U.S. DEPARTMENT OF THE INTERIOR

and

USDA FOREST SERVICE

JOINT FIRE SCIENCE PLAN

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TABLE OF CONTENTS

Introduction..... 1
Background 3
Principal Congressional Purposes of the Fire Science Program
Principal Purpose 1. Fuels Inventory and Mapping 5
Principal Purpose 2. Evaluation of Fuels Treatments 7
Principal Purpose 3. Scheduling of Fuels Treatments 9
Principal Purpose 4. Monitoring and Evaluation 10
Implementation
Program Management 12
Financial Management 14
Technology and Information Transfer 15
Conclusion 16

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INTRODUCTION

There is increasing concern that fuel loadings are reaching hazardous levels that can lead to widespread catastrophic fires in ecosystems where frequent fire has been excluded. This situation was addressed in the 1995 Federal Wildland Fire Management Policy Review and Report that contributed to the development of a new Federal fire policy. That policy directs agencies to achieve a balance between suppression capability and the use of fire to regulate fuels and sustain healthy ecosystems.

The need to understand both the role of wildland fire as an ecosystem process and the appropriate use of fire as a management tool has been recognized for years. Historically fire has played an important role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and diseases, stimulating regeneration, cycling critical nutrients, and providing a diversity of habitats for plant species and wildlife. As land management agencies have become more successful at suppressing wildland fires, and other human actions have reduced the spread of fires, fire frequencies have been reduced substantially in many ecosystems. However, there has been a growing recognition that disturbances by fire can have both positive and negative effects on human and environmental values. As a result, there has been a growing desire to understand the long-term consequences of altering fire regimes on the structure and health of plant communities, wildland fuels, fire severity, and air and water quality.

In the 1998 appropriation, Congress, with the support of the Administration, provided a more flexible funding authority to support the aggressive use of fire and mechanical fuels treatments, with the goals of reducing the occurrence of uncharacteristically severe wildland fires and improving ecosystem health. This change will help implement the new fire policy. In granting this new funding authority, Congress expressed a concern that "both the Forest Service and the Department of the Interior lack consistent and credible information about the fuels management situation and workload, including information about fuel loads, conditions, risk, flammability potential, fire regimes, locations, effects on other resources, and priorities for treatment in the context of the values to be protected." Congress directed the Department of Interior (including the Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), National Park Service (NPS), Fish and Wildlife Service (FWS), U.S. Geological Survey (USGS)), and the Forest Service (FS) to establish a Joint Fire Science Program to supplement existing fire research capabilities.

The new Joint Fire Science Program, described in this document, will be designed to provide a scientific basis and rationale for implementing fuels management activities, with a focus on activities that will lead to development and application of tools for managers.

This plan will address four issues critical to the success of the fuels management and fire use program. These issues are:

The need to develop and implement consistent interagency fuels mapping and inventories with common classifications and resolution within ecosystems. This information will help managers identify the location of hazardous fuels, determine where fuels have accumulated beyond the historic range of variability, determine potential impact of current fuel conditions on fire regimes and ecosystem processes, determine where fire damages and costs are increasing, recognize the most at-risk fuel/fire regime components, set priorities for treatments, and determine the appropriate type and frequency of treatment.

The need to evaluate and compare fuels treatment practices and techniques, including prescribed fire, thinning and other mechanical methods, increased utilization of biomass, and no treatment. The evaluations will assess cost effectiveness, social impacts, air quality and watershed impacts, ecological consequences, and potential effects on wildland fire size, severity, and cost.

The need to develop treatment schedules, determine the frequency of subsequent treatments, and coordinate treatment schedules among agencies. In developing treatment priorities and schedules, managers will need to consider the potential effects on other resources such as air and water quality, wildlife habitat, threatened and endangered species, and cultural values; on management activities, such as timber harvest, grazing, recreation, control of invasive, nonnative plants; and on costs, benefits, and risks associated with treatment and no treatment.

The need to establish compatible interagency processes and procedures for monitoring, evaluating, and reporting fuels treatments. This will allow managers to determine whether the fuels management program is meeting its goals and objectives, by regularly updating fuels maps and inventories, and allowing synthesis of information across geographic and agency boundaries.

The Joint Fire Science Program will establish the process and program oversight structure to identify and meet fire information and technological support needs for a national interagency fuels management program. Procedures will be developed to ensure financial accountability and proper business management practices. These include a competitive process for awarding contracts or other forms of agreements, contract administration that ensures deliverables are timely and meet specifications, and annual reporting requirements. The Joint Fire Science Program will be fully reviewed, and appropriate adjustments made, by the end of the year 2001.

BACKGROUND

Fire and resource managers have learned about the interrelationships among current levels of wildland fuels, fire effects, and ecosystem functions both through personal experience and from results of a limited number of scientific studies. This has led to concerns over the contribution of fuel accumulations to severe wildland fires and the relationship between such fires and ecosystem health problems. These concerns are substantiated by fire ecology studies and by data that show increasing fire severity. For example, historic photographs, fire history chronologies, and research on stand structure and composition of ponderosa pine forests clearly show relationships between fire exclusion, live and dead fuels, and changing species composition. Similar information on impacts of changing fire regimes exists for other forest and rangeland plant communities, such as the expansion of pinyon-juniper woodlands, conversion of oak savannas to shrubs or conifers, establishment of hardwoods in southern pine forests, and encroachment of conifers into aspen groves. The fragmented and often anecdotal nature of this information has hindered managers' ability to develop and predict effects of comprehensive fuels management programs.

Managers in some local field units already use geographic information systems (GIS) for mapping fuels and vegetation, for assessing wildland fire risk and values to be protected, for displaying the degree to which fire regimes have been altered, and to identify hazard areas and set treatment priorities. These spatial databases can also be combined with fire behavior and fire effects models. Although such capabilities exist within local areas, there have been few systematic attempts to test the relative accuracy or usefulness of different approaches or to integrate this local knowledge and aggregate it across watershed or agency boundaries. However, extrapolations within highly variable and dynamic systems are never as reliable as site-specific data, especially in areas with significant values to be protected. An expanded system of fuels sampling and mapping, combined with high resolution, remotely sensed data will support more realistic extrapolations and site-specific modeling of fire behavior.

Although annual fuels treatments expanded to more than one million acres nationally by 1997, this is still far short of the level needed to reverse the continuing accumulation of hazardous fuels and restore an appropriate role for fire in ecosystems. Living and dead fuels continue to accumulate on Federal and Indian trust lands at varied rates depending on site conditions. The Department of the Interior and the Forest Service have tentatively identified about 95 million acres of Federal and Indian trust forests and rangelands that require periodic burning or other treatments to reduce fuel loads or maintain ecosystem health. Currently, there is no estimate on how fast the problem is growing, but the extent and degree of hazard will increase over time without wildland fire or planned fuel treatments. The agencies estimate that it may be feasible to treat up to five million acres each year. It is uncertain whether this treatment level is adequate to reverse the trend of increasing fuel accumulations and begin to reduce wildland fire problems. A significant expansion of the fuels program above current levels will require more information on the long-term success of prescribed fire and mechanical treatments in meeting resource

management goals; the social acceptability of various treatment alternatives; the ability of mechanical treatments to meet ecosystem management goals; and the economic feasibility of biomass utilization.

Treatment priorities and timing are complicated because some areas require restoration or rehabilitation while others require maintenance to prevent degradation. As prescribed fire and mechanical treatments increase, managers will need to expand their knowledge about these activities and how they will integrate with other land uses and practices such as timber harvest, silviculture, grazing, wildlife management, control of invasive, nonnative plants, and recreation use. Managers also need to understand how these uses and practices affect wildland fuels and fire potential. At these expanded levels of activity, environmental law and social sensitivities will have increasing bearing on management actions.

To improve their ability to design ecologically sound fuel treatment programs, managers need better information on the distribution and amount of fuels across vegetation types, as well as the impacts of these fuel structures and changing fire regimes on fire hazard, potential fire severity, and ecosystem structure and function. Knowledge of historic fire and fuel patterns provides critical background information and will continue to be very important in understanding changing fire regimes. Studies of historic stand structure, fuel loadings, and fire regimes in areas such as southeast pinelands and ponderosa pine/mixed conifer forests of the West have been central to our understanding of the contribution of fire exclusion to hazardous fuels buildup and loss of ecosystem health, particularly in ecosystems which historically had high fire frequency. These studies have also provided the basis for several experimental projects to restore forests and their associated fire regimes. Basic understanding of ecological responses to disturbance and to changes in the environment is critical to determining the range of fire regime variability or mechanical treatment alternatives that are consistent with maintaining ecosystem health. Within this range, and within the priorities imposed by social and economic demands, managers must determine the best site-specific solutions that maintain viable ecosystems.

Many land managers have used repeated prescribed fire and/or mechanical treatments to significantly reduce live and dead fuels. These treatments have produced changes in wildland fire behavior such as the change of crown fires to surface fires as they enter burned and/or treated areas. The phenomenon of crown fires changing to surface fires as they enter previously burned areas has also been observed in wilderness and park areas that have active fire management programs. Intensive fuels treatments and studies of their effects have been concentrated within commercial forests, intensively used recreation areas, and areas managed for wildlife and/or livestock. However, the vast majority of Federal and Indian trust lands has been subjected to sporadic fuels treatments, and there have been few systematic studies to document changes in fuels and stand structure. Recent recognition of the hazards of increased fuel loading and the values of managing for healthy ecosystems has identified the need to greatly expand fuels management, understand fire regimes, and document changing conditions. The increased danger of intense wildland fire to humans and property as suburban areas encroach on wildlands has crystallized this need. The expansion of fuels management projects from small treatment blocks

to large areas capable of producing changes in ecosystem function, along with the growing problem of wildland/urban interface fires, has led to changing and competing treatment priorities that must be assessed with better information about fuels, fire behavior, fire effects, and values at risk.

The social aspect of wildland fire management is not well understood. Society's need for fire protection often conflicts with its demand for ecological amenities such as air quality, water quality, threatened and endangered species habitat, and pristine areas for recreation and conservation. For example, land managers are rapidly expanding the use of fire for managing ecosystems while air resource managers are accelerating efforts to reduce the local and regional impacts of smoke. Smoke management (meeting air quality standards) is a legal requirement of the Clean Air Act, as well as a health and safety issue for the general populace and fireline personnel. The Joint Fire Science Program will attempt to define these social relationships and develop analytical tools and communication practices to help managers include social considerations in decision making.

An expanded fuels management program cannot wait until perfect knowledge about fuels, fire behavior and ecosystem functions exists, because the current risk of catastrophic wildland fire is so great. The Joint Fire Science Program will provide a suite of methods for systematic monitoring and evaluation of changing fuels, fire and other treatment effects, and fire behavior conditions. These activities will provide the basis for adaptive management decisions to steadily refine and improve fuels management programs and integrate this work into overall land and resource management goals, now and in the future.

PRINCIPAL CONGRESSIONAL PURPOSES OF THE FIRE SCIENCE PROGRAM

Principal Purpose 1. Fuels Inventory and Mapping

"To establish and implement a comprehensive approach for fuel mapping and inventory that involves the location and condition of fuels, the appropriate treatment frequency, potential effects on other resources, and priorities for treatment."

Background. There is a lack of consistent and credible information about the current fuels management situation, including information about fuel loads, conditions, risks, flammability and emission potential, fire regimes, locations, and priorities for fuel treatment. There have been some regional assessments of fuel conditions such as in the Columbia River Basin and the Sierra Nevada, but their coarse spatial and temporal resolution does not provide the detailed data required for planning site-specific implementation. Some local units have high resolution, ground-based inventories and maps, although they are often incompatible in scale and content across administrative boundaries. At present, fuels are usually inventoried and mapped without consideration for related risks, making it difficult for managers to identify and prioritize hazardous fuels. There are only a few locations where assessments and analyses have been

conducted at an appropriate scale, contain appropriate data, and are integrated among management areas.

Target. The Joint Fire Science Program will develop a nationally consistent assessment of the fuels management situation and a comprehensive analytical system that will provide improved decision support. Remote sensing technology supported by ground truthing and accuracy assessments will be used to develop fuels maps and databases for all geographic areas. These maps and databases will be developed using site-specific data collected at the field level, and will be capable of being aggregated to a larger scale to provide a national perspective of the current fuels situation. Such an assessment will inventory current fuel conditions using nationally defined fuel attributes that include the vertical and horizontal structure of the fuel complex. Local fuels assessments can be linked to models that can predict fire characteristics and effects. Information on the historic fire regime, and the likely intensity and severity of current wildland fire will also be collected. Fuels assessments will be linked with other databases and with geographic information systems. Procedures for periodically updating fuels databases and assessments at the local, regional and national levels will be consistent with monitoring and evaluation protocols.

The Joint Fire Science Program will provide information on fuels and fire regimes; provide a means to assess changes in fuel over time; develop improved descriptors of fire regimes, including frequency, intensity, severity, aerial extent, and spatial pattern; and identify and provide analytical tools to assess risk factors. Decision support tools may include methods for identifying key factors that determine risk to values such as property, water quality, and air quality, and methods for integrating these risk factors into a comprehensive priority rating system for treatments.

Approach. The assessment of fuel conditions and values to be protected will follow a tiered approach. In the short-term, the size of the problem will be determined. Using existing data, all agencies will conduct an initial assessment of the locations and acres of fuels that require treatment. The Joint Fire Science Program will develop and implement a process to inventory existing fuels and vegetation data. Using this inventory, the program can provide managers with the first comprehensive assessment of fuel condition information, and identify inventory, mapping, and classification needs.

Projects will be undertaken to refine and compare methods for developing information on fuel condition and values to be protected. Current agency efforts to provide national maps (including non-fire related efforts) of vegetation and fuel types, fire return intervals, and critical fuels management situations using remote sensing will be accelerated and coordinated, using funds from the Joint Fire Science Program. The feasibility of using remote sensing imagery, including an assessment of current techniques, to produce a national map of fuels will be explored in pilot projects in several regions of the country. Within these areas, satellite imagery and aerial photography will be coupled with on-site fuels inventories to form nested samples. If this approach produces acceptable results, it will be expanded to other areas.

be developed for fire effects such as fuel consumption, fire severity and emissions. The new tools should be low cost and small scale, use remote sensing technology, be based upon on-the-ground comparisons and accuracy assessments, update fuel models and information on fuel condition, and model fuel consumption and related air quality factors.

Principal Purpose 2: Evaluation of Fuels Treatments

"To evaluate various treatment techniques for cost effectiveness, ecological consequences, and air quality impacts."

Background. In developing, prioritizing, and implementing treatments to reduce fire hazard, manage fire regimes, and improve forest and rangeland health and productivity, it is important to understand the potential ecosystem responses, economic and social consequences, and air and water quality impacts of various treatment options. Most treatments will include some combination of prescribed fire and/or mechanical treatment. Even when prescribed fire and mechanical treatments may have similar effects on fuel structure and fire hazard, their impacts on essential ecosystem processes and components may be quite different, and the implementation costs and social reaction will vary. Federal and State regulations require that agencies address the air quality impacts of prescribed fire treatments. Because of the magnitude of the fuels problem in many areas of the country, increased numbers of treatments are planned to reduce fire hazard over large areas. Multiple treatments on the same site will often be needed to mitigate the current fuel situation, and continuing maintenance treatments will be required.

Although prescribed fire and mechanical treatments have been used extensively, agencies lack sufficient comparative information on the ecological, social, economic, and air and water quality effects and on interactions among continued fire exclusion, wildland fire, and various fuels treatments to determine optimal approaches to managing forest and rangeland fuels. Replicated studies of the ecological consequences of prescribed fire and other silvicultural and fuels treatments have been conducted in only a few locations and vegetation types. Fuel treatment effects and interactions vary considerably among ecosystems. Few data are available on which to base comparisons among different treatments, ecosystems, and fire regimes.

In particular, economic data and analyses are extremely limited. Understanding and modelling economic impacts is particularly difficult, because they depend on both ecosystem and locality. Information also needs to be developed on the practicality and economics of commercial use of the biomass of small-diameter trees and tall shrubs cleared to reduce crown fire potential. Emissions and smoke modeling research has been conducted, but respective costs and benefits of prescribed fire and wildland fire have not been well analyzed. Methods have not been developed to assess the opportunities, costs, and effectiveness of employing smoke reduction techniques throughout the country. This research would also contribute to understanding the potential national and global impacts of changes in biomass use, prescribed fire, and wildland fire on wood supply, atmospheric chemistry, and carbon sequestration.

Target. Managers will have sufficient information on which to select the most ecologically appropriate, cost-effective, and socially acceptable fuels management techniques for each treatment site. They will have guidelines to determine the appropriate treatment, sequence, and priority, given site-specific conditions and socioeconomic factors. Managers will be able to evaluate the effects of different types and sequences of prescribed fire and mechanical treatments, and different intensities and severities of wildland fire on ecological and social values, as well as be able to assess the ecological consequences of continued lack of treatment.

Managers need assessments of fire and fuel treatment effects on ecosystem productivity and health, plant community structure and dynamics, plant species mortality and regeneration, fuel loading and distribution, hydrology and water quality, soil properties and below ground processes, wildlife habitat, fisheries, and air quality. By synthesizing existing knowledge and targeting new research at critical knowledge gaps, the program can develop the information and models necessary to determine the relative effects of treatments and wildland fire on resources and values such as timber, livestock forage, recreation, riparian areas, threatened and endangered species, spread of nonnative plants, non-traditional forest products, and archaeological, historic, and cultural sites. Managers require an understanding of short-term, long-term and cumulative effects, and their relationship to number, type, and sequencing of treatments. Linkages are needed between resource production and the current and proposed condition of forests, woodlands and rangelands. Managers must be able to engage local communities in dialogue to discover what fuel management treatments are socially acceptable.

Techniques for assessing economic effects can be improved particularly with respect to noncommodity values, including the economic valuation of ecological processes and functions, such as sources of clean water or the presence of nitrogen fixing plants and microorganisms. Methods are required for determining how various types and levels of treatment affect revenues from nontraditional forest products, recreation, and other sources. Benefits of fuels management treatments can be enhanced by cost-effective biomass utilization, including using biomass as an alternative fuel source for energy production, and using biomass in wood products.

Approach. Obtaining the necessary information in this area will require synthesis of existing knowledge, carefully designed experiments, and monitoring. The goal is to use both experiments and operational treatment applications to obtain data for modeling and predictive purposes. The Program will conduct replicated experiments in a variety of ecosystems in different climatic regimes to assess the impact of treatments on ecosystem processes; the cause and effect relationships among different types and sequences of prescribed fire applications and mechanical treatments; and different intensities and severities of wildland fire. Results will be compared with existing fire effects models, and new models will be developed as needed. Trade-offs among treatments can be assessed in terms of ecological and social values, including: ecological responses, reduction in potential fire intensity and severity, cost effectiveness, air quality, water quality, and mitigation of risks to human health, safety, and property.

To test and extrapolate experimental results across broader areas, methods will be devised for assessing operational treatments and incorporating data into models for predicting site-specific effects. It is also necessary to expand and develop new techniques for assessing economic efficiencies and the feasibility of developing markets for treatment byproducts, such as small-diameter lumber and biomass. Current models to assess regional scale cumulative effects on air quality and water quality will need to be expanded. The program will develop a nationally consistent system of models for fuel consumption, emission production, and smoke dispersal that can assess cumulative effects. The program will establish demonstration sites in various communities to study communication processes that facilitate the integration of polarized viewpoints to determine social acceptability of treatment practices.

Principal Purpose 3. Scheduling of Fuels Treatments

"Based on priorities and consistent with forest plan and land management plan direction, to develop long-range schedules that describe sequencing of treatments, as appropriate, such as commercial or pre-commercial thinning and prescribed fire."

Background. Strategies for addressing fuels management problems and ecosystem health issues vary greatly among management units. Priorities among watersheds or across unit boundaries have typically not been established, and past treatment levels have not required comprehensive scheduling efforts. Treatment implementation often has been haphazard and opportunistic with no clear long-term strategies. Treatment schedules must be developed with the overall ecological and social context and effects in mind, including legal constraints such as the Clean Air Act, Clean Water Act, and Endangered Species Act. Few ecological analyses provide the necessary context for administrative units to develop these priorities and schedules. Managers need information from which they can determine which treatments or sequences are most appropriate for different situations and sites.

Land managers may find it difficult to approve fuels projects because of the controversial nature of the treatments. Some mechanical treatments that focus on reduction of crown fire potential by reducing vegetation density or biomass, and long-duration prescribed fire projects covering several thousand acres may be especially controversial. These treatments may have the highest priority from an ecosystem health perspective but may be the least desirable socially. Managers may tend to avoid these situations because they are difficult and time-consuming to analyze and implement. To be successful, controversial treatments must integrate the goals of many resource disciplines.

Target. The program will develop methods for setting priorities and scheduling treatments based on economic, social, and environmental values to be protected from or enhanced by wildland fire. Methods will be developed for assessing the risk of wildland fires, and categorizing them in terms of values to be protected. Treatment prioritization methods will be developed which include effects of treatments on these values. The effect on both the physical and biological environment

of not treating fuels will be addressed in all treatment decisions. Science will help managers analyze and develop strategies for dealing with these potentially controversial situations in ways that incorporate and balance land use and resource management issues with social perspectives.

Approach. In the short term, the Joint Fire Science Program will review current (in use or under development) systems used by agencies for assessing priorities, and recommend an approach that will meet all agencies' needs. The program will compare and contrast the applicability of existing models and analytical systems for their capabilities to set priorities and schedule treatments, and make recommendations for further system development. Effective ecosystem treatments must be planned as a system of treatments over an appropriate length of time for the ecosystem and planning period.

The program will develop a system for analyzing the spatial and temporal effects of treatment priorities and schedules on wildland fire hazard, fuels accumulations, ecosystem condition, and air and water quality. Tools will be developed to analyze the effects of treatments on an ecological scale broader than the current administrative unit. These analysis tools will help managers identify the range of acceptable ecosystem changes that can be brought about by prescribed fire and mechanical treatments. Outputs from these analyses will be used in land management planning to identify the current and desired future condition, and to establish priorities and schedules for restoration or maintenance programs. Research will be conducted on communication processes at the community level to resolve controversial situations.

Principal Purpose 4. Monitoring and Evaluation

"To establish and implement a protocol for monitoring and evaluating fuels treatment techniques in a manner that measures performance over time and that allows conclusions to be drawn about the effectiveness and consequences of fuels management activities."

Background. Agencies have been collecting some fuels data and monitoring a limited number of fuels treatments. Most efforts have been conducted to address site specific objectives and have not been coordinated. Methods vary within and among agencies. This has resulted in a limited ability to determine the overall effectiveness and consequences of fuels management actions.

Target. The goal is to develop and implement a nationally applicable suite of methods for monitoring and evaluating wildland fuels treatments. Methods will be operationally feasible, scientifically based, applicable to all Federal agencies, and can be modified to meet changing information needs. Data can be used at various scales ranging from local decision making to national program evaluation. This requires a systematic approach that uses standardized data elements while allowing some flexibility in determining appropriate sampling procedures. This will allow a statistically based evaluation, integrated across agency boundaries, of treatment and program effectiveness over time. The protocols will identify required data elements, and provide compatible procedures for data collection, management, analysis, and sharing among agencies.

Program evaluation will be conducted at local, regional, and national levels, using the appropriate scales of data. The evaluation process will need to determine the degree of success in meeting ecological and social objectives and identify specific reasons for not meeting treatment objectives. Information gained during evaluation is used in an adaptive management process to improve all aspects of the program, including treatment objectives, techniques, priorities, sequences, schedules, and funding.

The monitoring and evaluation system will provide information to update the national fuels database (Purpose 1), will complement the monitoring methods required to validate and extrapolate research results about fuels treatment effects (Purpose 2), and will enhance our ability to set priorities and schedule treatments (Purpose 3).

Approach. The Joint Fire Science Program will develop a monitoring and evaluation system that identifies and defines data elements required to determine whether the fuels management program is meeting its goals and objectives. It will assess the cost and applicability of monitoring systems currently used by Federal agencies. Where feasible, the system will incorporate fire-related inventory and monitoring data collected for other purposes, such as timber or range production, or habitat characterization, and share fuels data with other standardized monitoring systems.

The monitoring protocols may be used to provide fine resolution data at the project level, and the ability to aggregate these data for coarse scale analysis. The techniques will provide accurate and cost-effective means of data collection and data entry, given the level of resolution required.

The program will develop analysis and evaluation procedures concurrent with development of the monitoring protocols. This program will also determine what analyses will be needed, what variables will be included, what analytical methods will be used, and the resolution of data on which analysis is based, in order to pool unit specific information for ecosystem, regional, or national purposes. The program will determine if existing systems and software are adequate, and develop new analytical methods where needed. The monitoring and analytical procedures and software will be tested at appropriate scales. Field users will be provided with adequate documentation for software use, and training modules may be developed when needed.

The Joint Fire Science Program will help agencies develop an implementation plan that addresses use of existing computer systems for data entry, analysis, evaluation, and interagency data sharing. The implementation plan will identify responsibilities for all aspects of data collection, entry, analysis, and storage; set schedules for monitoring and evaluation; estimate personnel and financial requirements for the monitoring program; and describe a method for incorporating procedures into agency policy and direction.

IMPLEMENTATION

Program Management

The primary program management goal is to produce results and products described in this Plan in a timely and efficient manner. A competitive process will be used to distribute funds to the groups best qualified to carry out the necessary research, development, and technology transfer activities.

The Department of the Interior and the Forest Service will appoint and charter a **Joint Fire Science Program Governing Board**, consisting of five representatives from Department of Interior agencies, including the U. S. Geological Survey, and five representatives from the USDA Forest Service. Interior Department representatives will be appointed by the Interior Fire Coordination Committee (in consultation with the Associate Director for Science in the U. S. Geological Survey) and with the approval of the Assistant Secretary - Policy, Management and Budget, and Forest Service representatives will be appointed jointly by the Deputy Chief for Research and the Deputy Chief for State and Private Forestry. Interior Department representatives will report to the Interior Fire Coordination Committee, and Forest Service representatives will report to the Director of Fire and Aviation Management, and the Director of Vegetation Management and Protection Research. These representatives will be from fire research, fire management, and resource management positions and will have national perspectives, experience, and responsibilities. At least six of the Governing Board will represent fire and resource management. Board members cannot conduct projects or compete for project funding under the Joint Fire Science Program. This group will be responsible for setting priorities, for program and budget oversight, and for making final determinations on funding. They will meet formally at least twice a year. The Board will have a rotating chair and determine its own operating procedures. The Governing Board may be expanded to include other agencies if funding partnerships can be developed in support of the program.

Terms of Governing Board members will be five years. Members cannot serve more than two consecutive terms. Appointing officials can change their representative at their discretion.

The Joint Fire Science Program Governing Board will recruit, appoint, and supervise a full-time **Joint Fire Science Program Manager**, along with necessary support staff (initially a contracting specialist and clerical postion), to manage the scoping, proposal solicitation, and funding processes; to maintain program and project performance records; and monitor performance and accomplishments of funded projects. The Program Manager will review progress on each project at least once annually, establish an oversight relationship with each principal investigator, and visit selected project sites each year. The Program Manager will report to the Governing Board, and the Governing Board will be responsible for the performance appraisal of the Program Manager. Except for the cost of the program office, funding is intended to be awarded through a competitive process.

The Joint Fire Science Program Governing Board will appoint a **Stakeholder Advisory Group** of technical experts that initially consists of Interior and Forest Service managers and researchers

and representatives of other Federal and State agencies. The Program Manager will be responsible for complying with the Federal Advisory Committee Act to expand this group to include external stakeholder groups such as regional fire and land management agencies and organizations, self governing tribes, private industry, university scientists, non-government organizations (NGO's), and representatives of the public. The Program Manager, with input from the Governing Board, will organize an annual meeting of the Stakeholder Advisory Group to formulate recommendations for program priorities, and establish other methods for assessing needs and setting priorities as necessary. This group will suggest appropriate topic areas, specific issues within those topic areas, and research and information transfer needs for proposals to the Governing Board. The Stakeholder Advisory Group will consider both immediate and long-term needs, using decision criteria established by the Governing Board, in formulating its recommendations and will reevaluate needs and recommendations annually. The Governing Board may identify program needs in addition to those identified by the Stakeholder Advisory Group and will make final decisions on project proposals and priorities. The first meeting of the Stakeholder Advisory Group will be scheduled as soon as possible after an interim Program Manager has been appointed and is expected to occur by mid-February, 1998.

The Joint Fire Science Program Governing Board will make all final decisions on annual funding priorities, and give direction to the Program Manager to complete proposal requests. These requests will be issued when needed, depending on available funds.

To ensure the obligation of funds by the end of fiscal year 1998, competition for project funding may be restricted to Federal agencies or groups with existing agreements with either the Forest Service or the Department of Interior. In future fiscal years, funding may be open to both Federal and non-Federal entities. The Governing Board will decide which, if any projects, will go through full open market contracting procedures and which will be handled by the government and its cooperators. Multi-year proposals may be considered for specific projects where appropriate, with clear annual reporting objectives to monitor progress. Criteria for funding will include: conformance to requested proposal guidelines; the qualifications and capability of the proposed project team to do the work; their past work performance; the likelihood that their proposed product will meet managers' needs; clear evidence of research/management partnerships in developing and implementing proposals; adequacy of experimental design; establishment of pilot projects or demonstration projects that have potential for broad implementation in the future; existence of matching funds from other sources; high level of integration across disciplines, including the social sciences, and with related programs; coordination with States and local communities; and clear evidence of mechanisms for rapid transfer and implementation of results.

It is expected that some of the requested proposals in the first year will be for information synthesis documents that can be used as a basis for future project identification and priority-setting. Funded projects are expected to range from experimental research to pilot projects for database development and implementation. The proposal review process will be managed by the Program Manager. The Program Manager will select a panel of peer reviewers from both research and management. Proposals will be evaluated by the peer review panel using

considerations listed in the previous paragraph. The Program Manager will present peer review recommendations to the Governing Board, which will then select proposals to be awarded funds.

In the initial year of the program, the Governing Board will be appointed and meet in January 1998. They will recruit and fill the position of Program Manager, develop an operating plan, set priorities, and request, select, and obligate funding for the program for up to $8,000,000 by the end of the fiscal year.

Financial Management

The Joint Fire Science Program will be supported in Fiscal Year 1998 by an interagency pool of funds consisting of $4 million each from the Forest Service and the Department of the Interior. Funding in future years will be based on needs and priorities identified by the Governing Board in consultation with the Stakeholder Advisory Group and will be included in the wildland fire management appropriations for the Department of the Interior and USDA Forest Service. The Forest Service and the Department of the Interior will provide equal shares of the annual program budget. The Governing Board will approve an annual budget for the Joint Fire Science Program. The budget will cover salaries, travel, and other support costs of the program manager, contracting specialist, and clerical position, plus other program needs as determined by the Governing Board. In addition to the budget for program management personnel, the agency hosting the program management staff may charge an appropriate administrative support fee not to exceed one percent of the total fire science budget in a given year. Salaries, travel and support costs for members of the Governing Board and Stakeholder Advisory Group will be borne by their respective agencies or organizations.

Initially, the annual fire science budget will remain with the Forest Service and the BLM, respectively. As projects are approved, the agency hosting the Joint Fire Science Program Manager will bill the other agencies under reimbursable agreements as necessary to satisfy contract and program support requirements. Within the Department of the Interior, fire science funds may be allotted from the BLM to other bureaus as needed to support bureau personnel carrying out projects approved through the competitive Joint Fire Science Program procedures.

Procedures for disbursement of funds will be the most efficient legal means for specific recipients, to minimize delays and overhead costs. A financial management system will be established for project tracking. Periodic project payments will be tied to the schedule of project deliverables, as specified by contracts and agreements. If projects are divided into phases, payments for later phases will not begin until adequate progress has been made in earlier phases, as certified by the Program Manager. The Program Manager will forward requests for major change orders (as defined by the Governing Board) to contracts or agreements to the Governing Board for decision. Annual project reporting requirements will be specified in each contract or agreement. Such requirements will be adequate to determine if a project is on time and meeting the objectives of the Statement of Work. Annual project reports will provide the detail necessary for the Program

Manager to recommend changes in the project budget for future fiscal years.

The Program Manager will prepare an annual report for all work performed under the Joint Fire Science Program. For each project, this report will display a breakdown of approved budget itemizations, expenditures, carryover obligations, and a section comparing accomplishments to the Statement of Work. The report also will contain similar financial information for the budget of the program management office. The report will summarize the intent of the board in approving the annual project plan, describing how these projects support the implementation of the fuels management and prescribed fire program. The annual report will be submitted to the Governing Board by the end of each calendar year. The Fire Science Program will be fully reviewed, and appropriate adjustments made, by the end of the year 2001.

Technology and Information Transfer

A significant focus of the program is to ensure that products intended for the field user are in a format that can be readily used in project planning, land and resource management planning, and project implementation. The Governing Board and Program Manager must take an active role in promoting the transfer of information and technological tools developed by the program. Proposal requests may require that final products include a means for the transfer and implementation of project results in fire management activities. Proposals may also be requested that deal exclusively with development of operational activities that integrate information developed by the Joint Fire Science Program. This could be accomplished through training courses, publications, workshops, CD-ROMS, software, internet, or other means. Information from the program can serve as a basis for public education programs about fuels, smoke management, related effects, and other social considerations and trade-offs.

While training is primarily the responsibility of other program areas, the Joint Fire Science Program may support educational programs for agency employees if necessary for effective implementation.

CONCLUSION

The Joint Fire Science Program established through this plan will provide information necessary for agencies to treat hazardous fuels successfully, reduce the threat of severe wildland fires, and restore or maintain the appropriate role of fire in ecosystems. It establishes program management structures and guidelines for funding allocations. These procedures will help to ensure that the program remains dedicated to its primary mission and directs funds for the maximum benefit of the fuels management effort. The Joint Fire Science Program is designed to be flexible and capable of responding to changing needs and priorities within fuels management. The focus will remain on providing consistent and credible information about the magnitude of the fuels problem, deciding how to set priorities and schedules for treatments, identifying the most effective treatment methods, and developing techniques for evaluating whether the fuels program is meeting its objectives.

The successful implementation of this Joint Fire Science Program will improve the overall effectiveness of Federal wildland fire management by providing scientific information and tools necessary to integrate fire into land and resource management plans and their implementation. This will improve agencies' ability to improve firefighter safety, control wildland fire suppression costs, protect the public, and sustain healthy ecosystems.

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