grouse occurrence under varying environmental conditions (*Project 01B-3-3-01*).

Consequences and Correlates of Fire in Wetlands

Fire officials are often concerned about the negative ecological effects when fire in wetlands leads to extensive smoldering in accumulated organic soils. In this study, project scientists are examining the ecological effects of fire in wetlands and the circumstances making extensive smoldering fires "more" or "less" likely. A unique opportunity to investigate these two subjects occurred at The Nature Conservancy's Disney Wilderness Preserve near Kissimmee, Florida, when fires burned approximately 50 percent of a previously installed sampling network. The existing network included vegetation monitoring transects, water sensors, and organic soil depth measurements in both natural and restored wetlands. As a result, scientists now have a considerable body of pre-wildfire data, on both unburned and burned sites, and can use the sampling network to acquire comparable post-burn data.

This project addresses how fire, and the conditions under which it occurs, affects the loss of organic soils, changes in ecological communities, and changes in the densities of plant species of particular interest in various wetland communities.

This investigation has shown:

- ✓ No significant difference between wetlands and uplands in the change in organic soil depth after fire.

- ✓ Plant community type, affected the amount of soil loss in response to fire. In particular, hardwood forests, shrub communities, and wet prairies showed strong effects of burning.

- ✓ Wildfires typically resulted in more soil loss than prescribed burns, but the effect depended strongly on plant community.

- ✓ The Keech-Byram drought index (KBDI) and depth to the water table, when combined with plant community type, are good predictors of soil loss.

(*Project 01-1-3-09*)

Research and Application Highlights

Effects of Alternative Fuel Reduction Treatments in Mixed Forest Shrublands

Background

In California's Whiskeytown National Recreation Area, the exclusion of fire, along with grazing, mining, and timber harvests of the twentieth century has resulted in the degradation of fire-adapted plant communities. The area is characterized by an assortment of oak woodlands, chaparral, mixed conifer, and knobcone pine vegetation types. To address the growing threat of undesirable fire in the park's urban interface, park mangers are proposing to carry out an ambitious fuels management program to protect high-value areas through a variety of alternative fire-risk reduction methods, including prescribed burning, vegetation chipping and mastication, and understory thinning. However, the ecological impacts and long-term effects of these new treatments are virtually unknown, and there are concerns that the combination of fire and ground-disturbing activities associated with mechanical treatments will create conditions favoring the invasion of non-native plant species. This study was designed to address some of these uncertainties and provide critical information to the Fire Management Program on how to refine fuels reduction projects to effectively manage for fire-safe communities, while balancing potential ecological impacts.

Approach

Researchers are examining the effects of four different fuels reduction treatments on soil, vegetation, and other site factors. Treatments being evaluated include prescribed fire, vegetation chipping and mastication, and understory thinning. The effectiveness of mechanical treatments is being evaluated by monitoring fire behavior and ecosystem fire effects on prescribed burns carried out following the treatments. Postfire measurements will include evaluation of soil impacts, vegetation mortality and recovery, invasive species, and tree growth. Results from this research will enable fire managers to more effectively manage sites for forest productivity, while minimizing the spread of invasive plant species.

Accomplishments

Preliminary results from the prescribed fires showed significantly higher fire intensity and severity in masticated plots relative to plots without mechanical treatments.

- ✓ Average postfire mortality was 16–49 percent higher for overstory tree species in masticated plots.
- ✓ Mean flame lengths and flaming zone depth were about three times greater, and mean maximum temperatures in the litter and at 0.5 meters above the surface were significantly higher in masticated fuelbeds (440 °F/220 °C higher in litter; 218 °F/122 °C higher at 0.5 m).

Vegetation and soil data collection is ongoing and expected to provide managers with guidance on optimal treatment methods for minimizing non-native plant occurrence within fuels treatment areas.

Application

The results of this research are being used by Whiskeytown National Recreation Area fire and resource management staff, to plan future fuels treatments in the park's low-elevation plant communities. This research is applicable to any land management agency considering mechanical fuel reductions of this type in similar mixed forest shrublands. The preliminary results of this project have been presented to park staff, local and regional National Park Service (NPS) managers, and ecologists in off and onsite meetings. Study tours of the project site have been provided to local county land management agencies, FS researchers, and university fire ecology classes. A website has been developed to share current and future findings with managers and scientists nationwide at http://www.nps.gov/whis/exp/fireweb/FireEcology/BrushMastication/intro.htm.

(Project 01B-3-3-27)

Contact:
Tim Bradley
National Park Service
Whiskeytown National Recreation Area
Whiskeytown, California
E-mail: Tim_Bradley@nps.gov

Estimates of seasonal trends in fuel moisture are being used by fire meteorologists to improve forecasts of fire danger.

Improving Predictions of Fire Severity from Remotely-Sensed Data

Background

Satellite imagery at 1-km resolution has long been used to model and map potential fire severity at a broad scale for major land cover classes. Field verification of these products in terms of fuels moisture and vegetation structure has been limited. In the Western United States, this technique historically used the Normalized Difference Vegetation Index (NDVI) to develop a series of maps that reflect seasonal or interannual variations in vegetation "greenness" or moisture level as an indicator of potential fire severity. Approaches other than NDVI show considerable promise for this application. Multi-scale testing of various spectral indices and their relationship with field data are necessary to develop validated approaches for mapping changes in fuels moisture or potential fire severity using remote sensing.

Approach

Researchers used a combination of high to moderate resolution satellite and aircraft remote-sensing data and field data to evaluate various approaches for mapping changes in vegetation moisture in diverse fuels types. Spectral data were analyzed at multiple spatial scales to test various methods, including NDVI and the normalized difference water index (NDWI). Ground measurements were collected to evaluate the effectiveness of these approaches at detecting and quantifying seasonal differences in fuels moisture between early and late (high-risk) fire season. A multiscale approach was used to combine temporal sampling from satellite and aircraft-based sensors at a range of spectral and spatial resolutions with data from field plots. Research was conducted on seven study sites in California, New Mexico, Colorado, Arizona, and Idaho to represent a wide range of vegetation types and fuels conditions. Scientists compared the indices and transformations with field data to evaluate accuracy and enhance confidence in the fire-severity mapping efforts.

Accomplishments

✓ Analysis of field data, incorporation into geographic information system (GIS) data bases, and comparisons with high to moderate resolution remote-sensing data demonstrated that NDWI is a better predictor of live fuels moisture than NDVI for most vegetation types evaluated.

✓ Application of the results of this analysis to MODIS data allowed researchers to map fuels properties over the Western United States at a 10-day interval to show changes in fuels moisture over time and to evaluate MODIS NDVI and NDWI as measures of live fuels moisture.

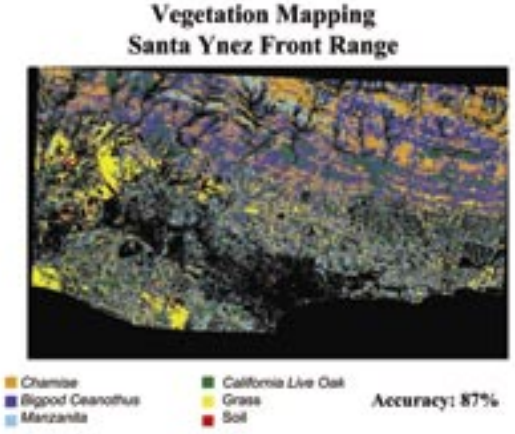
✓ The resulting maps of fire severity, vegetation greenness, and fuels moisture estimates provide fire managers with more accurate daily fire-severity levels for regional and local fire operations planning efforts.

✓ Researchers developed brochures that summarize the study results and that include photographs, GIS maps, and satellite and aircraft imagery.

✓ A Web page that will provide maps of fuels moisture and potential fire severity is under development at the University of California Santa Barbara, Southern California Wildfire Hazard Center (http:\\www.icess.ucsb.edu/resac).

Application

Research has developed improved methods for mapping seasonal trends in fuels moisture for use in estimating fire danger. These estimates are based on the NDWI, which is a better predictor of fuels moisture than NDVI. Applications include development of regional wildland fire assessments and associated maps that are used regularly by fire managers to plan daily and weekly fire operations strategies. The estimates are being used by fire meteorologists to improve forecasts of fire danger. In addition, information is being transferred through personal communications with local fire, fuels, and GIS managers in the FS, NPS, BLM, and



state agencies. Maps, brochures, and posters are currently available in hard copy and will be posted on the Web page.

(Project 01-1-4-23)

Contacts:
Jennifer L. Rechel
USDA Forest Service
Pacific Southwest
Research Station
Riverside, California
E-mail: jrechel@fs.fed.us

Dar A. Roberts
Department of Geography
University of California
Santa Barbara, California
E-mail: dar@geog.ucsb.edu

FireStem—A New System for Predicting Fire-Induced Tree Mortality

Background

As land managers consider the use of fire in vegetation management, a primary objective is often the survival of overstory trees and a reduction in density of smaller diameter trees or shrubs. Land managers use personal experience and fire behavior prediction systems to estimate expected fire intensity and duration and resulting fire-caused plant mortality. However, these systems do not account for variations in heat flux and surface temperatures around the plant stem. This research is developing and evaluating a new physics-based modeling approach for predicting fire-induced plant mortality. Once completed and tested, the resulting FireStem model will be linked with the new BehavePlus fire behavior decision support system.

Approach

This project developed the FireStem model to simulate the flow of heat into a tree stem. The model simulates the processes governing energy transfer, including temperature-dependent thermal properties of the bark and stem, desiccation, devolatilization, and ignition and combustion of the bark. FireStem can be linked directly to fire behavior models, to provide a comprehensive method for estimating fire-induced tree mortality prior to ignition. Integration of this JFSP-funded study with a related effort initiated by researchers in the FS Northeastern Research Station with NFP funding has strengthened both projects by combining the thermal modeling expertise of the scientists at the Rocky Mountain Station with the biological expertise of the Northeastern Research Station scientists.

Accomplishments

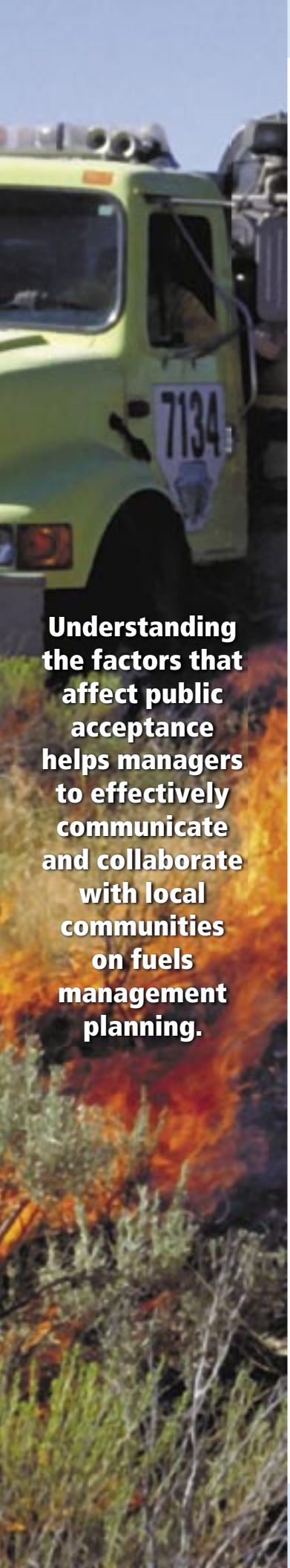
FireStem's ability to accurately predict fire-caused mortality has been tested on four tree species (red maple, chestnut oak, ponderosa pine, and Douglas-fir) selected to represent two hardwood and two softwood species of interest to forest managers in North America. Results indicate that stem mortality/survival is correctly predicted for approximately 75 percent of the test cases. Because of the synergy between the collaborating research teams, FireStem treats the thermal mechanisms and the associated tissue necrosis processes more accurately than any previously reported modeling work. For the first time ever, land managers have access to an objective, physics-based model for estimating mortality across size classes and species as a function of fire intensity, based on the most recent understanding of the underlying physical and biological processes.

Application

FireStem provides land managers with an objective tool for estimating tree mortality as a function of species and diameter due to heating of the tree stem. Various applications are envisioned, such as a "gaming" mode to explore various prescribed fire options prior to igniting the fire, a "forensic analysis" mode to reconstruct the fire behavior that caused the current condition, and a "forecast" mode to estimate mortality from natural or prescribed fires that are currently burning. It is believed that FireStem will form the foundation for ongoing research efforts to develop a system for evaluating forest stand mortality due to any combination of root, stem, or crown scorch and heating. An executable version of FireStem is available for download from http://www.firelab.org and includes instructions for using the software as well as sample data files.

(Project 00-1-1-06)

Contact:
Bret Butler
USDA Forest Service
Rocky Mountain Research Station
Missoula, Montana
E-mail: bwbutler@fs.fed.us



Understanding the factors that affect public acceptance helps managers to effectively communicate and collaborate with local communities on fuels management planning.

Predicting Public Acceptance of Fuel Management at the Wildland-Urban Interface

Background

A combination of fire suppression, urban sprawl, and migration to rural areas has created an extensive and expanding wildland-urban interface (WUI) where wildfire poses a serious threat to people, property, and resources. Achieving fuels reduction in such ecosystems, either by re-establishing fire or conducting mechanical treatments is a cornerstone of the NFP strategy for reducing the likelihood of catastrophic fires. Fuels management approaches vary by geographic area because of social, political, and economic factors (such as housing density, public awareness and support, local and state policies, fire department resources), in addition to ecological factors. People's acceptance of fuels management on public lands is likely to vary based on their knowledge and attitudes, but also may be related to demographic characteristics and home location with respect to vegetation fuels and past fire events. Understanding the factors that affect public acceptance helps managers to effectively communicate and collaborate with local communities on fuels management planning.

Approach

Scientists are using information gathered from focus groups and surveys to develop a conceptual model of the process by which people evaluate the acceptability of fuels management treatments. This study targeted social factors, often unstudied in fuels and fire policy, and attempted to join these factors with spatial data. Social factors relevant to fire and fuels experiences and public support were assessed through focus groups with homeowners and local fire professionals held in four areas in the United States: two areas in California, and one area each in Florida and Michigan. These factors were studied further in surveys implemented in California, Florida (with NFP funding), and Michigan (also with NFP funding).

Accomplishments

Households in the WUI were shown to have varying levels of support for fuels management and experience with wildland fires. Nonetheless,While both focus groups and survey results suggested strong support for fuels management in all study areas, there were despite geographic differences in what types of treatments were most acceptable. For example, in Florida prescribed burning was strongly supported, but defensible space had much less support. In California, defensible space and mechanical fuel reduction were strongly supported, but prescribed burning had less support. In Michigan, fuels efforts had less support and mechanical fuel reduction was supported slightly more than prescribed burning or defensible space.

Factors such as trust in fuels management implementation, belief that implementation would lead to positive outcomes, and personal importance of fuels treatments were found to be strong predictors of support for fuels reduction implementation for all study sites in the three states. Demographic factors and location of homes relative to past fires or current fuels projects were poor predictors of support for implementing fuels treatments. The questionnaire developed in this study produced reliable, valid results and is ready for use by resource managers.

Application

This research has generated new knowledge for fuels and fire managers that will allow them to sense public sentiments among WUI homeowners and target informational messages about fuels treatments to this group. Results are being used by other researchers, and the publications are being widely cited. All articles and reports are available on the project website at http://www.fire-aft.net/index.htm. Articles have been published in the Journal of Forestry, which is read by many fire managers. Another manuscript is being prepared for submission to Fire Management Today to communicate the findings from the survey, as well as guidelines for managers to conduct surveys using the questionnaire developed during this project.

(Project 99-1-2-10)

Contact:
Jeremy S. Fried
USDA Forest Service
Pacific Northwest Research Station
Portland, Oregon
E-mail: Jeremy.Fried@fs.fed.us

Determining Long-Term Fire History in Great Basin Shrub-Grass Landscapes

Background

One goal of land management is to restore or maintain healthy sustainable landscapes, and historical conditions often provide valuable

guidance in determining desired conditions. Because of the difficulty in applying traditional approaches to analysis of fire history in shrub and grass vegetation, the historical fire regimes of much of the Great Basin are poorly documented. In addition, many valley areas are now dominated by exotic, fire-adapted species like cheatgrass that thrive on frequent burning. Land managers interested in reducing frequent fires and establishing fire intervals that support continued existence of sagebrush ecosystems need baseline data on the pre-European fire history. Because the absence of trees prohibits use of tree ring and fire scar analyses, new methods are needed for determining the frequency and intensity of past fire regimes in sagebrush-dominated valleys. Such information will provide managers with a stronger foundation for managing fire in these landscapes

Approach

This project was designed to determine if prehistoric fires in treeless, sagebrush-dominated valleys of the Great Basin could be detected using a set of techniques developed for the reconstruction of prehistoric environments. Scientists are evaluating two methods for determining the occurrence of past fires: analysis of charcoal from wetland sediment cores, which has successfully been used in forest environments, and extraction of plant phytoliths (fossilized plant remains) from dry sediments, which has been used to determine prehistoric plant use in archaeological sites. Sediment cores from a spring-fed wetland in Newark Valley, central Nevada, provided charcoal profiles documenting the occurrence and relative magnitude of past fires, and a newly analyzed pollen profile documenting vegetation change associated with the charcoal deposition. Deposits from an archaeological site in Newark Cave provided artifacts documenting human use of the valley during prehistoric times, prehistoric occurrence of animal species associated with sage-grass habitats, and sediments containing evidence of past environments. Archival documents provided evidence of the changing use of the resources in the valley and the relatively infrequent occurrence of fire during early historical times. These data were integrated to reconstruct fire regimes in the sagebrush-dominated landscape of Newark Valley for the last 5,500 years.

Accomplishments

✓ Based on the knowledge that phytoliths change in predictable ways as they are heated in cooking fires, scientists are working to develop methods for their use as indicators of prehistoric landscape fires in sediments from which charcoal and pollen cores cannot be extracted.

✓ Researchers have synthesized records for recent fires with reconstructed fire history from charcoal and pollen records and data on past occurrence of mammal species to develop a record of the past fire regime and its impacts on wildlife.

✓ Results support the conclusion that in the central Great Basin a prehistoric fire regime of frequent fires in the sagebrush/woodland ecotone limited woodland expansion, but in sagebrush dominated valleys with lower fuels loads, fires were less frequent than previously estimated.

Application

Data indicate that protecting sagebrush-dominated valleys from frequent fire is more consistent with the long-term fire regime, as opposed to the recognized necessity for frequent, low-intensity burns that maintain low fuels loads in many woodland and forested areas. Protecting sagebrush-dominated valleys from frequent burning will contribute to maintaining habitat for native birds and mammals. In many areas, achieving this goal will require controlling invasive species such as red brome and cheatgrass.

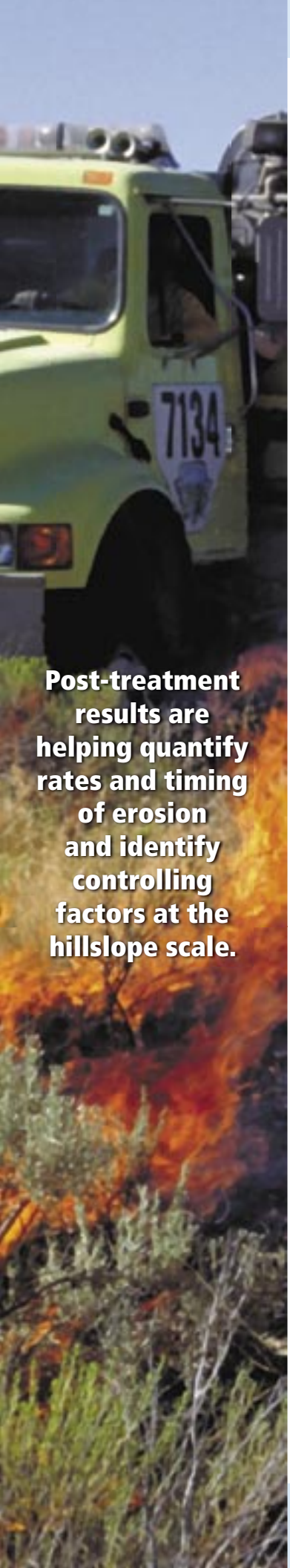
(*Project 01B-3-3-24)*

Contact:
Stephanie D. Livingston
University of Nevada Reno
Reno, Nevada
E-mail: sdlivingst@cs.com

Effects of Prescribed Fire and Mechanical Fuels Treatment on Water Quality and Aquatic Habitat

Background

In the Interior Columbia Basin, treatments to reduce long-term risks from wildfire are often motivated by potential threats to water and threatened and endangered salmonids. Management plans for the Basin assume that the direct effects of wildfires and wildfire-related erosion are greater threats to water quality and fish habitat than are the effects of fuels treatments. However, empirical data on these effects are scarce. Researchers are studying



Post-treatment results are helping quantify rates and timing of erosion and identify controlling factors at the hillslope scale.

the effects of mechanical fuels treatments and prescribed fire on surface erosion and stream sedimentation in two watersheds in Oregon.

Approach

This study examines the effects of prescribed fire and mechanical fuel treatments on surface erosion, stream sedimentation, channel morphology, and other water-quality parameters. Intensive study sites are located in the Skookum Experimental Watersheds, where baseline data are available for stream discharge and sediment yield. Scientists are measuring hillslope erosion, surface-sediment transport, and sediment delivery to streams on control and treatment sites within the Skookum Experimental Watersheds before and after treatments. The combination of gauged watersheds and long-term records of discharge, suspended sediment, and bedload makes it possible to examine watershed-scale treatment effects.

Extensive sampling is also being carried out on hillslope erosion plots in three additional fuels treatment projects in the Blue Mountains. These plots are providing information on rates of hillslope erosion and sediment transport on both control and treatment sites.

Accomplishments

- ✓ Researchers completed baseline data collection on fuels loads, erosion, and hydrology. First year post-fire data were collected and analyzed on prescribed burn treatments and control areas at one of the study areas.
- ✓ Twelve years of historical data compiled for the Skookum Experimental Watershed showed that natural annual variability of background water and sediment yields is strongly influenced by climate and vegetation and may be high enough to mask treatment effects.
- ✓ Sediment delivery to valley floors and stream channels appeared small compared to sediment yields from watersheds, suggesting hillslope and valley floor storage mechanisms and episodic transport processes.

.

- ✓ The highest erosion rates on study sites occurred on south aspects, although overall erosion was low in the first year.
- ✓ Low hillslope erosion rates observed in the first year after treatment may be attributable to rapid post-fire vegetative recovery and low rainfall intensities. In the absence of significant precipitation events, hillslope erosion may be related more to local factors, including wildlife (elk) impacts.

Application

Results will be used to refine and calibrate erosion and sediment delivery models used in planning and assessing management activities. Baseline data on hillslope erosion, stream discharge, sediment loads and concentrations, water temperature, and channel morphology are being used to characterize background conditions and to understand controlling factors at hillslope to landscape and seasonal to annual scales. Post-treatment results are helping quantify rates and timing of erosion and identify controlling factors at the hillslope scale. These results will be useful in estimating project-level effects from future prescribed burn and fuels treatment projects. Overall, results are helping to quantify the effects of these types of treatments compared to natural background and wildfire effects.

(Project 01-3-3-18)

Contact:
Steve Wondzell
USDA Forest Service
Pacific Northwest Research Station
Olympia, Washington
E-mail: swondzell@fs.fed.us

Low-Cost Sampler Systems for Estimating Smoke Contributions to Regional Haze

Background

Proper planning for prescribed fires requires evaluation of the potential impacts on air quality, including regional haze. This is particularly important for Class I areas (National Parks and Wilderness Areas). This study is evaluating and adapting a combination of low-cost monitoring systems for measuring smoke contributions to regional haze at remote sites. Major haze forming compounds being monitored include ozone and various nitrogen compounds. The long-term goal is to set up a network of 60–90 monitoring sites to gather data on spatial patterns of urban and agricultural pollution and smoke to regional haze and to test regional visibility models.

Approach

Robust, low-cost sampler systems were developed and tested for monitoring of forest fires and urban/agricultural activities on air quality in remote locations. The emphasis was on passive samplers for ozone and nitrogen pollutants (nitrogen oxides, ammonia, and nitric acid vapor). In addition, a system of throughfall collectors was developed to evaluate total inputs of atmospheric nitrogen under vegetation canopies. Passive samplers tested and developed in this study provide critical information on local plume dispersion and for regional air quality and haze assessments. Passive samplers for ozone, nitric acid, and ammonia were used in the 2002 summer season in selected areas of the Sierra Nevada (Lake Tahoe Basin, San Joaquin River Drainage, and eastern Sierra Nevada). Effects of local generation of air pollution, long-range transport of pollution plumes, and the McNalley fire (Sierra National Forest, July/August 2002) on distribution of gaseous and particulate air pollutants were evaluated. Geostatistical analyst software (ESRI) was used to develop maps of spatial and temporal distribution of air pollutants in the studied areas.

Accomplishments

- ✓ Development, testing, and calibration of easily-deployed passive samplers for monitoring ambient concentrations of ozone, nitrogen dioxide, nitric oxide, ammonia, and sulfur dioxide in remote areas and development of throughfall collectors to quantify total inputs of atmospheric nitrogen into forest canopies
- ✓ GIS maps, graphs, and tables that describe the spatial and temporal distribution of these pollutants, caused by photochemical smog and fires, in the Tahoe Basin the San Joaquin River drainage, and the southern and eastern Sierra Nevada
- ✓ Inexpensive, easy to use samplers designed for operational use by land managers to monitor key pollutants that contribute to regional haze

Application

Project scientists have created tools for understanding air pollution distribution at the regional and landscape levels. These methods are especially valuable for remote areas where traditional air pollution monitoring methods cannot be applied. Results will help land managers recognize "hot spots" for various air contaminants, especially ozone, which is the federal and state criteria pollutant. This information will help in understanding the contribution of prescribed fires to the overall air pollution status of forests and other ecosystems. Information on spatial and temporal distribution of ozone concentrations will help land managers in declaring conditions that are unsuitable for recreational activities. This study will provide managers with better tools and information for determining when and where to declare violations of federal or state air pollution standards.

(Project 01-1-5-06)

Contacts:
Andrzej Bytnerowicz
USDA Forest Service
Riverside, California
E-mail:
abytnerowicz@fs.fed.us

Michael Arbaugh
USDA Forest Service
Riverside, California
E-mail:
marbaugh@fs.fed.us

Researchers developed inexpensive, easy to use atmospheric samplers designed for operational use by land managers to monitor key pollutants that contribute to regional haze.

Developing Regional Fuel Maps by Linking Inventory Plots with Satellite Imagery and GIS Databases

Background

Accurate regional maps of vegetation and fuels are increasingly needed for assessing fire risk, planning fuels management, and modeling the behavior and effects of prescribed burns and wildfires. For such maps to be useful to land managers, they must accurately represent a large number of vegetation and fuels attributes across heterogeneous, multi-ownership landscapes.

Approach

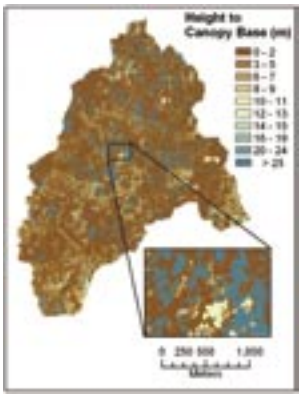
Project scientists are mapping fuels in the Western United States using the Gradient Nearest Neighbor (GNN) method, a novel approach for linking ground data, satellite imagery, and GIS maps of environmental variables. The GNN uses statistical relationships to assign fine-scale plot variables to each pixel in a digital map. This approach allows consistent predictions of a wide range of vegetation and fuels attributes. The final product can be used to map a wide array of summary variables and classifications. Although the GNN method has been successfully used in the past to generate forest vegetation maps suitable for detailed, stand-level modeling across the landscape, this is the first large-scale study to examine its usefulness for mapping fuel patterns across a range of ecosystems.

Detailed fuels maps were developed for three prototype landscapes in Oregon, Washington, and California. Vegetation in the study areas ranges from dense moist-site forests to rangelands in a mosaic of natural- and human-dominated environments. Digital maps, documentation of methods, and detailed accuracy assessments have been made available to managers working in each of the study areas. The project developed a user-friendly software interface to facilitate use of the GNN method to map vegetation in other areas.

Accomplishments

- ✓ Databases from ground plots include fuels-related variables derived from individual tree data, and variables needed for FlamMap and FARSITE models, as well as the Fuels Characterization Classification System (FCCS).
- ✓ Landscape-level spatial databases incorporated mosaics of Landsat imagery and data on climate, topography, disturbance history, and ownership.
- ✓ Spatial data and plot data were combined to develop vegetation and fuels maps, and maps were assessed for accuracy.
- ✓ The GNN vegetation and fuels maps have been linked to FlamMap for assessing fire potential, and are being linked with the FCCS to allow mapping of fuels conditions and potential fire effects.
- ✓ User-friendly software and a user's guide for applying the GNN method to vegetation and fuels mapping are being beta tested.

Application



Digital maps, documentation of methods, and accuracy assessments for the Washington and Oregon study areas have been provided to forest managers and other researchers. The maps and data are being used in eastern Washington in an integrated analysis in support of National Forest planning; by many users in assessing fuels conditions and fire risk and planning fuels treatments; and in modeling the behavior and the effects of prescribed burns and wildfires. Research results and software have been presented at numerous scientific and professional meetings, and published in one conference proceedings. Software and technical assistance have been provided to several users. As a result, this software is now being used to map vegetation in places such as the North-Central United States, California, and the Colville Reservation in Washington.

(Project 01-1-4-09)

Contact:
Janet L. Ohmann
USDA Forest Service
Pacific Northwest Research Station
Corvallis, Oregon
E-mail johmann@fs.fed.us

Conclusion

The Joint Fire Science Program (JFSP) is a dynamic program that actively seeks input from its partner agencies, Congress, land managers, and others to determine needs, set priorities, fund appropriate research projects, and ensure delivery of information and tools to end users. The JFSP plays a unique role in wildland fire research that is complementary to base research programs in several agencies and to National Fire Plan research in the Forest Service. Projects funded by the JFSP are providing new scientific information and technological applications that are helping agency administrators, resource management specialists, and others make sound management decisions in support of science-based planning and implementation of wildland fuels treatments and related activities on lands managed by federal agencies and cooperators. The results of the JFSP research are helping to ensure that future ecosystems will be healthier and less prone to destructive wildland fires, that fire suppression costs will be lower, and that communities and firefighters will be safer. The JFSP remains committed to this mission and vision for the future.

The JFSP plays a unique role in wildland fire research that is complementary to base research programs in several agencies…

Appendix A
Joint Fire Science Program Projects Funded in FY 2004

Project information has been organized into key functional areas: Air Quality, Smoke Management, and Climate; Demonstration Sites, Administrative Studies, and Local Needs Projects; Fire and Invasive Plant Species; Fire Effects and Fuels Treatment Effects; Other Projects; Planning and Preparedness; Remote Sensing; Science and Technology Applications; Social and Economic Impacts; and Workshops and Symposia. JFSP products may include publications, reports, websites, software, or other deliverables produced with JFSP funds.

Project Number	Project Title	Principal Investigator	E-mail
Air Quality, Smoke Management, and Climate			
04-1-1-04	Real Time Monitoring of the Three Dimensional Distribution of Smoke Aerosol Levels from Prescribed Fires and Wildfires	Ronald A. Susott	rsusott@fs.fed.us
Demonstration Sites, Administrative Studies, and Local Needs Projects			
04-2-1-06	Fire in Southern Appalachians: Fuels, Stand Structure and Oaks	David Loftis	dloftis@fs.fed.us
04-2-1-14	Effects of Disturbance History, Landscape Pattern, and Weather on Wildfire Severity in Southwestern Oregon: Implications for Management of a Fire-Prone Landscape	Thomas A. Spies	tspies@fs.fed.us
04-2-1-17	Effects of Fuel Reduction Treatments of Rocky Mountain Elk	John G. Kie	jkie@fe.fed.us
04-2-1-27	Multi-Jurisdictional Application of Forest ERA Landscape Decision Support Tools in North-Central New Mexico	Thomas D. Sisk	Thomas.Sisk@nau.edu
04-2-1-33	Epidemic Southern Pine Beetle Attacks: A Problem of Fuel-Loading or an Opportunity for Management?	Thomas A. Waldrop	twaldrop@fs.fed.us
04-2-1-35	Effects of 40 Years of Prescribed Fire on Pine Regeneration and Productivity	Carl Trettin	trettin@cofc.edu
04-2-1-49	Litter and Duff Bulk Densities in the Southern United States	Roger D. Ottmar	rottmar@fs.fed.us
04-2-1-52	Productivity and Habitat Use of Spotted Owls in Relation to Fire Severity in Southwestern Oregon: Can Prescribed Burns be Used to Reduce Fire Hazards in Spotted Owl Habitat?	Robert G. Anthony	Robert.Anthony@oregonstate.edu
04-2-1-71	Quality Assurance of Weather Data and the Probability of Favorable Weather for Prescribed Fire in Alaska	Larkin K. Narasimhan	larkin@fs.fed.us
04-2-1-75	A Landscape Level Approach to Fuels Management Through Ecological Restoration: Developing a Knowledge Base for Application to Historic Oak-Pine Savanna	Bart R. Johnson	bartj@uoregon.edu
04-2-1-77	Using Cattle as Fuel Reduction Agents in Annual and Perennial Grass Stands in Northern Nevada	Christopher Call	cacall@cc.usu.edu

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
04-2-1-80	Development and Demonstration of Smoke Plume, Fire Emissions, and Pre-and Post-Prescribed Fire Fuel Models on North Carolina Coastal Plain Forest Ecosystems	Robert Mickler	robert.mickler@manteck.com
04-2-1-84	Translating SPLSTs from a Theoretical to a Real World Landscape: The Implications of Fuel Management Strategies for Sagehen Creek Basin, Tahoe National Forest	Scott Stephens	stephens@nature.berkeley.edu
04-2-1-85	Does Season of Burn and Burn Interval Affect Soil Productivity and Processes in a Ponderosa Pine Ecosystem?	Walter G. Thies	wthies@fs.fed.us
04-2-1-86	Measurement of Mercury Mobilization and Accumulation in Fish in Response to Prescribed Fire in a Boreal Forest Ecosystem	Randall Kolka	rkolka@fs.fed.us
04-2-1-89	Effects of Prescribed Burning, Mechanical, and Chemical Treatments to Curtail Rhododendron Dominance and Reduce Urban Interface Fuel Loads	Shepard M. Zedaker	zedaker@vt.edu
04-2-1-94	Effects of Fire Severity and Distance From Unburned Edge on Mammalian Community Post-Fire Recovery	James E. Diffendorfer	jdiffen@sunstroke.sdsu.edu
04-2-1-95	The Influences of Post-Fire Salvage Logging on Wildlife Populations	John P. Hayes	john.hayes@oregonstate.edu
04-2-1-96	Refinement and Development of Fire Management Decision Support Models Through Field Assessment of Relationships Between Stand Characteristics, Fire Behavior and Burn Severity	Ann Camp	Ann.camp@yale.edu
04-2-1-97	The Effect of Spring Prescribed Fires on Nitrogen Dynamics Within Riparian and Stream Ecosystems	Kathleen L. Kavanagh	katyk@uidaho.edu
04-2-1-106	Understanding the Influence of Local and Landscape Conditions on the Occurrence and Abundance of Black-Backed Woodpeckers in Burned Forest Patches	Richard Hutto	hutto@selway.umt.edu
04-2-1-110	Learning From the Past: Retrospective Analysis of Fire Behavior in Yosemite and Sequoia-Kings Canyon National Parks	Carol Miller	cmiller04@fs.fed.us
04-2-1-112	Effectiveness of Litter Removal in Preventing Mortality of Yellow Barked Ponderosa Pine in Northern Arizona	James F. Fowler	jffowler@fs.fed.us
04-2-1-114	Integrating Social Values in Vegetation Models via GIS: The Missing Link for the Bitterroot National Forest	Alan E. Watson	awatson@fs.fed.us
04-2-1-115	Historical Fire Regimes of the Willamette Valley, Oregon: Providing a Long-Term, Regional Context for Fire and Fuels Management.	Cathy Whitlock	whitlock@oregon.uoregon.edu

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
04-2-1-116	Influence of Prescribed and Wildfire on Forest Structure and Fire Severity.	Theresa B. Jain	tjain@fs.fed.us
04-2-1-118	Effects of Fuels Treatments and Wildfire on Understory Species and Fuels in the Ponderosa Pine Zone of the Colorado Front Range.	Paula J. Fornwalt	pfornwalt@fs.fed.us
Fire and Invasive Plant Species			
04-4-1-08	Publication of Literature Synthesis Entitled "Effects of Fire on Nonnative Invasive Plants" as 6th Volume in the General Technical Report "Wildland Fire in Ecosystems" (Rainbow Series)	Jane Kapler-Smith	jsmith09@fs.fed.us
Fire Effects and Fuels Treatment Effects			
03-2-1-07	Effectiveness of Pre-Fire Fuel Treatments and Post-Fire Emergency Seeding Projects	Philip N. Omi	phil@cnr.colostate.edu
04-1-2-01	Rapid Response to the 2003 Fires in Southern California: Impact of Fuel Age on Fire Behavior and Recovery	Jon E. Keeley	jon_keeley@usgs.gov
04-1-2-04	Fire Use Over a Southwestern Elevational Gradient: Effects of 2003 Fires	Peter Z. Fulé	Pete.Fule@nau.edu
04-S-03	Bringing the Fire Effects Information System Up to Date and Improving Service to Land Managers	Jane Kapler-Smith	jsmith09@fs.fed.us
Planning and Preparedness			
03-4-1-04	Developing an Analysis and Planning Framework for District-Level Fuels Treatments Projects	Alan Agar	aagar@fs.fed.us
04-3-1-05	Best Management Practices for Fuels Management in Sub-Tropical Pine Flatwoods and Tropical Pine Rocklands	Joseph O'Brien	jjobrien@fs.fed.us
04-S-02	Supplement to the Fire and Fire Surrogate Study: Interdisciplinary and Multi-Site Analysis	Jim D. McIver	jmciver@fs.fed.us
Remote Sensing			
04-1-2-02	Mapping and Analysis of Pre-Fire Fuels Loading and Burn Intensity using Pre-Fire Interferometric Synthetic Aperture Radar Data Combined with Burn Intensity Derived from Post-Fire Multispectural Imagery for the 2003 Southern California Fires	Robert J. McGaughey	mcgoy@u.washington.edu

Project Number	Project Title	Principal Investigator	E-mail
Science and Technology Applications			
04-4-1-02	Describe and Apply a Specific Approach to Delivering, to Field level Practitioners, Fire Science Information or Tools Related to the Topic Areas of the JFSP	Clinton S. Wright	cwright@fs.fed.us
04-4-1-04	Development of Training Resources for Application of BlueSkyRAINS in Smoke Management and Fire Operations	Sue A. Ferguson	sferguson@fs.fed.us
04-4-1-12	Geo-Spatial Wildland Management Tool	Chris S. Renschler	rensch@buffalo.edu
04-4-1-19	Training Package for Land Management Tools Sponsored by the JFSP: Photo Series, FCCS, Consume 3.0, and FEPS	Roger D. Ottmar	rottmar@fs.fed.us
04-4-1-21	A Web-Based Information System for Estimating Fuel Characteristics, Fire-Hazard, and Treatment Effectiveness and costs in Montana and New Mexico	Carl Fiedler	fiedler@forestry.umt.edu
04-4-1-34	An Internet Based Portal for Fire Science and Management in the Southern Region	Penelope Morgan	pmorgan@uidaho.edu

Appendix B
Joint Fire Science Program Projects Funded FY 1998 through FY 2003

Project information has been organized into key functional areas: Air Quality, Smoke Management, and Climate; Demonstration Sites, Administrative Studies, and Local Needs Projects; Fire and Invasive Plant Species; Fire Effects and Fuels Treatment Effects; Other Projects; Planning and Preparedness; Remote Sensing; Science and Technology Applications; Social and Economic Impacts; and Workshops and Symposia. JFSP products may include publications, reports, websites, software, or other deliverables produced with JFSP funds.

Project Number	Project Title	Principal Investigator	E-mail
Air Quality, Smoke Management, and Climate			
98-1-4-14 *	Assessing Values of Air Quality and Visibility at Risk from Wildland Fire	Sue A. Ferguson	sferguson@fs.fed.us
98-1-8-01 *	Development, Sensitivity Testing and Retrospective Application of the Fire Effects Tradeoff Model	Kendall J. Snell	ksnell@fs.fed.us
98-1-9-01	Smoke Produced from Residual Combustion	WeiMin Hao	whao@fs.fed.us
98-1-9-03	Technically Advanced Smoke Evaluation Tools (TASET): Needs Assessment and Feasibility Investigation	Allen R. Riebau	ariebau@fs.fed.us
98-1-9-05	Implementation of an Improved Emission Production Model	David V. Sandberg	dsandberg@fs.fed.us
01-1-5-01	Fire Effects on Regional Air Quality Including Visibility	William C. Malm	malm@cira.colostate.edu
01-1-5-03	Automated Forecasting of Smoke Dispersion and Air Quality Using NASA Terra and Aqua Satellite Data	WeiMin MinHao	whao@fs.fed.us
01-1-5-06 *	Improving Model Estimates of Smoke Contributions to Regional Haze Using Low-cost Sampler Systems	Andrzej Bytnerowicz	abytnerowicz@fs.fed.us
01-1-6-01 *	Fire and Climate Variability in the Inland Pacific Northwest Integrating Science and Management	David L. Peterson	peterson@fs.fed.us
01-1-6-05	Climatic Controls of Fire in the Western United States: From Atmospheres to Ecosystems	Steven W. Hostetler	steve@coas.oregonstate.edu
03-1-1-37	Atmospheric Fire Risk in a Changed Climate	Julie Winkler	winkler@msu.edu
03-1-3-02	Forecasting of Fire Weather and Smoke Using Vegetation-Atmosphere Interactions	Karl F. Zeller	kzeller@fs.fed.us
03-1-3-09	An Automated System for Evaluating BlueSky Predictions of Smoke Impacts on Community Health and Ecosystems	Susan O'Neill	oneill@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects			
00-2-02	Fire Hazard Reduction in Chaparral Using Diverse Treatments	James F. Dawson	jdawson@ca.blm.gov
00-2-04	Integrating Fuel and Forest Management: Developing Prescriptions for the Central Hardwood Region	Edward F. Loewenstein	loewenstein@auburn.edu
00-2-05	Kings River and Lake Tahoe Basin Demonstration Sites for Fuel Treatments	Carolyn T. Hunsaker	chunsaker@fs.fed.us
00-2-06	Conversion of Upland Loblolly Pine-Hardwood Stands to Longleaf Pine	James D. Haywood	dhaywood@fs.fed.us
00-2-13	A Comparison of Silvicultural Practices for Controlling Mountain Laurel in the Mixed-Oak Forests of Pennsylvania	Patrick Brose	pbrose@fs.fed.us
00-2-15 *	A Demonstration Area on Ecosystem Response to Watershed-Scale Burns in Great Basin Pinyon-Juniper Woodlands	Jeanne C. Chambers	jchambers@fs.fed.us
00-2-19	Stand and Fuel Treatments for Restoring Old-Growth Ponderosa Pine Forests in the Interior West (Boise Basin Experimental Forest)	Russell T. Graham	rtgraham@fs.fed.us
00-2-20	Treatments that Enhance the Decomposition of Forest Fuels for Use in Partially Harvested Stands in the Moist Forests of the Northern Rocky Mountains (Priest River Experimental Forest)	Russell T. Graham	rtgraham@fs.fed.us
00-2-23 *	Managing Fuels and Forest Structure in the Southern Boreal Forest on Minnesota's National Forests	Dan Gilmore	dgilmore@umn.edu
00-2-25	Demonstration Plots for Comparing Fuel Complexes and Profile Development in Untreated Stands versus Stands Treated for the Management of Spruce Beetle Outbreaks and Implications for Fuels Manipulation	Elizabeth Hebertson	lghebertson@fs.fed.us
00-2-27	Maintaining Longleaf Pine Woodlands: Is Mechanical Shearing a Surrogate for Prescribed Burning	Jeff S. Glitzenstein	bluestem@istal.com
00-2-29	Fire Application to Saltcedar-Dominated Riparian Areas: Ecosystem Response, Prescription Development, and Hazardous Fuels Reduction	Brent Racher	racher@resource-management.us
00-2-30	Fire Hazard Reduction in Ponderosa Pine Plantations	John Swanson	jrswanson@fs.fed.us
00-2-31	Restoring Mixed Conifer Ecosystems to Pre-Fire Suppression Conditions in Crater Lake National Park	James K. Agee	jagee@u.washington.edu
00-2-32	Control of Invasive Annual Grasses in the Mojave Desert	Matthew L. Brooks	matt_brooks@usgs.gov
00-2-33	The Lick Creek Demonstration Forest: Renewal Through Partial Harvest and Fire	Benjamin Zamora	bzamora@mail.wsu.edu
00-2-34	Fuels Treatment Demonstration Sites in the Boreal Forests of Interior Alaska	Robert A. Ott	robert_ott@dnr.state.ak.us
00-2-35	Evaluation of Three Fuel Management Treatments for Eastern White Pine	James Cook	jcook@uwsp.edu
01-3-1-05 *	Demonstrating the Ecological Effects of Mechanical Thinning and Prescribed Fire on Mixed-Conifer Forests	Malcolm North	mnorth@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
01-3-1-06	Two Demonstration Sites in Northern Arizona for Forest Thinning, Fire Use, and Fire Surrogate Treatments in the Ponderosa Pine Type	Edward Smith	esmith@tnc.org
01-3-2-02	Tree Regeneration Response to Fire Restoration in Mixed-Conifer Forest	Andrew Gray	agray01@fs.fed.us
01-3-2-03	Prescribed Fires in Mid-Atlantic Coastal Plain Forests	Oliver H. Pattee	Hank_Pattee@usgs.gov
01-3-2-08	Risk Assessment of Fuel Management Practices on Hillslope Erosion Processes, Phase II	Peter R. Robichaud	probichaud@fs.fed.us
01-3-2-09	Prescribed Fire for Fuel Reduction in Northern Mixed Grass Prairie: Influence on Habitat and Population Dynamics of Indigenous Wildlife	Robert Murphy	bob_murphy@fws.gov
01-3-2-12 *	Weed Invasions Following Fire in Southwestern Colorado: Long-term Effectiveness of Mitigation Treatments and Future Predictions	Lisa Floyd-Hanna	lfloyd-hanna@prescott.edu
01-3-2-14	Effects of Prescribed Grazing and Burning Treatments on Fire Regimes in Alien Grass-dominated Wildland-Urban Interface Areas, Leeward Hawaii	Amanda G. McAdams	amanda_mcadams@r1.fws.gov
01-3-3-12	Identifying Reference Conditions for Prescribed Fire Management of Mixed Conifer Forests in Yosemite National Park, California	Kara J. Paintner	kara_paintner@nps.gov
01-3-3-13	Fire and Forest Structure Across Vegetation Gradients in San Juan National Forest, Colorado: A Multi-Scaled Historical Analysis	Peter M. Brown	pmb@rmtrr.org
01-3-3-14	Fire and Oak Regeneration in the Southern Appalachians	David Loftis	dloftis@fs.fed.us
01-3-3-18	Evaluating the Effects of Prescribed Fire and Fuels Treatment on Water Quality and Aquatic Habitat	Caty F. Clifton	cclifton@fs.fed.us
01-3-3-20	Experimental Studies of the Role of Fire in Restoring and Maintaining Arid Grasslands	Carleton B. Edminster	cedminster@fs.fed.us
01-3-3-27	Jeffrey Pine-Mixed Conifer Fire History and Forest Structure With and Without Fire Suppression and Harvesting	Scott Stephens	stephens@nature.berkeley.edu
01-3-3-29	Assessing Anthropogenic Changes in Fire Regimes Using Relict Areas in El Malpais National Monument, New Mexico	Henri D. Grissino-Mayer	grissino@utk.edu
01-3-3-30	Including Fire Effects Information in a Manual of California Vegetation	Michael McCoy	mcmccoy@ucdavis.edu
01-3-3-32	Changes in Fire Regimes and the Successional Status of Table Mountain Pine (Pinus pungens Lamb.) in the Southern Appalachians	Henri D. Grissino-Mayer	grissino@utk.edu
01-3-3-33	Predicting the Invasion and Survival of the Exotic Species Paulownia tomentosa Following Burning in Pine and Oak-Pine Forests	Michael A. Jenkins	mike_jenkins@nps.gov

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
01-3-3-34	Effects of Fire on Biological Soil Crusts and Their Subsequent Recovery at the Great Basin Pinyon-Juniper Demonstration Area	Steven D. Warren	swarren@cemml.colostate.edu
01B-3-1-01	The Flomaton Natural Area: Demonstrating the Benefits of Fuel Management and the Risks of Fire Exclusion in an Old-Growth Longleaf Pine Ecosystem	John Kush	kushjoh@auburn.edu
01B-3-1-03	Dormant-Season Prescription Fires to Reduce Hazardous Fuel Loads on the South Carolina Coastal Plain: Establishing a Demonstration Area on a 40+ Year Study	Kenneth W. Outcalt	koutcalt@fs.fed.us
01B-3-1-04	Long-term Dormant-Season Burning Interval Study in the Palmetto/Gallberry Fuel Complex: Establishing an Adjacent Growing-Season Burn Study and Making Both Demonstration Areas	Kenneth W. Outcalt	koutcalt@fs.fed.us
01B-3-1-05	Frequency and Season of Prescription Fires to Reduce Hazardous Fuel Loads on the Lower Piedmont of Georgia: Establishing a Demonstration Area on a 12 Year-Old Study	Kenneth W. Outcalt	koutcalt@fs.fed.us
01B-3-2-01	Impacts of Prescribed Burning on the Survival of Douglas-fir and Ponderosa Pine in the Boise National Forest	Robert Progar	rprogar@fs.fed.us
01B-3-2-07	Management of Fuel Loading in the Shrub-steppe	Steven O. Link	slink@tricity.wsu.edu
01B-3-2-08	Pre-Fire Fuel Manipulation Impacts on Alien Plant Invasion of Wildlands	Jon E. Keeley	jon_keeley@usgs.gov
01B-3-2-10	Determining the Ecological Effects of Fire Suppression, Fuels Treatment, and Wildfire through Bird Monitoring in the Klamath Ecoregion of Southern Oregon and Northern California	John Alexander	jda@klamathBird.org
01B-3-2-11	Using Cattle as Fuel Reduction and Seeding Agents in Annual and Perennial Grass Stands in the Great Basin	Christopher Call	cacall@cc.usu.edu
01B-3-3-01	Effects of Fire and Rehabilitation Seeding on Sage Grouse Habitat in the Pinyon-juniper Zone	Jeanne C. Chambers	jchambers@fs.fed.us
01B-3-3-03	Effects of Prescribed Fire on the Invasion of Northern Mixed-grass Prairie by Non-native Plant Species: Implications for Restoration of an Endangered Ecosystem	Fred G. Giese	Fred_Giese@fws.gov
01B-3-3-05	Fuel Reduction Effects on a Key Sierra Food Web	Malcolm North	mnorth@fs.fed.us
01B-3-3-06	Interactions of Burn Season and Ecological Condition on Ecosystem Response to Fire in the Mountain Big Sagebrush Communities: Information Necessary for Restoration and Postfire Rehabilitation	Boone Kauffman	Boone.Kauffman@orst.edu
01B-3-3-13	Quantification of Fuel in Baccharis (Coyote Bush) Shrub Types: Assessing Fuel Loading Using Destructive and Non-destructive Methods	Will Russell	wrussell@usgs.gov
01B-3-3-15	Integrating Prescribed Fire into Management of Mixed-oak Forests of the Mid-Atlantic Region: Developing Basic Fire Behavior and Fuels Information for the Silvah System	Patrick Brose	pbrose@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
01B-3-3-16	Effects of Season and Interval of Prescribed Burns in a Ponderosa Pine Ecosystem	Walter G. Thies	wthies@fs.fed.us
01B-3-3-18	Fire Regimes of Forests in the Peninsular and Transverse Ranges of Southern California	Scott Stephens	stephens@nature.berkeley.edu
01B-3-3-24	Development of a Methodology for Building a Long-term Fire History in Great Basin Valley Landscapes	Pat Barker	jbarker@nv.blm.gov
01B-3-3-26	Fire Knowledge for Managing Cascadian Whitebark Pine Forests	Michael P. Murray	michael_murray@nps.gov
01B-3-3-27	Fuels Management and Non-native Plant Species: An Evaluation of Fire and Fire Surrogate Treatments in Chaparral Plant Community	Jennifer Gibson	Jennifer_Gibson@nps.gov
01B-3-3-28	Fire Effects on Rare Flora and Fauna in Southern California National Forests	Jan L. Beyers	jbeyers@fs.fed.us
01C-3-1-02	Armells Creek Prescribed Fire Demonstration Project	Clayton B. Marlow	cmarlow@montana.edu
01C-3-1-05	Managing Fuels in Northeastern Barrens	David W. Crary	david_crary@nps.gov
01C-3-3-01	An Integrated Assessment of the Historical Role and Contemporary Uses of Prescribed Fire in Southern Appalachian Ecosystems	James M. Vose	jvose@fs.fed.us
01C-3-3-02	Implications of Fire and Fire Surrogate Treatments on Fisher Habitat in the Sierra Nevada	Richard Truex	rtruex@fs.fed.us
01C-3-3-09	Fire Regimes and Successional Dynamics of Yellow Pine (Pinus) Stands in the Central Appalachian Mountains	Henri D. Grissino-Mayer	grissino@utk.edu
01C-3-3-10	Restoration of Dry, Montane Meadows Through Prescribed Fire, Vegetation, and Fuels Management: A Program of Research and Adaptive Management in Western Oregon	Fred J. Swanson	fswanson@fs.fed.us
01C-3-3-12	Effects of Fire on Kuenzler's Hedgehog Cactus (Echinocereus fendleri v. kuenzleri) and Endangered Species in the Northern Chihuahuan Desert	David B. Wester	david.wester@ttu.edu
01C-3-3-13	Effectiveness of Postfire Seeding to Reduce Cheatgrass (Bromus tectorum) Growth and Reproduction in Recently Burned Sagebrush Steppe	Matthew L. Brooks	matt_brooks@usgs.gov
01C-3-3-17	Evaluation Communication Strategies and Local Partnerships: Methods for Reducing Fuels, Sharing Responsibility, and Building Trust	Bruce A. Shindler	Bruce.Shindler@orst.edu
01C-3-3-21	Characterizing Moisture Regimes for Assessing Fuel Availability in North Carolina Vegetation Communities	Roberta A. Bartlette	rbarlette@fs.fed.us
01C-3-3-22	Fire Regimes and Forest Structure of Utah and Eastern Nevada: A Multi-scale History from Tree Rings	Emily K. Heyerdahl	eheyerdahl@fs.fed.us
01C-3-3-25	Fire Regimes and Forest Reference Conditions for Prescribed Fire Management of Relic Mixed Conifer Forests in Guadalupe Mountains National Park, Texas	Richard Gatewood	richard_gatewood@nps.gov

Project Number	Project Title	Principal Investigator	E-mail
Demonstration Sites, Administrative Studies, and Local Needs Projects (continued)			
03-3-2-04	Prescribed Burning to Protect Large Diameter Pine Trees From Wildfire - Can We Do It Without Killing the Trees We Are Trying to Save?	Kevin C. Ryan	kryan@fs.fed.us
03-3-2-05	Effects of Prescribed Burning on Mycorrihizal Fungi in Crater Lake National Park	Randolph J. Molina	rmolina@fs.fed.us
03-3-2-06	Effects of Mechanically Generated Slash Particle Size on Prescribed Fire Behavior and Subsequent Vegetation Effects	Richy Harrod	rharrod@fs.fed.us
03-3-2-07	Fire Effects on Yuma Clapper Rails and California Black Rails on the Lower Colorado River	Courtney J. Conway	cconway@ag.arizona.edu
03-3-3-11	Effects of Fuels Treatments on Native Flora and Fauna: Restoration in Weed-Invaded Landscapes of the Northern Rocky Mountains	Yvette Ortega	yortega@fs.fed.us
03-3-3-13	Assessment of Top Down and Bottom Up Controls on Fire Regimes and Vegetation Abundance and Distribution Patterns in the Southwestern Texas Borderlands: A Hierarchical Approach	Ann Camp	Ann.camp@yale.edu
03-3-3-15	Relationships of an Alien Plant, Fuel Dynamics, Fire Weather, and Unprecedented Wildfires in Hawaiian Rain Forests: Implications for Fire Management at Hawaii Volcanoes National Park	Rhonda K. Loh	rhonda_loh@nps.gov
03-3-3-26	Effects of Wildland Fires on Buff-Breasted Flycatchers and Other Forest Birds in Southeastern Arizona	Courtney J. Conway	cconway@ag.arizona.edu
03-3-3-28	Effects of Season of Prescribed Fire and Grazing on Understory Plant Communities in a Ponderosa Pine Forest	Becky K. Kerns	bkerns@fs.fed.us
03-3-3-46	Stereo Photo Series for Quantifying Natural Fuels in the Prairie Forest and Northwestern Great Plains	Roger D. Ottmar	rottmar@fs.fed.us
03-3-3-57	The Effects of Prescribed Fire Season and Fire Surrogates on Crown Fire Adapted Knob Cone Pine Forests	James F. Dawson	jdawson@ca.blm.gov
03-3-3-58	Effects of Fuel Management Treatments in Pinyon Juniper Vegetation at a Site on the Colorado Plateau	Matthew L. Brooks	matt_brooks@usgs.gov
Fire and Invasive Plant Species			
00-1-2-01	Spatial Interactions Among Fuels, Wildfire, and Invasive Plants	Philip N. Omi	phil@cnr.colostate.edu
00-1-2-04	Fire and Invasive Annual Grasses in Western Ecosystems	Matthew L. Brooks	matt_brooks@usgs.gov
00-1-2-06 *	Fire Management Options to Control Woody Invasive Plants in the Northeastern and the Mid-Atlantic U.S.	Alison C. Dibble	adibble@fs.fed.us
00-1-2-09	Invasive Plant and Fire Interactions: Use of the Fire Effects Information System to Provide Information for Managers	Kevin C. Ryan	kryan@fs.fed.us
01-S-05	Proceedings of the Workshop on Fire and Invasive Species	David Brownlie	dave_brownlie@fws.gov

Project Number	Project Title	Principal Investigator	E-mail
Fire Effects and Fuels Treatment Effects			
98-1-1-05	Photo Series for Major Natural Fuel Types of the United States, Phase II	Roger D. Ottmar	rottmar@fs.fed.us
98-1-1-06	Application of a Fuel Characterization System for Major Fuel Types of the Contiguous United States and Alaska	Roger D. Ottmar	rottmar@fs.fed.us
98-1-4-02 *	Assessing Values at Risk in the United States from Wildland Fire	Douglas B. Rideout	doug@cnr.colostate.edu
98-1-4-09	Stand Replacement Prescribed Burning for Fuel Reduction and Regeneration of Table Mountain/Pitch Pine Stands in the Southern Appalachian Mountains	Thomas A. Waldrop	twaldrop@fs.fed.us
98-1-4-10 *	Fuels Management and Wildlife Habitat: Quantity and Quality Relationships	R. Bruce Bury	burryb@mail.cor.epa.gov
98-1-4-12	Risk Assessment of Fuel Management Practices on Hillslope Erosion Processes	Peter R. Robichaud	probichaud@fs.fed.us
98-1-5-01 *	Fire Regimes and Fuel Treatments: A Synthesis with Manager Feedback	Philip N. Omi	phil@cnr.colostate.edu
98-1-5-02	Fire Ecology Information for California	Neil G. Sugihara	nsugihara@fs.fed.us
98-1-5-04 *	Historic Fire Regimes and Changes Since European Settlement on the Northern Mixed Prairie: Effect on Ecosystem Function and Fire Behavior	Ronald H. Wakimoto	wakimoto@forestry.umt.edu
98-1-7-01	Developing a Standard Experimental Design and Protocol for a National Study of the Consequences of Fire and Fire Surrogate Treatments	Phil Weatherspoon	pspoon@c-zone.net or pweather_redding@fs.fed.us
98-1-7-02	Adaptation of the Fuels and Fire Extension to the Forest Vegetation Simulator to meet the Objectives of the Joint Fire Science Program	Nicholas L. Crookston	ncrookston@fs.fed.us
98-1-7-04	Development of a Flexible, Standardized Methodology for Optimizing Fuel Treatment Programs Across Space and Time	Denis J. Dean	denis@cnr.colostate.edu
98-1-8-02	Fire Modeling for Fuel and Smoke Assessment	Patricia L. Andrews	pandrews@fs.fed.us
98-1-8-03	A National Fire Effects Prediction Model	Elizabeth D. Reinhardt	ereinhardt@fs.fed.us
98-1-8-06	A Risk Based Comparison of Potential Fuel Treatment Trade-off Models	David R. Weise	dweise@fs.fed.us.
98-S-01	Completion of the Rainbow Series	Kevin C. Ryan	kryan@fs.fed.us
98-S-02 *	Development of Course Scale Spatial Data for Wildland Fire and Fuels Management	Colin C. Hardy	chardy01@fs.fed.us
99-1-1-04	Development and Delivery of the Fire and Fuels Extension to the Forest Vegetation Simulator for Use by Stakeholders of the Joint Fire Science Program	Nicholas L. Crookston	ncrookston@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Fire Effects and Fuels Treatment Effects (continued)			
99-1-3-02 *	Using Goats to Prevent or Reduce Wildland Fire Danger in Shrub Dominated Wildland-Urban Interface Areas	Katherine Voth	kvoth@cc.usu.edu
99-1-3-04 *	Develop a Landscape-Scale Framework for Interagency Wildland Fuels Management Planning	Pat Lineback	pat_lineback@nps.gov
99-1-3-06	Mechanical Midstory Reduction Treatment: An Alternative to Prescribed Fire	Robert B. Rummer	rummer@fs.fed.us
99-1-3-08 *	Monument Canyon Research Natural Area, Santa Fe National Forest	Tom Swetnam	tswetnam@ltrr.arizona.edu
99-1-3-11 *	Multi-Century Fire Modeling Over Landscape Gradients	Peter Z. Fulé	Pete.Fule@nau.edu
99-1-3-12	Quantification of Canopy Fuels in Conifer Forests	Elizabeth D. Reinhardt	ereinhardt@fs.fed.us
99-1-3-13 *	Carbon and Nitrogen Cycling by Microbial Decomposers Following Thinning and Burning in a Southwest Ponderosa Pine Ecosystem	Daniel G. Neary	dneary@fs.fed.us
99-1-3-29 *	Southern Utah Fuels Management Demonstration Project	Kevin C. Ryan	kryan@fs.fed.us
99-1-4-01 *	Effect of Fuel Treatments on Wildfire Severity	Philip N. Omi	phil@cnr.colostate.edu
99-1-4-02 *	The Value of Fuel Management in Reducing Wildfire Damage to Overstory Trees	Kenneth W. Outcalt	koutcalt@fs.fed.us
00-1-1-03	Changing Fire Regimes, Increased Fuel Loads, and Invasive Species: Effects on Sagebrush Steppe and Pinyon-Juniper Ecosystems	Jeanne C. Chambers	jchambers@fs.fed.us
00-U-01 *	Cerro Grande Post-Fire Inventory and Analysis	Carleton B. Edminster	cedminster@fs.fed.us
01-1-1-02	Development of a Computer Model for Management of Fuels, Human-Fire Interactions, and Wildland Fires in the Boreal Forest of Alaska	Scott Rupp	scott.rupp@uaf.edu
01-1-1-05 *	Can Wildland Fire Use Restore Historical Fire Regimes in Wilderness and Other Unroaded Lands?	Carol Miller	cmiller04@fs.fed.us
01-1-1-06	Historical Wildland Fire Use: Lessons to be Learned from Twenty-Five Years of Wilderness Fire Management	Matthew G. Rollins	mrollins@fs.fed.us
01-1-2-03	In-Woods Decision Making of Utilization Opportunities to Lower Costs of Fire Hazard Reduction Treatments	Eini C. Lowell	elowell@fs.fed.us
01-1-3-09	Consequences and Correlates of Fire in Wetlands	David Brownlie	dave_brownlie@fws.gov
01-1-3-11	Duff Consumption and Southern Pine Mortality	John K. Hiers	john.hiers@eglin.af.mil
01-1-3-12	Effects of Prescribed and Wildland Fire on Aquatic Ecosystems in Western Forests	David S. Pilliod	dpilliod@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Fire Effects and Fuels Treatment Effects (continued)			
01-1-3-19	Effects of Fuels-Reduction and Exotic Plant Removal on Vertebrates, Vegetation, and Water Resources in Southwestern Riparian Ecosystems	Deborah M. Finch	dfinch@fs.fed.us
01-1-3-21	Cumulative Effects of Fuel Management on Landscape-Scale Fire Behavior and Effects	Mark A. Finney	mfinney@fs.fed.us
01-1-3-22	Optimizing Landscape Treatments for Reducing Wildfire Risk and Improving Ecological Sustainability of Ponderosa Pine Forests within Mixed Severity Fire Regimes	Merrill R. Kaufmann	mkaufmann@fs.fed.us
01-1-3-25	Prescribed Fire Strategies to Restore Wildlife Habitat in Ponderosa Pine Forests of the Intermountain West	Victoria A. Saab	vsaab@fs.fed.us
01-1-3-27	Developing Statistical Wildlife Habitat Relationships For Assessing Cumulative Effects of Fuels Treatments	Kevin S. McKelvey	kmckelvey@fs.fed.us
01-1-3-37	Landscape Fragmentation and Forest Fuel Accumulation: Effects of Fragment Size, Age, and Climate	William Gould	wgould@fs.fed.us
01-1-3-40	Incorporating Spatial Heterogeneity into Fire Restoration Plans	Dean Urban	deanu@duke.edu
01-1-3-43 *	Fire, Management, and Land Mosaic Interactions: A Generic Spatial Model and Toolkit from Stand to Landscape Scales	Thomas R. Crow	tcrow@fs.fed.us
01-1-7-02	Photo Series for Major Natural Fuel Types of the United States, Phase III	Roger D. Ottmar	rottmar@fs.fed.us
01-S-06	Additional Work for Quantification of Canopy Fuels in Conifer Forests	Elizabeth D. Reinhardt	ereinhardt@fs.fed.us
03-1-1-06	Carbon Cycling at the Landscape Scale: the Effect of Changes in Climate and Fire Frequency on Age Distribution, Stand Structure, and Net Ecosystem Production	Michael G. Ryan	mryan@lamar.colostate.edu, mgryan@fs.fed.us
03-1-1-07	Climate Drivers of Fire and Fuel in the Northern Rockies: Past, Present, and Future	Penelope Morgan	pmorgan@uidaho.edu
03-1-3-06	Fuel Consumption and Flammability Thresholds in Shrub-Dominated Ecosystems	Clinton S. Wright	cwright@fs.fed.us
03-1-3-08	Forest Floor Consumption and Smoke Characterization in Boreal Forested Fuelbed Types of Alaska	Roger D. Ottmar	rottmar@fs.fed.us
03-1-4-09	Patch Burning on Grasslands: Effects on Fuels, Fire Behavior, and Fire Spread	David M. Engle	dme@mail.pss.okstate.edu
03-1-4-11	The Effects of Grass Seeding and Salvage Logging on Fuel Loads, Potential Fire Behavior, and the Biological Diversity of Severely Burned Low Elevation Southern Oregon Forests	Boone Kauffman	Boone.Kauffman@orst.edu
03-1-4-21	Designing an Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome	Jim D. McIver	jmciver@fs.fed.us
03-2-1-02	Assessing the Causes, Consequences and Spatial Variability of Burn Severity: A Rapid Response Proposal	Penelope Morgan	pmorgan@uidaho.edu

Project Number	Project Title	Principal Investigator	E-mail
Fire Effects and Fuels Treatment Effects (continued)			
03-2-2-01	Effects of Blowdown, Beetle Outbreak, and Fire History on the Behavior and Effects of the 2002 Fires in Western Colorado	Claudia M. Regan	cregan@fs.fed.us
03-2-3-01	The Effects of Fire on Umpqua Gentain (Frasera umpquaensis), a Rare Plant Species	Thomas N. Kaye	kayet@peak.org
03-2-3-05	Ecosystem Responses to a High-Severity Wildfire: a Serendipitous Opportunity to Enhance the Fire/Fire Surrogate Study	Steven T. Overby	soverby@fs.fed.us
03-2-3-08	Pre-Fire Condition, Fire Severity, and Post-Fire Effects in the Hayman Burn, Colorado	Merrill R. Kaufmann	mkaufmann@fs.fed.us
03-2-3-09	Ecosystem Effects and Propagation of the Biscuit Fire Across the Large-Scale Plots of the Long-Term Ecosystem Productivity Experiment	Bernard T. Bormann	bbormann@fs.fed.us
03-2-3-11	Quantification of Runoff and Erosion on Semi-Arid Grasslands Following Wildfire	Jeffry J. Stone	jstone@tucson.ars.ag.gov
03-2-3-13	The Effects of Soil Properties, Fuel Characteristics, and Vegetation Recovery on Post-Fire Watershed Hydrology and Sediment Yield in Chaparral Steeplands	Peter M. Wohlgemuth	pwohlgemuth@fs.fed.us
03-2-3-15	Initial Post-Fire Avian Response to High Fire Severity	Marcia G. Narog	mnarog@fs.fed.us
03-2-3-20	Effects of Altering Stand Structure on Wildfire Severity and Effects in the Black Mountain Experimental Forest, Cascade Range, California	Carl Skinner	cskinner@fs.fed.us
03-2-3-22	Post-Fire Erosion and the Effectiveness of Emergency Rehabilitation Treatments Over Time	Peter R. Robichaud	probichaud@fs.fed.us
03-3-3-36	Fuels Reduction in Oak Woodlands, Shrub Lands and Grasslands of SW Oregon: Consequences for Native Plants and Invasion by Non-Native Species	Patricia Muir	muirp@science.oregonstate.edu
Other Projects			
98-S-05	A Workstation/Server Upgrade to Enhance Image Processing and Data Handling Capability	Robert Burgan	rburgan/rmrs_missoula@fs.fed.us
01-S-01	Development of a Landscape Fire Analysis Center	Lloyd Queen	lpqueen@ntsg.umt.edu
02-S-01	Database Design and Data Applications Development for the JFSP	Carol L. Simmons	carols@nrel.colostate.edu
Planning and Preparedness			
98-1-5-03	Characterizing Historic and Contemporary Fire Regimes in the Lake States	David T. Cleland	dcleland@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Planning and Preparedness (continued)			
98-1-9-06	Modification and Validation of Fuel Consumption Models for Shrub and Forested Lands in the Southwest, Pacific Northwest, Rockies, Midwest, Southeast and Alaska	Roger D. Ottmar	rottmar@fs.fed.us
99-1-3-10 *	Incorporation of Wildland Fuels Information into Scale Land Use and Planning Processes	Philip N. Omi	phil@cnr.colostate.edu
99-1-3-16 *	Wildland Fuels Management: Evaluating and Planning Risks and Benefits	Peter B. Landres	plandres@fs.fed.us
99-1-3-28 *	Spatial and Temporal Analysis of Lightning and Fire Occurrence in Rocky Mountain Wilderness Areas	Matthew G. Rollins	mrollins@fs.fed.us
99-S-01	A National Study of the Consequences of Fire and Fire Surrogate Treatments	Jim D. McIver	jmciver@fs.fed.us
00-1-1-06 *	Development and Implementation of a System for Prediction of Fire-Induced Shrub and Tree Mortality	Bret W. Butler	bwbutler@fs.fed.us
01-1-6-07 *	Assessing the Value of Mesoscale Models in Predicting Fire Danger	Sue A. Ferguson	sferguson@fs.fed.us
01-1-6-08	Predicting Lightning Risk	Sue A. Ferguson	sferguson@fs.fed.us
01-1-7-03	Using the NED Decision Support System to Improve Fuels Management Decision Processes	H. Michael Rauscher	mrauscher@fs.fed.us
01-1-7-06	Techniques for Creating a National Interagency Process for Predicting Preparedness Levels	Gerry A. Day	gday@fs.fed.us
01-1-7-07	Fire and Fuels Extension to the Forest Vegetation Simulator: Completion of Calibration for Eastern Forests, Provisions for User Training, and Program Maintenance	Gary E. Dixon	gdixon01@fs.fed.us
01-1-7-14	Decision Support Methods for Prescribed Fire	Donald G. MacGregor	donaldm@epud.net
03-1-1-08	Modeling Vegetation Phenology for the Assessment of Present and Future Fire Hazard Potential	Patricia L. Andrews	pandrews@fs.fed.us
03-1-1-22	Fire-Climate Interactions and Predicting Fire Season Severity in the Mediterranean Climate Areas of California, Southern Oregon, and Western Nevada	Carl Skinner	cskinner@fs.fed.us
03-1-2-02	Monitoring Trust as an Evaluation of the Success of Collaborative Planning in a Landscape-Level Fuel Hazard Reduction Treatment Project in the Bitterroot Valley, Montana	Alan E. Watson	awatson@fs.fed.us
03-1-4-14	Evaluation of Post-Wildfire Debris Flow Mitigation Methods and Development of Decision-Support Tools	Paul M. Santi	psanti@mines.edu
03-2-1-03	Characterization of Firefighter Safety Zone Awareness	Bret W. Butler	bbutler03@fs.fed.us
03-2-1-04	Modeling Surface Winds in Complex Terrain for Wildland Fire Incident Support	Mark A. Finney	mfinney@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Remote Sensing			
00-1-3-01	The Use of Landsat 7 (ETM+) and AVIRIS Data to Map Fuel Characteristic Classes in Western Ecosystems	Jan W. Van Wagtendonk	jan_van_wagtendonk@usgs.gov
00-1-3-05	Testing an Approach to Improving Fire Fuel Mapping by Mapping and Modeling Vegetation Structure and Types Based on Combined Field Data	Zhiliang Zhu	zhu@usgs.gov
00-1-3-19 *	Monitoring Fire Effects at Multiple Scales: Integrating Standardized Field Data Collection with Remote Sensing to Assess Fire Effects	Robert E. Keane	rkeane@fs.fed.us
00-1-3-21	Validation of Crown Fuel Amount and Configuration Measured by Multispectral Fusion of Remote Sensors	Jo Ann Fites-Kaufman	Jfites@fs.fed.us
01-1-4-02	Fuel Classification for the Southern Appalachian Mountains using Hyperspectral Image Analysis and Landscape Ecosystem Classification	Thomas A. Waldrop	twaldrop@fs.fed.us
01-1-4-07	The Use of High-Resolution Remotely Sensed Data in Estimating Crown Fire Behavior Variables	Hans-Erik St. John	hanserik@u.washington.edu
01-1-4-09	A Novel Approach to Regional Fuel Mapping: Linking Inventory Plots with Satellite Imagery and GIS Databases Using the Gradient Nearest Neighbor Method	Janet L. Ohmann	johmann@fs.fed.us
01-1-4-12	Evaluate Sensitivities of Burn-Severity Mapping Algorithms for Different Ecosystems and Fire Histories in the United States	Zhiliang Zhu	zhu@usgs.gov
01-1-4-14	Advanced Remote Sensing Technologies for Monitoring Postburn Vegetation Trends and Conditions	Ralph R. Root	ralph_root@usgs.gov
01-1-4-15	Mapping Horizontal and Vertical Distribution of Fuel by Fusing High-Resolution Hyperspectral and Polarimetric Data	Don Despain	don_despain@usgs.gov
01-1-4-23	Quantitative Comparison of Spectral Indices and Transformations with Multi-Resolution Remotely Sensed Data Using Ground Measurements: Implications for Fire Severity Modeling	Jennifer L. Rechel	jrechel@fs.fed.us
01B-2-1-01 *	Field Measurements for the Training and Validation of Burn Severity Maps from Spaceborne, Remotely Sensed Imagery	Thomas J. Bobbe	tbobbe@fs.fed.us
01C-2-1-02	Evaluating High Resolution Hyperspectral Images for Determining Postfire Burn Severity	Peter R. Robichaud	probichaud@fs.fed.us
01C-2-1-08 *	Real-Time Evaluation of Effects of Fuel-Treatments and Other Previous Land Management Activities on Fire Behavior During Wildfires: A Rapid Response Proposal	Jo Ann Fites-Kaufman	Jfites@fs.fed.us
03-2-3-18	Using LIDAR to Identify Sediment and Forest Structure Change in the Hayman Burn, Colorado	Merrill R. Kaufmann	mkaufmann@fs.fed.us
03-S-01	Demonstration and Integration of Systems for Fire Remote Sensing, Ground Based Fire Measurement, and Fire Modeling	Colin C. Hardy	chardy01@fs.fed.us
Science and Technology Applications			
03-4-1-02	An Expert System and New Web Interface for Tools on the Fire Research and Management Exchange System	Penelope Morgan	pmorgan@uidaho.edu

Project Number	Project Title	Principal Investigator	E-mail
Science and Technology Applications (continued)			
03-4-2-03	Completion of Invasive Plant Knowledge Base Summaries for FEIS (Fire Effects Information System)	Jane Kapler-Smith	jsmith09@fs.fed.us
03-4-2-05	Strengthening Application of the Ventilation Climate Information System (VCIS) for Multiple-Scale Planning, Documentation and Risk Assessment	Sue A. Ferguson	sferguson@fs.fed.us
03-4-2-06	A Regional Information Node for Fire Science in the Pacific Northwest	David L. Peterson	peterson@fs.fed.us
03-4-2-08	Geomorphic and Watershed Impacts of Wildland Fire - Understanding and Mitigation	Thomas J. Casadevall	tcasadev@usgs.gov
Social and Economic Impacts			
98-S-03 *	Ecological and Economic Consequences of the 1998 Florida Wildfires	Sue Grace	sue_grace@fws.gov
98-S-04	A Survey of Public Attitudes and Behavior Toward Fuel Treatment Policies	Armando Gonzalez-Caban	agc/psw_rfl@fs.fed.us
99-1-1-01 *	Assessing the Need, Costs, and Potential Benefits of Prescribed Fire and Mechanical Treatments to Reduce Fire Hazard	Jamie Barbour	jbarbour01@fs.fed.us
99-1-1-05 *	Integrated Fuels Treatment Assessment: Ecological, Economic, and Financial Impacts	Hayley Hesseln	hayley@forestry.umt.edu
99-1-2-08	Evaluating Public Responses to Wildland Fuels Management: Factors that Influence Acceptance of Practices and Decision Processes	Bruce A. Shindler	Bruce.Shindler@orst.edu
99-1-2-10	Demographic and Geographic Approaches to Predicting Public Acceptance of Fuel Management at the Wildland-Urban Interface	Jeremy S. Fried	jeremy.fried@fs.fed.us
01-1-2-09	A National Study of the Economic Impacts of Biomass Removals to Mitigate Wildfire Damages on Federal, State, and Private Lands	Jeffrey P. Prestemon	jprestemon@fs.fed.us
01-1-3-30	A Social Assessment of Public Knowledge, Attitudes and Values Related to Wildland Fire, Fire Risk, and Fire Recovery	H. Ken Cordell	kcordell@fs.fed.us
Workshops and Symposia			
98-1-1-07	Mapping Fuels Using Remote Sensing and Biophysical Modeling	Robert E. Keane	rkeane@fs.fed.us
99-1-2-04	National Conference on Social Acceptability of Fuel Treatments in Forest and Grassland Environments	Alan E. Watson	awatson@fs.fed.us
01-S-02	4th Symposium on Fire and Forest Meteorology	Sue A. Ferguson	sferguson@fs.fed.us

Project Number	Project Title	Principal Investigator	E-mail
Workshops and Symposia (continued)			
01-S-03	Fire and Climate 2001 Workshop	Francis M. Fujioka	ffujioka@fs.fed.us
01-S-04 *	Climate Variability and Associated Wildfire Implications	James D. Brenner	brennej@doacs.state.fl.us
01-U-02 *	Workshop on Fire and Climate History in Western North and South America	Tom Swetnam	tswetnam@ltrr.arizona.edu
02-S-02	Fire and Climate Workshop 2002	Carleton B. Edminster	cedminster@fs.fed.us
02-S-03	Fire and Invasive Plant Ecology and Management: The Need for Integration to Effectively Restore Ecosystems ESA/SER Symposium	Matthew L. Brooks	matt_brooks@usgs.gov
03-4-2-16 *	Assessing the Risk of Decision Making Related to Uncharacteristic Wildfires: A 2003 Symposium	David L. Peterson	peterson@fs.fed.us
03-S-02	2nd International Wildland Fire Ecology and Fire Management Congress and the 5th Symposium on Fire and Forest Meteorology	James D. Brenner	brennej@doacs.state.fl.us
03-S-03	A Workshop to Develop a Comprehensive Approach to Identifying the Essential Elements of Collaboration	Daniel R. Williams	drwilliams@fs.fed.us
03-U-01	Fire Economics, Policy, and Planning: A Global Vision	Armando Gonzalez-Caban	agc/psw_rfl@fs.fed.us

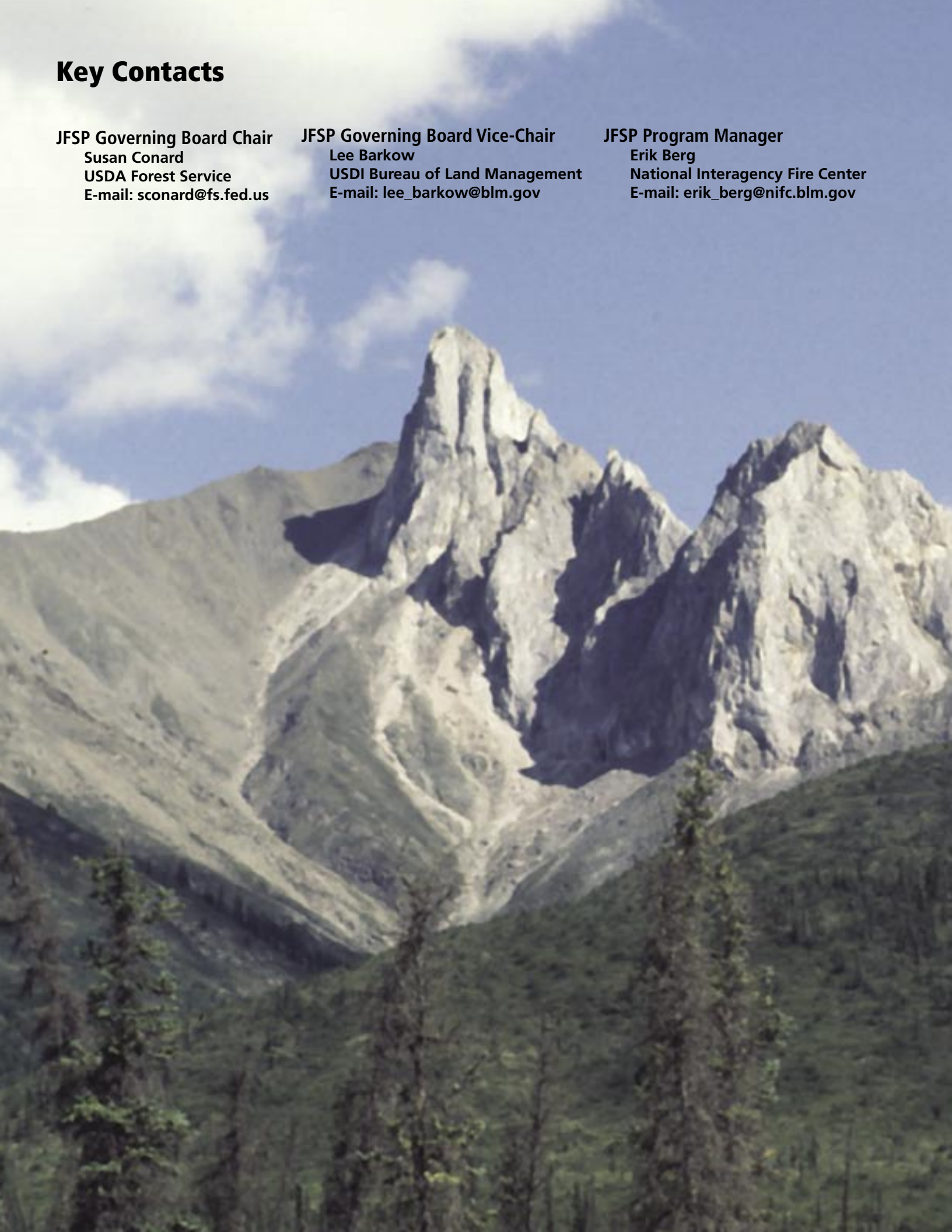
* JFSP project substantially complete. A final project report has been submitted to the Program Office; some research products have yet to be delivered.

Key Contacts

JFSP Governing Board Chair
Susan Conard
USDA Forest Service
E-mail: sconard@fs.fed.us

JFSP Governing Board Vice-Chair
Lee Barkow
USDI Bureau of Land Management
E-mail: lee_barkow@blm.gov

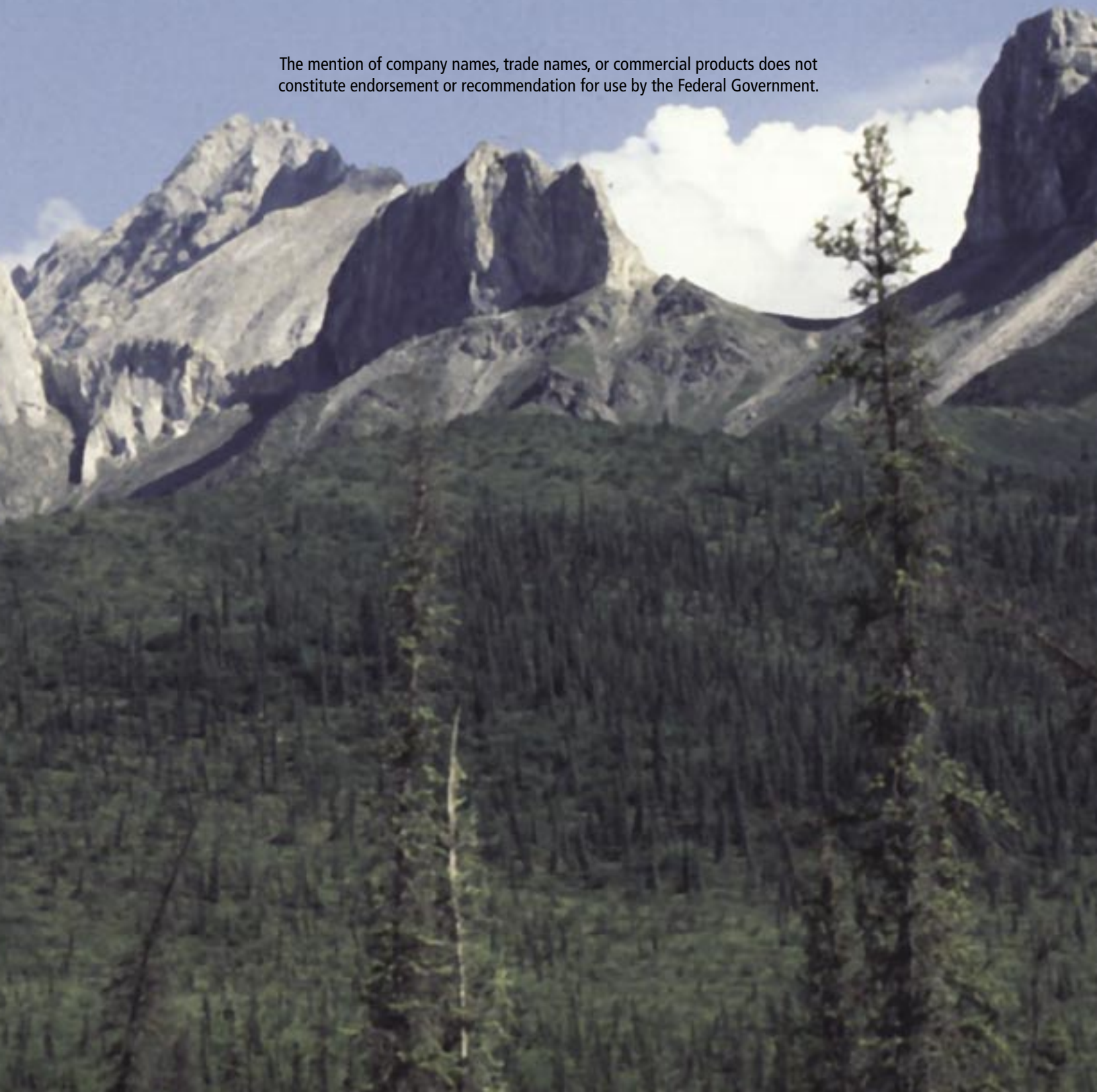
JFSP Program Manager
Erik Berg
National Interagency Fire Center
E-mail: erik_berg@nifc.blm.gov



JFSP Fire Technology Transfer Specialist
Tom Wordell
National Interagency Fire Center
E-mail: tom_wordell@nifc.blm.gov

JFSP Program Management Specialist
Becky Jenison
National Interagency Fire Center
E-mail: becky_jenison@nifc.blm.gov

JFSP Office
3833 S. Development Ave.
Boise, ID 83705
http://jfsp.nifc.gov




U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
U.S.
FISH & WILDLIFE
SERVICE
FOREST SERVICE
DEPARTMENT OF AGRICULTURE
NATIONAL
PARK
SERVICE
USGS
science for a changing world