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FOREST TRUST

April 2004

snapshot

state of the national fire plan

April 2004
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Many organizations provided data including Las Humanas,
Ecosystem Workforce Project, Center for Watershed and Community Health,
Idaho Conservation League, Watershed Research and Training Center,
Sustainable Northwest, National Community Forestry Center,
American Forests, Pinchot Institute for Conservation,
The Nature Conservancy, Western Forestry Leadership Coalition,
Ecological Restoration Institute, Applegate Partnership,
National Association of State Foresters, USDA Forest Service, and
Department of the Interior.

The Ford Foundation provided support for this project.

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The Forest Trust is dedicated to protecting the integrity of the forest ecosystem and improving the lives of people in rural communities.

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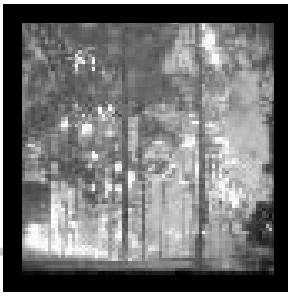

The National Fire Plan was created after wildfires burned 6.5 million acres across the U.S. in 2000, including the dramatic Cerro Grande Fire that threatened the Los Alamos National Laboratory. The President, federal lawmakers and agency leaders took action to protect the nation from catastrophic wildfire and to restore fire-adapted ecosystems so fires would burn less aggressively. The resulting National Fire Plan is a complex program that addresses all aspects of fire and includes activities carried out by the USDA Forest Service, Department of the Interior, and state, tribal and local governments. President Bush modified the National Fire Plan in 2002 by introducing the Healthy Forests Initiative, which provides new tools and authorities to carry out the Fire Plan.

The purpose of this report is to provide a snapshot of the effects of the program on communities and in the forest. The report assembles a variety of data to create a "photo album" of Fire Plan implementation. Consistent data to assess outcomes of the Plan across the West were nearly impossible to obtain, underscoring the need for a better system for documenting the effects of this important federal policy.

GOALS OF THE NATIONAL FIRE PLAN

The National Fire Plan is made up of five documents developed by different Administrations and state and federal entities (see Figure 1). The most concise statement of Fire Plan goals is presented in the 10-Year Comprehensive Strategy. We organized this report using these Comprehensive Strategy goals: (1) improve fire suppression efforts; (2) reduce hazardous fuels; (3) restore fire adapted ecosystems; and (4) promote community assistance. A fifth goal, accountability, appears in two other National Fire Plan documents and is included in this report.

The Forest Trust used the goals of the National Fire Plan to create six evaluation criteria that reflect the interests of forest-dependent communities. The criteria do not correspond one-to-one with the goals of the 10-Year Comprehensive Strategy. For example, progress toward the goal of fire suppression is not evaluated, while two criteria are used to assess community assistance. The criteria used to evaluate the programs are:

- Strategic allocation of funding to accomplish National Fire Plan goals
- Effective alteration of fuels to reduce the likelihood of catastrophic fire
- Restoration of natural fire regimes in fire-adapted ecosystem types
- Collaboration among all levels of government and with citizens
- Provision of local employment and training opportunities
- Protection of people and their property — including low-income communities — from fire

FUNDING

The distribution of National Fire Plan funding reflects policymakers' emphasis on certain program goals. We reviewed National Fire Plan appropriations and expenditures from 2000-2003 and appropriations from 2004.

- More than 70% of each annual Fire Plan appropriation is for fire suppression and preparedness.
- For two of the last three years, the fire season was so severe that suppression appropriations were insufficient. The USDA Forest Service and Department of Interior paid for firefighting expenses with funds that were appropriated to other programs. The "borrowed" funds included hazardous fuel reduction and community assistance appropriations. Funds for these programs were not fully restored by Congress.
- The funds appropriated for hazardous fuel reduction were not fully expended in any of the last three years. Agency personnel have cited insufficient funding and suspension of treatments during periods of high fire danger as reasons for the shortfall. In addition, funds were not available for treatments at the appropriate time of year because they were "borrowed" to pay for fire suppression.
- Funding for the National Fire Plan Economic Action Program declined steadily from 2001 to 2004, despite the recognized need to develop and market products that utilize small diameter wood.
- The least expensive fuel treatment, prescribed fire, has also been demonstrated as the most effective method.

COMMUNITY ASSISTANCE

Economic Opportunity

Results of a number of studies from around the West provide a snapshot of the effectiveness of National Fire Plan programs at providing local employment and training opportunities.

- Existing training programs contribute to the creation of new jobs and businesses in fuel reduction. However, many barriers still prevent small businesses from succeeding and providing living wage employment in forest-dependent communities.
- Many communities have lost their wood processing infrastructure and find it difficult to attract or create new facilities to manufacture value-added products from small diameter wood. The Fire Plan Economic Action Program supports research and development in marketing and utilization, and when it was funded (2001-2003), resulted in new jobs and manufacturing in forest-dependent communities.
- The National Fire Plan provides some economic benefits to rural communities by awarding a small percentage of fuel reduction jobs to local contractors and workers. Most of these employment benefits accrue to small businesses with heavy equipment, while contracts

that involve labor-intensive work are usually awarded to large contractors whose home bases are far from the treatment sites.

- The Plan created approximately 5,500 new fire suppression jobs in government agencies and resulted in new jobs for contract firefighters. A study from Oregon and Washington found that most of the people hired for the agency jobs are from nearby communities, while most of the contract fire suppression nationwide is accomplished through a handful of companies.

- The National Fire Plan contains special authorities that allow federal agencies to give preference to contractors who train and employ local workers. These authorities are helpful to rural communities but are not used consistently.

- Significant barriers to rural economic development through the National Fire Plan include insufficient public investment in processing infrastructure and a new government emphasis on efficiency through large contracts that excludes small community-based businesses.

Community Protection

A primary goal of all five National Fire Plan documents is to protect people and their property from wildfire. Federal accomplishment reports and independent studies are used to evaluate success at community protection. Community protection goals are accomplished with funds to state and rural fire assistance programs that allow local and volunteer fire departments to train firefighters and update their equipment.

- Grants to a select number of communities in 2001 allowed them to prepare fire protection plans. However, after the first year, National Fire Plan funds were not appropriated for community plans.

- Low-income households are more vulnerable than high-income households to the economic effects of wildfire, yet Fire Plan programs to assist homeowners do not target low-income communities. One national forest, however, tailored its technical assistance to low-income residents.

FIRE-RISK REDUCTION

Priority Setting

The National Fire Plan provided little direction to field managers about how to set priorities for fuel reduction treatments. Congress initially instructed the agencies to identify high-risk communities, but the process was poorly conceived and did not provide satisfactory results. The Western Governors' Association suggested an approach to collaborative priority setting through the 10-Year Comprehensive Strategy. At the same time, the agencies adopted a system based on fire regime condition class. Other significant findings of our review:

- The 10-Year Comprehensive Strategy Implementation Plan led to a new policy for a collaborative process to identify and set priorities for fuel treatment at the state and regional level. This policy is supported through an interagency memorandum of understanding committing to joint federal, state, local and tribal government planning of annual treatment plans beginning in 2004.

- Fire regime condition class is a science-based framework for assessing ecological health. Condition class was introduced in legislation in the 108th Congress as a tool to set national treatment priorities. The Healthy Forests Restoration Act of 2003 applies certain provisions of the law to lands in certain condition classes. The law also supports the collaborative priority setting process from the Comprehensive Strategy.

- The agencies recognized that coarse-resolution condition class data were insufficient to assist project planning. The new Forest Service Landfire Project will develop high-resolution condition class data for the West in 2006.

- Consistent identification of treatment priorities did not occur in the first two years of the National Fire Plan. However, new policies and tools are in place that may result in collaborative priority setting in 2004.

Collaboration

Several of the National Fire Plan documents called for collaboration between government and citizens to set priorities and carry out projects. The first examples of intergovernmental coordination date back to 1965 when the USDA Forest Service and Department of Interior started the National Interagency Fire Center and the Wildland Fire Coordinating Group. The National Fire Plan built on these earlier efforts to create new forums for collaboration between federal, state, local and tribal governments, including the Wildland Fire Leadership Council established in 2003.

- The National Fire Plan does not provide formal channels for communities to engage in policy-oriented collaboration at the national level. For example, the Wildland Fire Leadership Council includes the National Association of Counties but does not have any community level representation.

- Collaboration that includes communities in place-based implementation of fuel reduction and restoration treatments is becoming more commonplace and successful.

Fuel Treatment Outcomes

Comprehensive evaluation of progress to reduce the likelihood of catastrophic fire by altering fire behavior is not possible with existing data. Instead, we provide descriptions of changes in the fuel profiles of treatment areas in the Southwest and northern Rocky Mountains.

- Reports describing wildfire behavior and burn patterns indicate that strategically placed fuel breaks are effective at dropping crown fire to the ground and in particular, that wildfires slow when they burn into large areas where ground fuels have been cleared out by

prescribed fire. The reports also indicate that the behavior of wind-driven wildfire is rarely influenced by fuel treatments, and the severity of large wildfires is patchy.

- Most prescriptions for fuels reduction adjust tree space and canopy closure, and remove ladder fuels, yet do not address tree regeneration even though the re-growth creates new ladder fuels.

RESTORATION

Natural Fire Restoration

Federal policy recognized fire as an important ecological process for the first time in 1995 when the Federal Wildfire Management Policy was created. This historic new policy established protocols to allow natural fires to burn (called "wildland fire use") and to limit the century-old practice of fire suppression. Thus, we evaluate progress to implement the 1995 policy and to restore natural fire regimes with examples from Idaho and New Mexico.

- The area where natural fires are allowed to burn is still small compared to the acres where fire is suppressed.

- Most management units have been slow to adopt Fire Management Plans, a prerequisite for using natural fire to accomplish management goals, and many units write plans that lack the necessary substance for "wildland fire use."

- The federal agencies do not have a system to review Fire Management Plans and provide quality control.

- Prescribed burning and "wildland fire use" are the least expensive methods of reducing hazardous fuels. Wildfire use treatments are only used to restore large areas (10,000 acres or more) in a few management units.

Restoration Treatment Outcomes

Evaluation of the effect of restoration treatments on ecosystem condition and natural fire regimes also is not possible with existing data. Therefore, we describe changes in forest structures in restoration treatments in the Southwest and northern Rocky Mountains.

- Restoration goals for treatments usually result in prescriptions that diversify forest structure and modify crown fuels.

- Restoration treatments of stands with random spacing often retain the varied spatial arrangement if the prescriptions specify keeping large trees and creating new clumps and openings.

- Prescriptions that consider a variety of forest characteristics usually result in a diverse stand structure. In contrast, fuel reduction treatments that rely on basal area and trees per acre to describe the desired future condition usually result in a uniform structure.

ACCOUNTABILITY

Tracking the Extent and Location of Treatments

Roughly six million acres of forests were treated under the National Fire Plan in 2001-2003. The Healthy Forests Restoration Act recently cleared the way for treatment of an additional 20 million acres. State by state maps showing treatment locations as points are provided on the National Fire Plan web site, yet they do not provide sufficient information to assess the extent of treatments in America's forests or the proximity of projects to wildland urban interfaces, roadless areas, and old growth forests. As a result, some communities are tracking the location and extent of National Fire Plan projects on their own.

- Some proactive communities created their own maps, which revealed that fuel reduction projects are usually located in areas where significant housing development has occurred in the wildland urban interface.

- Treatments with mechanical thinning are almost always located near communities or in strategic locations to protect communities, while treatments using prescribed fire are commonly located in more remote forest areas.

- The National Fire Plan Operations Reporting System (NFPORS) is not accessible to communities and other partners who seek to learn about the extent of National Fire Plan treatments.

CONCLUSIONS

We provide the following conclusions based on the State of the National Fire Plan report and the preceding summaries:

- The National Fire Plan successfully focuses land managers' attention on the urgent problems created by a century of fire suppression and widespread home building in forested areas vulnerable to fire.

- Efforts to reduce forest fuels and fire risk are hindered by the difficulty of establishing an equitable collaborative priority setting process and by the diversion of funds appropriated for fuels reduction to fire suppression.

- Rural forest-dependent communities benefit from the National Fire Plan because of special authorities to encourage local employment. However, only modest employment gains have been documented and significant barriers to economic opportunities have been identified.

- Assessment of progress to meet the goals of the National Fire Plan is difficult and piecemeal because of the size and complexity of the programs and the lack of a consistent, integrated system for tracking accomplishments and maintenance needs.

introduction:

The National Fire Plan is a complex and comprehensive program that addresses all aspects of fire effects and activity carried out by the USDA Forest Service, Department of the Interior, and state, tribal and local governments. Many of these fire-related programs operated independently before the National Fire Plan. The broad scope and diversity of the activities makes it difficult to get a clear picture of what the Fire Plan does. The purpose of this report is to provide information that describes the National Fire Plan, summarizes its goals, reports on what has been accomplished, and evaluates the benefits of its programs.

DESCRIPTION OF THE NATIONAL FIRE PLAN

The National Fire Plan was born after the 2000 wildfire season burned 6.5 million acres, including the dramatic Cerro Grande Fire that threatened Los Alamos National Laboratory. The President, federal lawmakers and agency leaders sought to take action to protect the nation from catastrophic wildfire and to restore fire-adapted ecosystems so that fires would burn less aggressively.

President Clinton initiated the National Fire Plan in September 2000 with a report called *Managing the Impact of Wildfires on Communities and the Environment.* In October 2000, the Interior and Related Agencies Appropriations Act of 2001 provided emergency funding for the National Fire Plan. Several other documents were added in the following year. For example, the Departments of Interior and Agriculture prepared "Cohesive Strategy" documents to describe how they would address the wildfire threat. The Western Governors' Association also created a document, the "10-Year Comprehensive Strategy," with the input of their member states. The 10-Year Comprehensive Strategy, and its companion Implementation Plan, were adopted by the Secretaries of Interior and Agriculture.

Two years later, wildfires again threatened urban areas in Colorado, Arizona and Oregon. President Bush responded by launching the Healthy Forests Initiative. The initiative carries out many of the goals of the National Fire Plan, yet provides different strategies than envisioned by President Clinton and the Congress in 2000. The Healthy Forest Initiative strategies are being carried out with changes in the administrative rules governing the federal agencies and through the Healthy Forests Restoration Act of 2003.

GOALS OF THE NATIONAL FIRE PLAN

A number of similar and overlapping goals are contained in the documents that make up the National Fire Plan (see Figure 1). The most concise statement of goals is in the 10-Year Comprehensive Strategy: (1) improve fire suppression efforts; (2) reduce hazardous fuels; (3) restore

fire adapted ecosystems; and (4) promote community assistance. These goals are used to organize this report. However, this report does not evaluate progress to achieve the fire suppression goal, and it includes a fifth goal, accountability, that appears in two of the National Fire Plan documents.

Figure 1. **National Fire Plan Documents and Goals**

DOCUMENTS / GOALS	Clinton Administration September 2000 Report	2001 Interior Appropriations Bill	USDA Forest Service: Cohesive Strategy	WGA 10 Year Comprehensive Strategy	Bush Administration, Healthy Forest Initiative
FIRE SUPPRESSION	✓	✓	✓	✓	✓
RESTORATION	✓		✓	✓	✓
REDUCE FIRE RISK	✓	✓	✓	✓	✓
SET TREATMENT PRIORITIES	✓	✓	✓	✓	
LOCAL ECONOMIC DEVELOPMENT	✓	✓		✓	✓
ENVIRONMENTAL LAWS	✓	✓		✓	✓
COLLABORATION	✓	✓		✓	
ACCOUNTABILITY	✓	✓		✓	

DIVERSITY OF FIRE PLAN PROGRAMS

The National Fire Plan contains many diverse programs under its umbrella. For example, it includes fire suppression and preparedness programs, with activities such as procuring slurry-bomber planes for the fire season, training new agency firefighters, and purchasing firefighting equipment and supplies. The plan includes community assistance with activities like training for rural and volunteer fire departments and the Firewise program that teaches homeowners to lower the risk of home ignition. Hazardous fuel reduction is also included, with activities such as thinning and prescribed fire. Other programs within the purview of the National Fire Plan include interagency management of fires that cross jurisdictional boundaries, grants to develop value-added products that use wood by-products of hazardous fuels reduction, and planning to protect wildland urban interface communities.

With so many different fire-related programs, it is difficult to assess what the National Fire Plan actually does, or whether it has been effective at meeting its goals. One of the primary challenges in understanding the effects of the National Fire Plan is choosing which programs to evaluate. No single, comprehensive list of the programs and activities carried out by the National Fire Plan — with information about specific projects, partners, and outcomes — is available. A second challenge is

accessing data about the National Fire Plan. The National Fire Plan Operations Reporting System (NFPORS) is used by the federal agencies to collect information about plan expenditures and accomplishments. However, this system collects limited data and is not useful for program evaluation. Thus, the Forest Trust compiled this report from data obtained from many different sources.

APPROACH AND ORGANIZATION OF THIS REPORT

The purpose of this report is to provide a "snapshot" of the effects of the National Fire Plan on communities and forests. The report assembles a variety of data to create a "photo album" of Fire Plan implementation. Most of the snapshots are from the southwestern United States — New Mexico primarily and Arizona, Utah and Colorado. Information is also included from two Northern Rocky Mountain states, Montana and Idaho, and from the Pacific Coast — California, Oregon and Washington.

Evaluation Criteria

The Forest Trust used the goals of the National Fire Plan to create six evaluation criteria that reflect the interests of forest-dependent communities. The criteria do not correspond one-to-one with the goals of the 10-Year Comprehensive Strategy. For example, progress toward the goal of fire suppression is not evaluated, while two criteria are used to assess community assistance. The criteria used to evaluate the programs are:

- Strategic allocation of funding to accomplish National Fire Plan goals
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- Collaboration among all levels of government and with citizens
- Provision of local employment and training opportunities
- Protection of people and their property, including rural low-income communities, from fire

Methods

The Forest Trust developed this report by reviewing published studies, government documents and other reports; interviewing people who were involved in National Fire Plan implementation; and conducting our own studies about various aspects of the Fire Plan. A complete description of methods is provided in Appendices.

Organization

This report consists of five chapters on different aspects of fire plan implementation. The chapters correspond roughly to the goals of the 10-Year Comprehensive Strategy.

Funding. This chapter provides a review of National Fire Plan appropriations and expenditures from 2000-2003 and appropriations from 2004.

Community Assistance. This chapter considers the impact of the National Fire Plan on communities. The first section addresses economic opportunities provided by the Fire Plan. The second section looks at community protection from wildfire, with a focus on low-income rural communities.

Fire Risk Reduction. This chapter examines programs in the Fire Plan to reduce fire risk. The chapter includes three sections that describe collaboration to reduce fire risk, setting priorities for risk reduction, and outcomes of fuel reduction treatments.

Restoration. This chapter focuses on programs in the Fire Plan to restore forests and natural fire regimes. The first section addresses policies and programs to restore natural fire, and the second section describes the outcomes of forest restoration treatments.

Accountability. This chapter provides a summary of government accountability for the accomplishments of the National Fire Plan and non-governmental systems to track Fire Plan implementation.

funding the national fire plan

The distribution of National Fire Plan funding reflects policymakers' emphasis on certain program goals. Appropriations are an indicator of Congressional interest in the National Fire Plan, while actual expenditures indicate the agencies' ability to carry out Fire Plan programs. In this chapter, we use federal budgets and fiscal year reports to address three basic questions about the National Fire Plan: how much was appropriated, how much was spent, and what was it spent on.

APPROPRIATIONS

Federal appropriations provide information about the programs that agencies are authorized to spend funds to accomplish. The amount of the appropriation is a rough indicator of priority: higher priority programs receive more funding. Several programs included in the National Fire Plan appropriations were previously funded through regular appropriations, such as the Economic Action Program. New programs were also added, such as the Community and Private Land Fire Assistance fund. The National Fire Plan appropriation is in five categories, each with several major programs:

Firefighting: preparedness, suppression, emergency transfers, fire facilities backlog
Hazardous Fuel Reduction: prescribed burning, mechanical thinning and wildland fire use
Community Assistance: state fire assistance, economic action program, rural fire assistance, volunteer fire assistance, community and private land assistance
Rehabilitation: emergency stabilization, rehabilitation and restoration
Other: Joint Fire Science Program, forest health management, research and development

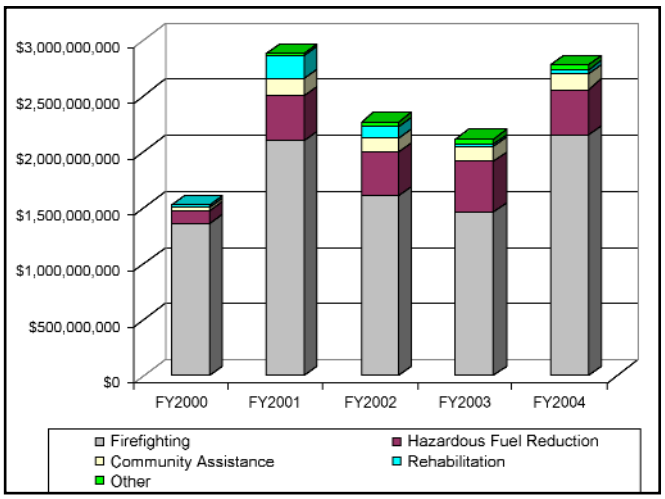
Key Points

- The first year of National Fire Plan funding was FY 2001. Appropriations for hazardous fuel reduction were significantly more than in FY 2000 (see Figure 1).

- The average amount appropriated for hazardous fuel reduction is 17% of the total Fire Plan budget. The proportion of funds for hazardous fuel reduction has been relatively constant over the four years of the Fire Plan (FY 2001-2004).

- The majority of funding for the National Fire Plan (70%) is appropriated to fire suppression activities and preparedness measures. These appropriations cover the purchase of new firefighting equipment, including helicopters and engines, as well as salaries and training for approximately 5,500 new firefighters.

Figure 1. **FY 2000 - FY 2004 Total Wildland Fire Management Appropriations**



Shows the amount of the appropriations for each funding category in 2000-2004. The fire-fighting category includes preparedness and supplemental appropriations for suppression. The chart shows the year before the National Fire Plan (2000) and the first four years of implementation (2001-2004).

Sources: Data for 2000-2002 from the FY2002 Performance Report: National Fire Plan and data for 2003-2004 from the Department of Interior, Office of National Fire Plan Coordination.

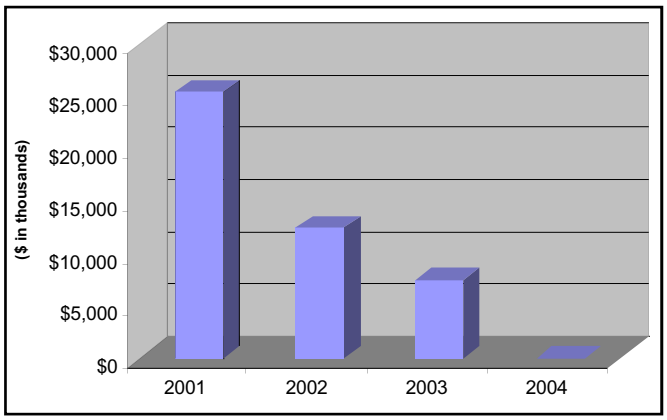
- Community assistance programs were funded at different levels in each year of appropriations. The FY 2000 appropriation was $27 million, which grew to $148 million in 2001 and was reduced to $117 million in 2002. As a proportion of total Fire Plan funding, appropriations for community assistance did not exceeded 5% of the total in any year.

- The National Fire Plan Economic Action Program (EAP) is one of several programs funded under Community Assistance. EAP is the only source of Fire Plan funding for product and market development to use small diameter wood. Appropriations for EAP through the Fire Plan declined steadily from 2001 to 2004 (see Figure 2).

- The Forest Service receives larger appropriations through the National Fire Plan than the Department of the Interior (see Figure 3).

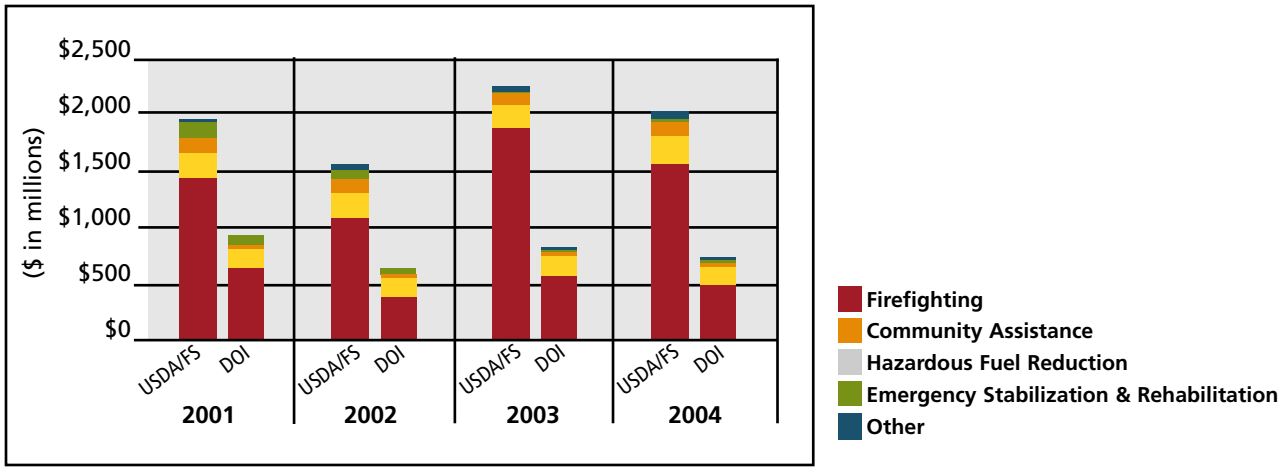
- National Fire Plan appropriations represent 33% of the total Forest Service budget, while the Fire Plan is only 5% of the Department of the Interior budget.

Figure 2. **Appropriations for the National Fire Plan Economic Action Program**



Source: USDA Forest Service

Figure 3. **Comparison of USDA Forest Service and Department of the Interior National Fire Plan Appropriations FY 2001-2004**



Sources: Data for 2000-2002 from the FY2002 Performance Report: National Fire Plan and data for 2003-2004 from the Department of Interior, Office of National Fire Plan Coordination.

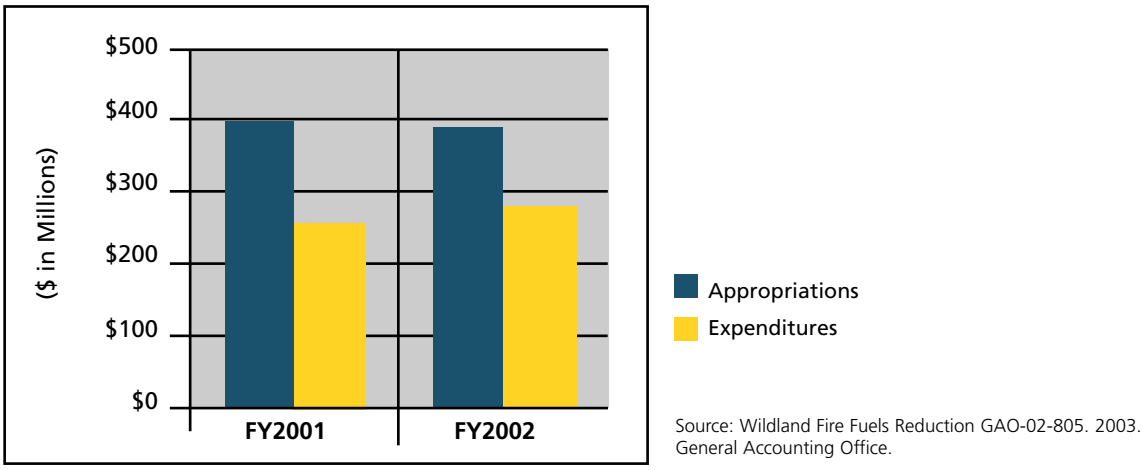
EXPENDITURES

National Fire Plan expenditures do not consistently equal the appropriations. The severe wildfire seasons in 2000, 2002 and 2003 put fire suppression expenditures far above the appropriated amount. The agencies were forced to "borrow" funds that were appropriated for other activities – such as hazardous fuel reduction and community assistance – to cover the suppression costs. The "borrowed" funds were restored in subsequent Congressional appropriations, but the full amount of borrowed money was not replaced.

Key Points

- Expenditures for fire suppression and hazardous fuel reduction follow opposite trends. That is, fire suppression expenditures consistently exceed the appropriated amount, while fuel reduction expenditures are consistently less than the appropriated amount (see Figure 4).

Figure 4: **Hazardous Fuel Reduction Program Appropriations vs. Expenditures**



Source: Wildland Fire Fuels Reduction GAO-02-805. 2003. General Accounting Office.

- Three factors make it difficult for the agencies to spend the full hazardous reduction appropriations. First, drought conditions and high fire danger force some land management units to suspend mechanical and prescribed fire treatments. Second, as the fire season intensifies, agencies curtail their non-essential expenditures and "borrow" fuel treatment funds to pay for fire suppression. Even when fuel treatment funds are restored, managers still cannot accomplish treatments in a timely manner because the funds are pulled during the field season and returned in the winter.

- Data about National Fire Plan expenditures is surprisingly difficult to compile. The two primary sources, agency annual reports to Congress and Government Accounting Office reports, display different numbers. The difference could be because the agencies show obligated funds and the GAO shows expended funds. Figure 5 illustrates that nearly the full amount of appropriated funds is obligated each year, while a smaller amount is actually spent.

Figure 5: **FY 2002 Hazardous Fuel Reduction Appropriations, Costs, and Obligations**

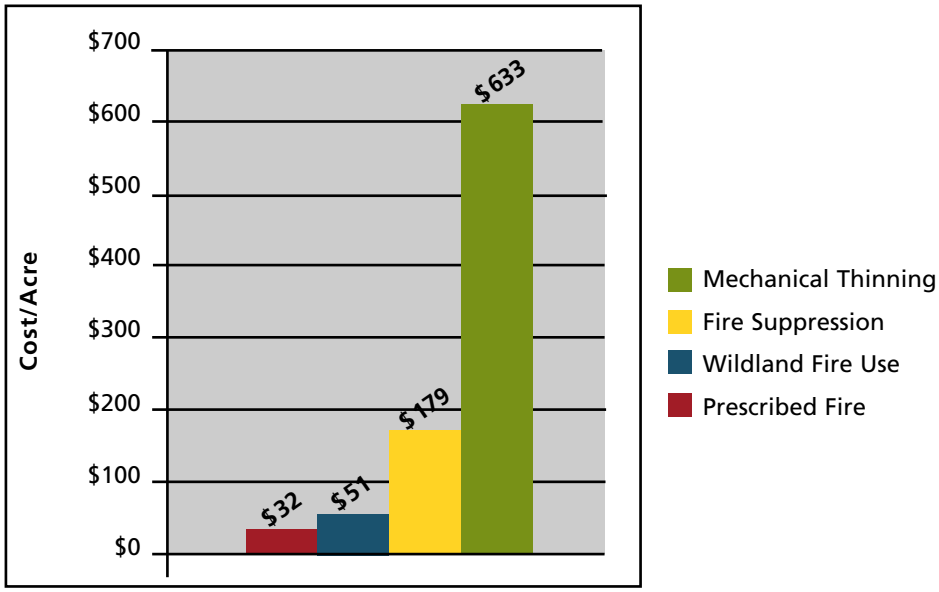
	Planned Acres	Treated Acres	Appropriated Funds	Total Costs (GAO)	Obligations (NFP Performance)
USDA/FS	2,101,234	1,198,518	$209,010,000	$127,379,000	$188,623,000
DOI	1,899,815	1,058,964	$186,190,000	$159,380,000	$178,252,000
Totals	4,001,049	2,257,482	$395,200,000	$286,759,000	$366,875,000

Sources: Wildland Fire Fuels Reduction GAO-02-805 and FY 2002 Performance Report: National Fire Plan.

PER-ACRE COSTS

Four activities are carried out through the National Fire Plan: (1) fire suppression to extinguish natural and human-ignited fires; (2) "wildland fire use" allowing certain natural fires to proceed in order to accomplish management objectives under preestablished conditions and in predetermined geographic areas; (3) prescribed fire which is intentionally ignited to accomplish management objectives; and (4) mechanical treatment to remove fuels including trees, shrubs and woody debris. The cost of these activities is difficult to estimate. For example, mechanical treatment is a relatively new practice and a wide range of costs have been estimated — from $200 per acre in President Bush's 2005 budget up to $1,500 per acre in a recent report by the Ecological Restoration Institute. In contrast, costs for fire suppression are well documented and have been recorded for more than a decade. Figure 6 uses several data sources to provide comparative costs of the four National Fire Plan activities.

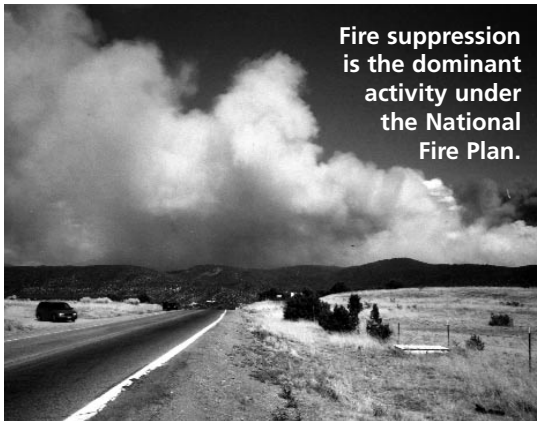
Figure 6: **Comparative Per Acre Costs for Fire Suppression and Hazardous Fuel Treatments**



Sources: National Interagency Fire Center 2003; GAO 2003; Oppenheimer 2003; and Snider *et al.* 2003.

Key Points

- Comparative data show that the cost per acre of treating fuels with wildland fire use or prescribed fire is significantly lower than either fire suppression or mechanical treatment.
- A short-term investment in fuel treatments such as wildland fire use and prescribed fire, with investment in mechanical thinning to prepare some sites for fire, will reduce the long-term cost of fire suppression.
- Mechanical fuel reduction is the most expensive form of fuel treatment, yet in some locations near homes and communities, it is the only viable treatment alternative.


Fire suppression is the dominant activity under the National Fire Plan.

SUMMARY

- The appropriations, expenditures and costs incurred under the National Fire Plan illustrate many of the key implementation issues.

- The allocation of more than 70% of each annual National Fire Plan appropriation to fire suppression reveals that wildfire protection is still policymakers' dominant concern and the agencies' primary activity.

- The appropriations in 2002 and 2003 for fire suppression were not sufficient to cover firefighting costs. The agencies had to pay for fire suppression using funds that were appropriated to other programs. Funds were "borrowed" from many sources, including hazardous fuel reduction and community assistance programs. Congress restored some of the borrowed funds, but not the full amount.

- The funds appropriated for hazardous fuel reduction were not fully expended in any of the last three years.

- Funding for the National Fire Plan Economic Action Program declined steadily from 2001 to 2004, despite the recognized need to develop and market products that utilize small diameter wood.

economic opportunities:

The US Congress emphasized the creation of local employment opportunities and rural business growth through the National Fire Plan in the 2001 Interior Appropriations Bill and subsequent appropriations in 2002-2004. Specifically, the 2001 Interior Appropriations Bill specified that the Secretaries of Interior and Agriculture "give preference to local workers and youth groups" and that "as much of this work as possible will be completed with the use of local contractors" (P.L. 106-291). The 10-Year Comprehensive Strategy also emphasizes the idea of engaging local contractors and workers to carry out the National Fire Plan.

In this chapter we look at the programs of the National Fire Plan that provide economic opportunities in forest-dependent communities. The effects of the special National Fire Plan authorities are difficult to assess because the agencies did not conduct monitoring to quantify employment gains through the National Fire Plan. However, several studies by the University of Oregon's Ecosystem Workforce Program assess progress toward the local employment goal in the Pacific Northwest. Some of these studies were partially funded by the Forest Service, but since they were not conducted elsewhere, the information is only available for one region. A variety of these data are included.

The discussion of economic opportunities and employment effects is presented in several sections as follows: contract work to reduce fuels; agency firefighting; local and contracted firefighting; and subsistence employment.

Contract Work to Reduce Fuels

Two studies by the University of Oregon's Ecosystem Workforce Program, entitled *The Business and Employment Effects of the National Fire Plan in Oregon and Washington in 2001* and *Long Term Trends in Contracting and the Impact of the National Fire Plan in Northern California*, assess progress toward the local employment goal through service contracts to perform fuels reduction. The study results are summarized below.

Key Points

- Contractors who received National Fire Plan funds from the Forest Service in Oregon and Washington in fiscal year 2001 were based in locations closer to the work site than contractors performing similar work funded by other programs. Contractors in Northern California in fiscal years 2000-2002 were also located closer to their work sites. However, since the contractors were still 50-60 miles away from home, workers from the communities closest to the project sites were not employed.
- Contractors from rural communities with 5,000 or fewer residents in Oregon, Washington, and northern California still captured only a small percentage of the total federal procurement dollars awarded by the agencies.

- Contracts requiring heavy equipment were generally awarded to businesses closer to the work site than contracts requiring labor-intensive work such as hand thinning and brush piling. The study of northern California found that nearby contractors were more likely to be awarded contracts that required knowledge of the area, such as biological surveys, along with equipment-intensive contracts.

Use of Special Contracting Authorities

One of the authorities specified by Congress in the 2001 Interior Appropriations Bill was that "best value" contracting, as defined in the Federal Acquisition Regulations (FAR), could be used to award fuel reduction contracts. The best value form of contracting allows the government to take into account factors other than the lowest price. For example, contracts awarded as best value consider factors such as past performance, experience, and method along with price. While best value contracting is authorized in the FAR, the 2001 Interior Appropriations Bill added that local workers could be given preference. To do this, some contracting officers include an evaluation factor in their solicitations that asks bidders to explain how they will provide training and employment opportunities for the local workforce. Contracting officers need to be sure of the origin of project funds if they use local preference evaluation. On many management units, information about the source of funds is difficult to obtain. Learning the source of project funding may become easier in fiscal year 2005 when the Forest Service switches to a new database system for organizing information (Schmidt 2003).

Forest Service Regions 5 and 6 were the first to use the new evaluation factors. These regions issued guidance to their contracting officers that explained the authority to make "enhancement of local business into an evaluation criterion" shortly after the National Fire Plan was authorized. The guidance in these regions also states, "when linked to best value, the agency has the opportunity to pay a higher price in order to do business locally." The implementation of this authority in Regions 5 and 6 was most likely tied to their prior experience with the Northwest Forest Plan and the *Jobs in the Woods* program in the 1990s (Jungwirth 2004). This program allowed the Forest Service to start contracting with businesses that would retrain and employ displaced timber workers. Contracting officers from the Northwest had experience with the *Jobs in the Woods* program, and therefore were probably more receptive to the National Fire Plan authorities giving preference to contractors who would train and employ local workers.

The National Fire Plan provisions for accomplishing fuel treatments with local workforces were not well received in the Forest Service's Southwest Region 3, an area with no previous experience using special authorities for local contractors. The perception of one contracting officer in the Southwest Region was that the local preference authorized in the National Fire Plan "would create unfair competition in favor of local businesses" (McCarthy 2003). Another reason cited for not allowing local preference was that the authority only applied to projects funded through the National Fire Plan, requiring the contracting officer to be sure of the source of funds before giving local preference.

<u>Key Points</u>

- Field units of the federal agencies unevenly applied the use of the best value contracting to determine whether contractors provided local employment opportunities. For example, Regions 5 and 6 issued direction to use the local preference technical evaluation factors in November 2000, while the authority was not used in Region 3 until June 2003.

- The Congressional direction to give preference to local contractors who train and employ local workers was limited in two ways: (1) the authority could only be used for projects funded by the National Fire Plan; and (2) in FY 2001 and 2002 the authority only applied to fuels reduction contracts, while in 2003 and 2004 the authority was applied to a broad array of forest and watershed activities.

Liability for Contract Work

Liability is a significant barrier for contractors who prescribed burn. Specific concerns include identifying those who are qualified to light a prescribed fire and those who would be liable if a prescribed fire escapes (Society for Ecological Restoration 2003).

The risks associated with fuel treatments, both thinning and prescribed burning, also create huge costs for contractors in the form of workers compensation insurance. In New Mexico, for example, contractors pay up to 69 percent of wages in workers compensation insurance.

Key Points

- It is nearly impossible for private contractors to obtain prescribed burn liability insurance. A USDA Risk Management Agency study is currently researching and developing an insurance product to cover prescribed fire use. A new insurance product for prescribed burning may be on the market sometime in 2004 (Society for Ecological Restoration 2003).

- Start-up contractors often find it difficult to pay workers compensation insurance and wages before they have significant income from contracts. Fuel reduction activities are classified as logging for workers compensation insurance purposes, and in New Mexico, the small pool of workers means that rates can be as high as $69 for every $100 of wages (Winters 2004).

Firefighting Employment in the Federal Land Management Agencies

The National Fire Plan includes funds to expand agency firefighting capacity, defined as workers hired directly by the government. Approximately 5,500 new firefighters were hired by the Forest Service and Department of Interior through the Fire Plan (USDA *et al.* 2002). The Ecosystem Workforce Program at the University of Oregon examined the local employment effects of the agency hires (Moseley *et al.* 2003) and provides the following conclusions:

Key Points

- The Forest Service hired many local residents in Oregon and Washington to carry out fire suppression functions of the National Fire Plan in 2001-2002. Between one half and two thirds of Forest Service hires for Fire Plan funded work did not relocate for their positions.

- Most people hired for new firefighting positions were local residents. However, as with contract firefighting, agency jobs were usually temporary, seasonal appointments that do not provide year-round income.

Local Water Tenders Used for Fire Suppression

A case study from Lake County, Oregon illustrates the challenges facing local equipment operators who want to work in fire suppression. Some of the equipment used, such as water tenders and bulldozers, is expensive to transport. Bill Duke, a retired Forest Service Fire Management Officer now working for the Lake County Resources Initiative, observed in 2001 that several people in the community owned water tenders that could be used in fire suppression. He worked with the owners to bring their equipment into compliance with federal standards. Duke also helped them to negotiate the 100-plus-page Forest Service contracts and provided training. Four local contracts were awarded the first year and the number doubled in the second year. Freemont National Forest contracting officer, Bob Gibbs, also played a role by working closely with the local water tender owners to make sure they understood the expectations of the contract.

Duke and Gibbs identified a number of institutional and societal barriers that prevent local contractors from engaging in fire suppression activities. The standards, certifications, and insurance required to participate in fire suppression are complex. Inexperienced local operators often need technical assistance, which in this case Duke was able to provide. Meeting the standards requires an up-front investment and in the event of a slow fire season, local contractors may find themselves saddled with large debts that cannot be repaid. The agencies revise their requirements annually and sometimes the changes can force the contractors to purchase new and expensive equipment, such as a specific type of radio, to be in compliance. Furthermore, fire suppression equipment must be inspected before it can be used, which means transporting the equipment to and from a regional agency office, and returning for a reinspection if a repair is needed. One of Duke's innovations was to set up local inspection sites. However, the inspection function is soon to be outsourced, so water tenders will again be required to transport their equipment large distances.

Firefighting Employment for Local and Contract Workers

Resources to hire local and contract firefighters were also increased through the National Fire Plan. Local personnel bring knowledge of the terrain and local fire behavior that can aid fire suppression efforts. An experienced firefighter from northern California wrote, "How do you show the advantage of knowing which ridge to send a bulldozer up the night of the Hyampom Fire? I knew in the dark where the ridge was, what the fuel type was, how wide the line needed to be for the burning conditions, and how to get there....Knowing the people and the county is a great asset. Time is also a factor. Having quick response local folks keeps fires small" (Stetson 2003).

The employment of local and contracted firefighters is governed by procedures established through the National Wildfire Coordinating Group, whose standards are needed to ensure orderly deployment of resources and ensure firefighter safety. Many local contractors and fire departments are frustrated by the deployment of outside resources to fight fires in their communities while they sit on the sidelines (see sidebar). In some cases, significant costs are incurred by the transportation of firefighting resources and consequent delays in the early stages of suppression (NASF *et al.* 2003).

Nationally, the majority of contract firefighting occurs with non-local workers. Nearly all (94%) of the national firefighting contracting crews are based in Oregon. As of 2003, there were 263 contract crews operating in the Pacific Northwest (Pulaski 2003). Significant performance problems were reported about contract crews, including insufficient training, language barriers with firefighting overhead, and falsified records of training, past experience and time sheets.

Local firefighters can also be federal agency employees. The National Academy of Public Administration (NAPA) report entitled *Wildfire Suppression: Strategies for Containing Costs* identifies the use of local agency firefighting resources as a possible cost savings (Fairbanks 2002).

Key Points

- The use of local resources in fire suppression activities may reduce fire suppression costs by eliminating transportation expenses and reducing wildfire response time. However, current National Wildfire Coordinating Group policies used to incorporate local personnel still result in community resources sitting on the sidelines.

- Standards for personnel and equipment are essential for effective suppression and for safety in what is inherently dangerous work. However, different regions and agencies do not use the same systems to train their local fire personnel and equipment operators. As a result, compliance with National Wildfire Coordinating Group standards is not always immediately apparent.

- The capabilities of local fire personnel and equipment operators vary by location and fire management plans and mutual aid agreements are not fully utilized to clarify the roles of local personnel prior to actual fire incidents.

Subsistence Employment

Subsistence economies still exist in many small rural communities, where access to firewood for home heating and intermittent work that leaves time for other pursuits is culturally important. In Northern New Mexico, for example, many local workers do not want to take on a business or large-scale project, yet they are eager to use the wood that is provided as a byproduct of fuel reduction and restoration treatments.

National Fire Plan authorities were used by the Camino Real District on the Carson National Forest to accommodate the needs of a community where the workforce did not have the capacity or desire to enter into service contracts for thinning work (Derr and Schumann, 2001). Instead, the Camino Real District experimented with a tool they called "stewardship blocks" to treat 200 acres of ponderosa pine forest north of Truchas, New Mexico. District Forester Henry Lopez designed the stewardship block program to promote sustainable, small-scale thinning. First, local woodcutters signed a written agreement with the Forest Service to cut only in their assigned blocks, and the Forest Service marked trees that were not to be harvested. Then the woodcutters thinned, leaving the marked trees and removing firewood-sized logs. The woodcutters paid for fuelwood permits when they removed wood. The blocks ranged from one to four acres in size, depending on the worker's experience and ability. The woodcutters began thinning at one edge of their block and moved towards the other side, a policy that insured against the selective removal of larger trees in the block and allowed the Forest Service to monitor the quality of the thinning as it progressed.

Key Points

- Stewardship block agreements fill a niche for local workers who want projects that are smaller in scope than precommercial thinning and offer more opportunities than can be obtained with a fuelwood permit.

- The stewardship block concept builds two incentives for quality work – community accountability and access to an ample supply of firewood. The woodcutters are not assigned additional blocks if the work is not performed well, but most take great pride in their plots.

Workforce Training

Forest Service National Fire Plan Coordinator Lyle Laverty testified in 2001 to the U.S. Senate that an adequate skilled workforce was one of three immediate needs for achieving fire risk reduction goals (Laverty 2001). Several programs emerged to fill this need, focusing on training workers to conduct prescribed burns and mechanical thinning. A few examples of workforce training programs and of associated problems with developing and retaining well-trained employees are provided below.

Training in Fire Management. The Southwest Fire Use Training Academy (FUTA) and the Wildland Fire Science Program at the Northern New Mexico Community College provide training that leads graduates to employment in prescribed fire, fire use, and fire fighting (Derr 2002). The interagency Southwestern FUTA program was started to complement the offerings of other FUTAs in the country, while providing specific training to address the complex fuels and topography found in the Southwest. The Wildland Fire Science program offered at El Rito campus of Northern New Mexico Community College is an example of an entry-level curriculum that offers firefighting training and an optional two-year associate's degree in wildfire science. Started by employees of the Forest Service's Southwest Region, the program provides degree and non-degree options, offers certificates for each class completed, teaches courses that meet the National Wildfire Coordinating Group's standards for trained fire fighters, and guarantees summer employment with the Forest Service and Bureau of Land Management for students who complete the program.

Youth Training. The National Fire Plan gives special authority that allows the Forest Service and Department of the Interior to award contracts, grants, or cooperating agreements for fuel reduction to Youth Conservation Corps (YCC), local nonprofits, or partnerships with State, local, nonprofit, or small disadvantaged businesses. The inclusion of the YCC provided a vehicle for training youth to be a skilled workforce for the community protection activities of the National Fire Plan, such as defensible space creation, and fuel treatment. Three examples of youth programs are the Rocky Mountain Youth Corps in Taos, NM, Southwest Youth Corp in Durango, CO, and Forest Trust Youth Corps operating throughout New Mexico (Derr 2002). All three of these local groups helped the Forest Service meet the challenge of developing a well-trained local workforce.

Key Points

- Training courses such as community college wildland fire science programs help to develop a local workforce with sufficient training and entrepreneurial skill to carry out aspects of the National Fire Plan.

- Youth Conservation Corps programs with a skill-oriented training component help to develop the local workforce.

Value-Added Industry

Fuel reduction treatments create new supplies of small diameter wood that are not well-utilized for commercial purposes. One Fire Plan goal, emphasized in the Healthy Forests Initiative, is to manufacture

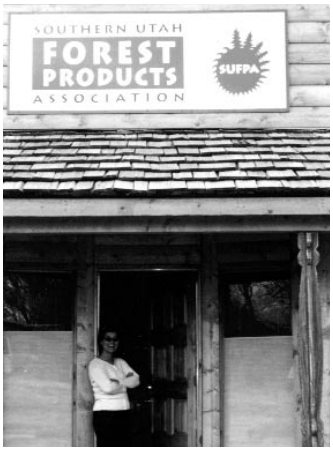
value-added goods and generate energy from the by-products of fuel reduction and restoration treatments. However, the infrastructure to create products from small diameter trees generally does not exist or is economically infeasible (Moote and Becker 2003).

Investment in infrastructure is necessary to stimulate value-added manufacturing and energy generation from the byproducts of fuel reduction and restoration treatments. The National Fire Plan Economic Action Program provided some investments funds, but appropriations for this program declined from 2001-2003 and were not appropriated in 2004 (see Figure 3 on page 17).

The development of value-added industries is different in every region of the country and is related, in part, to the status of existing commercial forestry infrastructure. For example, the Southwest once had a strong forest industry with primary manufacturing located in small- and mid-sized communities in Arizona, New Mexico, southern Utah, and Colorado. These mills began to decline in the 1990s. The last commercial sawmill in New Mexico closed in 2003, leaving only two sawmills owned by the Mescalero Apache Tribe. Small businesses using wood began filling the void left by the commercial mill closures, finding it easier and cheaper to buy wood with less competition. A study of Forest Service timber sale purchasers in northern New Mexico found that small businesses bought an increasing share of stumpage through the 1990s as large businesses closed (Gunderson 2001).

Following is a selection of short profiles about little-known small producers from the Southwest that utilized small diameter wood from fuel reduction and restoration projects. Some of these businesses were recipients of National Fire Plan Economic Action Program (EAP) grants, and the others would be good candidates if EAP funding is reinstated.

Torrey Home and Garden, Utah



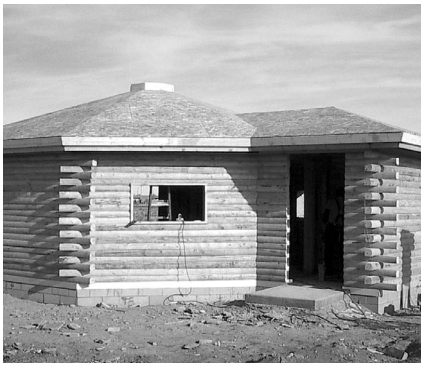
Torrey Home and Garden is a retail store owned and operated by the Southern Utah Forest Products Association (SUFPA), a grassroots organization that promotes community based forestry and helps its members to develop and market their forest products and services (Schumann and Derr 2001). The store is in Torrey, Utah along a tourist route between Zion, Bryce Canyon and Capitol Reef National Parks and sells products that range from carved furniture to handmade flutes. Most of the products use wood from public forests, and woodworkers find it difficult to obtain a consistent supply of raw material.

Santa Clara Woodworks, New Mexico

Santa Clara Woodworks is a private enterprise that buys small-diameter timber from sustainably harvested restoration projects, dries and mills the lumber, and builds furniture. The cost of processing small logs is higher, and the time to create some types of furniture, such as tabletops, is increased because of the small logs. However, since the company purchases much of its wood from firewood sales, the cost is low and the small sales easily clear the environmental review process. The company benefited from a federal grant, offered only to collaborative restoration projects in New Mexico, that provided some investment funds.

Rocky Mountain Youth Corps, New Mexico

The Rocky Mountain Youth Corp operates a sustainable forestry program that includes the utilization of small diameter materials in a program called the Taos Timberline Woodshop (Shull 2002). The Woodshop program operates a training facility where youth corps members add value to wood that is cut by fellow corps members, and market the products to help support the program. The woodshop provides both entrepreneurial and fine woodworking training. Taos Timberline products include rolling pins, bowls, cutting boards, vases, picture frames and mirrors. The Rocky Mountain Youth Corp was also awarded a federal restoration grant that provided access to raw materials and helped offset some of the costs of training the youth workers.



Indigenous Community Enterprise, Arizona

Indigenous Community Enterprise (ICE) was formed by the Navajo Nation to develop the capacity to create and use products from small diameter wood (KenCairn 2002). A $302,000 National Fire Plan Economic Action Program grant in 2001 provided ICE with investment funds for the manufacturing plant. The first product they developed was a hogan kit, a traditional log house made of small diameter wood. A prototype was built in the summer of 2001 and by the fall, ICE had purchased pole peeling machinery and ordered its first 15 shipments of small diameter logs. The finished homes meet Universal Building Code and Department of Housing and Urban Design standards, and cost approximately $75 per square foot. By adding two and three bedroom hogan designs, ICE expects to lower the area unit cost. By 2002, ICE provided jobs for eleven native community members, four native contractors, and eight additional workers. ICE used grant funds to cover the initial investment costs in building the manufacturing plant and deliberately installed machinery that could only handle logs up to 12 inches diameter, to assure the hogans would be made of small-diameter logs. A consistent supply of logs is provided by National Fire Plan projects on the Navajo Nation, which has extensive forest areas.

<u>Key Points</u>

- Despite the variation in the size of business and type of product manufactured, many of the Southwestern businesses described above faced common barriers: access to a consistent supply of wood, high costs of processing small diameter wood and transportation, access to capital, and reliance on grant funds to subsidize high costs.

- Funds for investment in infrastructure are needed and are difficult to obtain for small- and mid-size businesses. The only support of infrastructure development was through the National Fire Plan Economic Action Program, which helped many businesses to research and develop products using small diameter wood, and the Forest Products Lab in Madison, Wisconsin that provided technical assistance to many communities and businesses.

SUMMARY

- The National Fire Plan provides benefits to rural communities by creating fuels reduction contracts that employ more local workers than other forms of service contracting. However, workers are still not based in the communities closest to the project sites and, in northern California, must travel an average of 50-60 air miles to work.

- Where contractual employment benefits do accrue to small businesses, they are usually for activities requiring heavy equipment. The majority of contracts that involve labor-intensive work, such as mechanical thinning, are awarded to large companies based long distances from the work sites.

- The special contracting authorities that allow federal agencies to give preference to contractors who will train and employ local workers are not used consistently by the federal land management agencies. For example, Forest Service regions in the Pacific Northwest and Pacific Southwest employed the special authorities immediately in FY 2001, while contracting officers in the Southwest did not use the special authorities until the end of FY 2003.

- The creation of local businesses capable of performing fuels reduction work is hindered by the high cost of workers compensation and liability insurance.

- The National Fire Plan created 5,500 new agency fire suppression jobs and in Oregon and Washington, most of the people hired for those jobs are from nearby communities. The wages paid for these new, seasonal jobs are higher than the average wages in the counties where the jobs are based.

- The use of local, rural and volunteer fire department resources and local equipment operators in fire suppression is hindered by interagency systems and procedures. However, the use of local resources may provide employment and generate cost savings by reducing transportation costs and cutting wildfire response times.

- Innovative agency personnel use the special National Fire Plan authorities to enter into agreements with local woodcutters to accomplish mechanical thinning using contractors who would not normally have the capacity to perform standard fuels reduction treatments.

- Development of local workforce capacity to be employed in fuels reduction occurs through existing training and YCC programs. Even with adequate workforce training, there are still many barriers to creating viable small businesses and living-wage employment opportunities in forest-dependent communities.

- Many forest-dependent communities have lost their wood processing infrastructure and are challenged to develop new facilities to manufacture value-added products from small diameter trees. Regions that do not have adequate infrastructure face many barriers to new business development, including obtaining consistent supplies of wood and access to capital and research and development funds.

community protection:

One of the goals of the National Fire Plan is to protect communities at risk. In this chapter we use federal accomplishment reports and independent studies to evaluate success at community protection and illustrate the key points with case studies.

Community protection receives very little of the total National Fire Plan funds. The primary delivery mechanism for community protection is through states and rural fire departments and most of the funding is used to train firefighters and purchase and update equipment (see Figure 7). In addition, funds were appropriated in 2001 for community fire protection plans.

Figure 7. **Summary of Community Assistance Program Expenditures and Accomplishments in FY 2002**

Community Assistance Programs	Grant Funds Distributed	Accomplishments
State Fire Assistance	$51 Million	• 11,400 mitigation and education campaigns • 400 community plans • 2,686 hazard mitigation projects • 13,000 firefighters trained
Rural Fire Assistance	$10 Million*	• 1,568 rural fire departments received funds for technical assistance, training, supplies, equipment, and public education
Volunteer Fire Assistance	$10.4 Million	• 3,781 volunteer fire departments received funds to organize, train and equip firefighters • 5,900 small communities served • 16,830 firefighters trained
Economic Action Programs	$12.4 Million	• 1,070 projects completed • 467 strategic plans implemented/updated

*Rural Fire Departments must contribute a minimum of 10% in matching funds or in kind services.
Source: FY 2002 Performance Report: National Fire Plan, 2003.

Research by Jack Cohen at the Forest Service, Rocky Mountain Experiment Station demonstrates that removing fuels around homes and buildings is an effective way to reduce fire risk. Several programs are in place to teach homeowners to create safe space around their houses, such as Firewise and the FireSafe Communities Initiative. Recent large wildfires have shown that firescaping is an effective way to reduce structural damage from wildfire.

Less than 5% of National Fire Plan funds in any given year went to support firescaping and other community fire prevention activities. Even less funding was spent to underwrite the costs of fire-

proofing homes in low-income communities. In New Mexico, disadvantaged low-income communities funded community fire protection plans in 2001 with National Fire Plan grants. For example, the Sierra Land Grant Coalition and Truchas Land Grant, both traditional Hispano community groups, received grants for fire plans. The funding was discontinued in 2002 and other land grant communities have not been able to develop plans.

Wildfire and Poverty

Approximately 30% of the households in western at-risk communities are low-income and lack adequate resources to protect themselves from wildfire. A December 2001 study commissioned by the University of Oregon's Center for Watershed and Community Health (CWCH), highlights the fact that wildfire has a disproportionately greater effect on low-income households. Since then, the relationship between wildfire and poverty has garnered increasing attention.

The CWCH study assesses the impact of wildfire on people whose income is below the federal poverty level, as well as people who cannot afford wildfire protection. All communities, wealthy and poor, suffer direct economic consequences when wildfire destroys homes. Poor people, however, are more likely to lose all of their assets – buildings, possessions, livestock, and vehicles. Low-income communities usually lack high-quality fire protection services and the residents cannot always muster the resources to fireproof their homes. Wealthier families usually have insurance to replace lost possessions. Financial assets, such as bank accounts and investments, are not affected by fire.

Wildfires often disrupt normal commercial activity by causing homes to be evacuated and work places to close. The need for short-term lodging or long-term alternative housing, as well as the temporary loss of work, can overwhelm low-income families. Fires can also curtail the supply of subsistence foods, native plants, and building supplies that sustain many traditional and indigenous communities.

The CWCH study notes that services provided by fire prevention programs through federal and state land management agencies are not connected to the economic assistance programs of poverty alleviation agencies and organizations.

Key Point

- None of the existing fire risk reduction and post-fire assistance programs systematically addresses the needs of poor families and communities. Community assistance programs funded through the National Fire Plan do not recognize that poor, rural communities are less able to reduce fire risks without assistance or that low-income households suffer greater consequences when wildfires occur.

Inequities in the Implementation of a Defensible Space Grant Program

Las Humanas, a locally-based cooperative that supports land grant communities in the East Manzano Mountains, tested the assertion that grants given for defensible space creation were only awarded to homes in wealthy bedroom communities outside Albuquerque, New Mexico. Their investigation used mapping to locate defensible space grant recipients and to characterize them by socioeconomic condition (see Figures 8 and 9). The project also looked at the requirements of the grant program to

Figure 8. **Economic Characteristics and Grant Awards in East and Manzano Mountains**

	Median Income	Families Below Poverty Level	Defensible Space Grant Amounts
Bedroom Communities	$45,300	6%	$685,000
Forest-Dependent Communities	$28,537	25%	$0

Source: Morton 2003

see if there were administrative factors that could deter low-income applicants.

Key Points

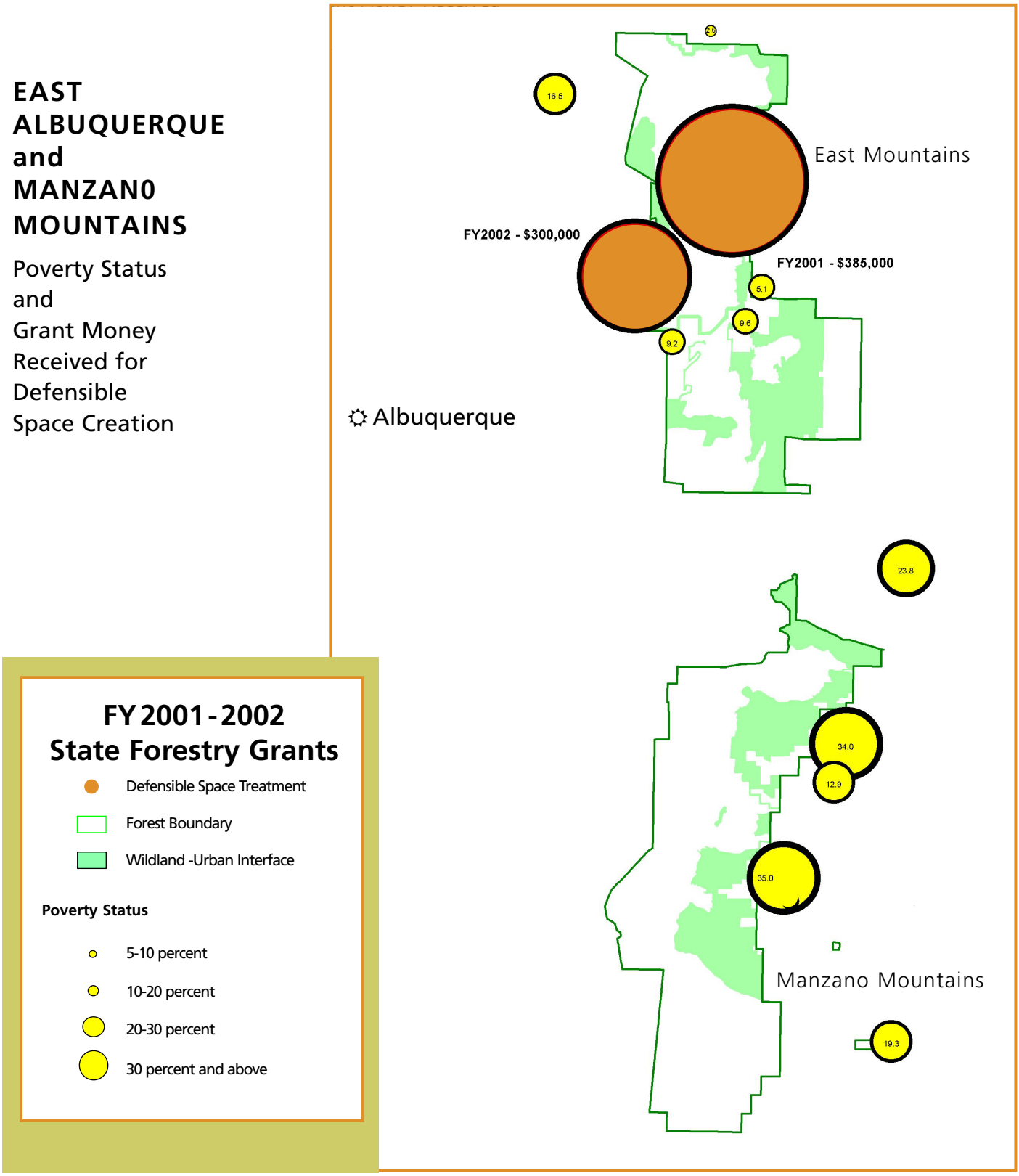
- The distribution of defensible space grants program in the East and Manzano Mountains favors wealthy communities. In FY 2001 and 2002, $685,000 in grants went to bedroom communities in the East Mountains of Albuquerque, while no funds to create defensible space were made available to low-income, forest-dependent communities.
- The administrative requirements of the defensible space grants may discourage low-income applicants from applying. For example, one constraint imposed by the program is that matching funds from private landowners be 15 to 30% — more than most low-income families can afford. In-kind matches of labor are not accepted, and landowners have to choose from a predetermined list of contractors to carry out the work instead of using their own labor. Finally, grants are awarded to landowners on a first-come, first-serve basis, and the outreach focus on affluent communities produces significant landowner participation in those areas.
- Other National Fire Plan programs in the East and Manzano Mountains, such as the Rural Community Assistance Economic Action Program and the Collaborative Forest Restoration Program, are more effective at dispersing grants to low-income forest-dependent communities. A total of six grants for economic development and community planning for fire protection were awarded in 2001 and 2002 to recipients in the Manzano Mountains communities.

Strategy for Low-Income Community Protection

Even without a special National Fire Plan program to address the vulnerability of low-income families, some program implementers have found ways to direct resources where they were most needed. For example, the Lands Council in Spokane, Washington developed an outreach program to help homeowners around the boundaries of the Colville National Forest in Washington to take preventative fireproofing action. The project focused on rural areas of the Selkirk Mountains that are populated with low-income households. The Lands Council applied for a federal rural community assistance grant to educate people in this area about fuels reduction treatments and to offer technical assistance to property owners to create plans for defensible space around their homes. The Forest Service funded the proposal with Economic Action Program funding from the 2001 National Fire Plan.

After several unsuccessful outreach efforts, including public meetings and posting flyers, the Lands Council changed tactics and sent staff door-to-door in the target area, this time with resounding

Figure 9. **Map of Economic Characteristics and Grant Awards in East and Manzano Mountains**



Sources: U.S. Census Data and the Ciudad Soil and Water Conservation District.
Adapted from Morton 2003.

success. The Lands Council visually examined more than 1,300 homes and created a geo-referenced database about the condition of each property they visited. When the visual assessments revealed risk factors – such as firewood stacked against the house, a wood-shake roof, or continuous fuels from the forest to the buildings – the staff knocked on the door and offered a complete assessment. The staff met with over 200 homeowners and, with only one exception, their free technical assistance was welcomed. Several dozens of the homeowners used the Lands Council's assistance to write fire management plans for their property. The staff assisted homeowners with an average of three fire plans per week.

Key Point

- Low-income residents may not respond to traditional outreach tactics such as public meetings. The door-to-door method presents a proactive alternative that, in this case, effectively engaged low-income families to participate in maintaining defensible space around their homes.

SUMMARY

Low-income households are more vulnerable to the devastating effects of wildfire, yet communities in poor areas receive little of the National Fire Plan funding aimed at protecting homes. The emphasis on protecting high-value structures and the cost-share requirements of federal and state property protection programs excludes low-income communities. However, at least one program has provided technical assistance in Firewise practices to low-income residents. In contrast to the defensible space grant programs, the Economic Action Program and other Community Assistance Programs have delivered services and grant opportunities to many rural and low-income communities.

- Community planning to reduce fire threats and firescaping around individual properties are the most effective fire risk reduction strategies, yet less than 5% of Fire Plan funds are spent on these activities.

- Most reports of accomplishments with community assistance funds were to boost firefighting preparedness, in the form of local fire department training and equipment purchases.

- Community fire planning grants enabled communities to write plans, and when the funding was discontinued, the number of plans dropped off.

- National Fire Plan programs to assist homeowners do not target low-income households. Some programs are set up in ways that make it difficult for low-income communities to participate. On the other hand, it is also possible for agency programs to be tailored to meet the needs of low-income residents.

collaboration:

Wildfires burn across jurisdictional boundaries and for decades wildfire programs have required interagency coordination and collaboration. For example, the USDA Forest Service and Bureau of Land Management formed the National Interagency Fire Center (NIFC) in 1965 to improve support to firefighters in the West (Sturtevant *et al.* 2004). Three more agencies joined NIFC in the 1970s – National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service – along with the Office of Aircraft Services. In 1976 another collaborative, the National Wildfire Coordinating Group, was formed by the NIFC partners and National Association of State Foresters to develop common fire-fighting practices, standards and training.

The US Congress directed the Secretaries of the Interior and Agriculture to work with the states on the National Fire Plan, specifically to develop a fire risk reduction strategy for communities and the environment. Congress directed in the 2001 Interior Appropriation Bill that there be "a collaborative structure, with the states and local governments as full partners" and specified the "inclusion of all levels of government and citizens."

Early reports to Congress on the National Fire Plan by the General Accounting Office (GAO) were critical of federal agency collaboration. The GAO wrote in August 2001 that the federal agencies "continue to plan and manage wildland fire management activities primarily on an agency-by-agency and unit-by-unit basis" (Hill 2001). Yet in the same month, the Western Governors' Association presented to the Secretaries of the Interior and Agriculture a 10-Year Comprehensive Strategy called *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment*. This strategy, which was formally accepted by the Secretaries, focused on information sharing, implementation planning, and performance measures. One year later, a 10-Year Implementation Plan was adopted with specific steps to address the persistent problems of collaboration.

A recent summary of research about collaboration found that "collaborative relationships can fall on a continuum, varying according to their context and desired outcomes" (Sturdevant *et al.* 2004). The continuum ranges from informal linkages to structured collaborative group (see Figure 10).

Figure 10. **Continuum of Collaborative Relationships and Processes**

Informal linkages	Intermittent coordination	Temporary task force	Formal partner-	Coalition for strategic action	Collaborative

Source: Sturtevant 2004.

Another classification scheme for different types of collaborative groups divides them according to whether they are place-based or policy-based. Collaboration at the local level is almost always place-based, whereas policy-based collaboratives usually advocate for or coordinate a regional or national level issue.

The 10-Year Implementation Plan outlined a three-level framework for collaboration that differentiated relationships at the national, regional and local levels. As shown in Figure 11, the national level of collaboration is between cabinet Secretaries, Governors and Congress and focused on policy. Collaboration at the national level was formalized as part of the National Fire Plan in 2002, when the agencies created the Wildland Fire Leadership Council. This council is lead by the Departments of Agriculture and the Interior with agency heads from the two departments and representation of the Western Governor's Association, National Association of State Foresters, Intertribal Timber Council, and National Association of Counties.

Figure 11.
Examples of Collaborative Efforts Within the 10-Year Comprehensive Strategy Framework

Level of Collaboration	Examples of Collaborative Activity	Type of Collaboration
National	• Wildland Fire Leadership Council • Western Governors' Association Forest Stakeholders Group • Memorandum of Understanding for Collaborative Fuels Treatment Program between DOI, FS, NASF, NACo	Policy-based
Regional	• Southwest Strategy promoting interagency collaboration • Quarterly meetings of USFS and DOI National Fire Plan Coordinators with community-based foresters • NASF drafted Field Guidance for Identifying and Prioritizing Communities at Risk	Policy-based and Place-based
Local	• Collaborative Forest Restoration Program in New Mexico • Numerous examples of federal, state, county, tribal and citizen collaboration at the project level. To name just two: Silver City National Fire Plan Implementation Team in New Mexico and Priest River Development Corp. in Idaho	Place-based

The regional level is collaboration among multi-state, state, local, tribal and area administrators and interest groups and includes both policy- and place-based collaboratives. The local level is between stakeholder groups and local decision-makers and local offices of federal and state government, counties, municipalities, and tribal governments and is almost always place-based.

Although local level collaboration is often successful, it yields variable outcomes. A report of a September 2003 workshop called *Barriers to Collaboration* found that "collaborative forestry groups are not achieving their land management goals at the rate and scale they had anticipated, with the result that both agency and non-agency collaborators are experiencing frustration and burnout" (Moote and Becker 2003). The reasons cited include unrealistic expectations, lack of criteria for measuring the effectiveness of collaboration, federal policies, procedures and agency cultures that limit engagement in collaborative efforts, and lack of capacity and funding for collaborators to deliver the outcomes they promised. One key finding is that expectations of collaboration vary widely, from people who see collaboration as a process to collect information and build support for proposed actions on the one hand, to people who view collaboration as a shared decisionmaking process on the other. Another important finding is that success is more likely when the collaborative process is adequately funded.

Funding for collaboration in the National Fire Plan was extremely small compared to the total budget. When funding was available in 2001 through the Community Assistance program, it was usually distributed at the county and community level through grants and agreements. For example, the FY 2001 appropriation resulted in 400 community fire plans and 467 strategic plans.

In contrast, the Collaborative Forest Restoration Program (CFRP) in New Mexico provided ample funding for local level collaboration. The CFRP was authorized in P.L. 106-393, although its funds were appropriated in the National Fire Plan budget. The CFRP awarded 60 grants of up to $360,000 to restore forests using a collaborative process between agencies, diverse stakeholders and interest groups. The program has been a catalyst for collaboration in the Forest Service Southwest Region. For example, dedicated agency staff were hired on each national forest in New Mexico to manage partnerships and as a result, collaborative ways of doing business are becoming more accepted by other staff. The CFRP grant recipients recognize that their program implements the collaborative goals of the 10-Year Comprehensive Strategy. They also note that a "one size fits all" approach to collaboration will not succeed as well as tailoring collaboration to the unique circumstances of each project (USDA Forest Service 2003).

SUMMARY

Collaboration that includes communities directly has occurred primarily at the local level and usually resulted in on-the-ground treatments. Collaboration at national and regional levels is usually between agencies and different levels of federal, state, local and tribal government.

- At the national level, collaboration is a vehicle for interagency coordination on policies and procedures. Since jurisdictional boundaries do not stop wildfire and are irrelevant in fire planning and management, national level collaboration is essential for interagency coordination.

- At the regional level, collaboration results in tangible products, such as compacts to establish fire-fighting guidelines for the land management agencies and rural, local and state fire departments.

- Expectations of what can be accomplished with local level collaboration vary widely. Adequate funding for placed-based collaboration is necessary for successful results.

- The National Fire Plan does not provide formal channels for communities to engage in policy-oriented collaboration at the national level. For example, the Wildland Fire Leadership Council includes the National Association of Counties but does not have any community-level representation.

setting priorities:

Setting priorities for hazardous fuels reduction and community protection is one of the most contentious issues associated with the National Fire Plan. Priority setting determines the allocation of resources and benefits, and many interest groups seek to influence the allocation to support their own agendas. Science is often used to provide information for the selection of priorities, but ultimately the decisions reflect human values and choices.

Current estimates of the acreage of forests at risk of catastrophic fire on all ownerships range from 89 million to 182 million acres (Council on Environmental Quality 2000, Schmidt *et al.* 2002). The agencies have treated two to three million acres per year for three years. Priority setting is clearly needed since only a small percentage of the at-risk acres can be treated each year.

A range of interest groups have weighed in on the need to set priorities and expressed their preferences. For example, environmental groups assert that research about home ignition during wildfire indicates that community protection zones and firescaping around structures should be the highest priority (Aplet and Wilmer 2003). In contrast, the Bush Administration has taken positions that promote fuels reduction in any forests where fuels conditions are considered to be hazardous. Protection of structures and fuels reduction is generally supported in rural areas, yet communities are usually most interested in the use of collaborative process to set priorities so that local representatives are included (Jungwirth 2004). Because of the wide range of opinions, crafting a national policy for setting priorities is exceedingly difficult.

The National Fire Plan documents provide multiple, sometimes conflicting, directives about how to set priorities. For example, the 2001 Interior Appropriations Bill directed the federal land management agencies to develop a list of communities at risk and required that funding be used for both community protection and wildland hazardous fuel reduction. The Comprehensive Strategy, on the other hand, called for a collaborative process with all levels of government and stakeholders setting priorities together. A third idea, using fire regime condition class to set priorities, was suggested in legislation introduced in the U.S. Congress in 2002 and 2003, a version of which was included in the Healthy Forests Restoration Act of 2003. We review these three methods of priority setting in this chapter.

FOCUS ON COMMUNITIES AT RISK

Congress recognized the importance of setting national priorities for fuels reduction as they took action to follow the 2000 wildfire season that burned part of the city of Los Alamos, New Mexico. The 2001 Interior Appropriations Bill, which included the first authorization of National Fire Plan funds, directed "the Secretaries to report jointly to Congress, by May 1, 2001, with...an inventory of communities at risk that require hazardous fuel reduction treatment" (P.L. 106-291).

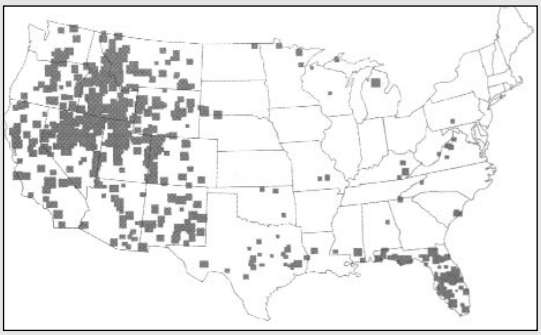
The success of the effort to inventory communities at risk was probably limited by the Congressional mandate of a 180-day response time. The short timeframe was intended to spur the agencies to develop quick answers that could be used to guide the allocation of 2001 funding, and avoid prolonged study. Since communities are under state jurisdiction, the federal agencies deferred to the states and asked them to develop their own lists of communities at risk.

The states could not develop a systematic process for determining communities at risk in the time allowed. The only national guideline given to the states was a proposed definition for wildland urban interface. The definition of "interface," "intermix," and "occluded" communities had been created a year earlier by a committee of the Western States Fire Managers.

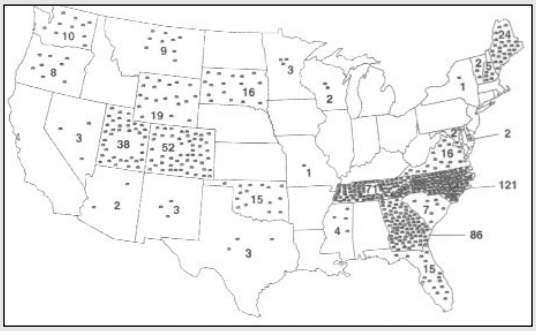
Each state used its own, unique process for identifying communities at risk. For years, California's Department of Forestry studied fire risk and developing data to perform spatial analysis of development patterns and fuel loads. Thus, California had the data and analytical systems in place to identify its highest risk communities. On the other hand, in New Mexico, little reliable data was on hand and the state had no process for spatial analysis. The New Mexico State Forester had previously commissioned a study of fuels conditions as part of a larger effort by the Four Corners Sustainable Forestry Partnership. However that study relied on Forest, Inventory and Analysis data and concluded that the data were not sufficient to accurately portray fuels conditions. Since New Mexico did not have sufficient data to use a scientific process to develop priorities in 180 days, the state agency convened its foresters and asked them to use their personal observations and experience to develop a matrix of risk factors and communities. From this matrix the agency established a list of 100 communities at risk and a list of 20 immediate priority communities.

The federal agencies, led by the National Park Service, collected the states' lists of communities at risk and published them in the Federal Register on January 4, 2001. A total of 22,000 communities were listed (see Figure12). The lack of consistent methodology was evident. Some small states, such as Virginia, listed 2,000 communities while some large states, such as New Mexico, listed only 100.

Figure 12. **Comparison of 2002 Wildfire Locations and List of At-Risk Communities**



Location of Major Wildland Fires During the 2000 Wildland Fire Season



Number of Communities by State Identified by Interior as Being at Highest Risk from Wildland Fire

Source: GAO-02-259 Severe Wildland Fires

The reliability of the list was soon questioned and the agencies quickly realized that the list would not help them to set treatment priorities for the 2001 field season. By mid-January 2001, the National Fire Plan coordinator for the Forest Service, Lyle Laverty, concluded that the hazardous fuels reduction projects to be implemented in 2001 would be the projects that were NEPA-ready and would not necessarily be correlated with communities at risk (Laverty 2001).

The federal agencies proceeded to refine the lists of communities at risk. The 2001 Interior Appropriations Bill specified that hazardous fuels reduction funding was intended for federal lands, so the states were asked to limit their lists to communities that were in close proximity to federal lands. The list was published again on August 12, 2001 with 11,000 communities. At that point the task was considered completed and results were reported to Congress.

Key Point

- In giving the agencies 180 days, Congress tried to avoid a long planning process, but the product was not specific enough to set meaningful priorities. The lack of consistent criteria used by the states to rank their highest-need communities undermined the effort to understand the extent of fuel treatment needed to reduce the national fire risk. The resulting lists — first of 22,000 and then of 11,000 communities — were not useful as tools for setting priorities.

FOCUS ON COLLABORATIVE PROCESS

The Western Governors' Association (WGA) provided their own suggestions for identifying at-risk communities and selecting projects to implement in the 10-Year Comprehensive Strategy Implementation Plan. Their strategy focused on collaboration between all levels of government and stakeholders to jointly determine priorities at landscape and regional scales. The Implementation Plan includes four specific tasks to help set priorities, with the lead role assigned to the National Association of State Foresters (NASF). NASF prepared a plan for addressing the identification and prioritization of communities at risk, and the Wildland Fire Leadership Council accepted their recommendations in September 2003.

Figure 13. **Selected Goals from the 10-Year Comprehensive Strategy Implementation Plan**

Goal 2e	Collaboration by federal, state, tribal and local governments on the annual selection of fuel treatment projects within their jurisdictions.
Goal 3c	Collaboration by federal, state, tribal and local governments on the annual selection of ecosystem restoration projects within their jurisdictions.
Goal 4e	Development of nationally comparable definitions for identifying at-risk wildland urban interface communities and a process for prioritizing communities within state or tribal jurisdictions.
Goal 4f	Maintaining an accurate prioritized list of all communities designated by states as being at-risk of wildland fire (Goal 4f). NASF assumed the lead role in accomplishing all four of these tasks.

Examples of State-led Collaborative Priority Setting Efforts

Arizona

Governor Janet Napolitano held a forest summit in March 2003 and in April formed two new councils that created ongoing forums for collaboration. The Forest Health Advisory Council was created to develop a "science-based approach" to fuel reduction efforts and promote markets for small-diameter trees. The Forest Health Oversight Council was established to oversee implementation of fuels reduction programs.

New Mexico

Governor Bill Richardson charged the state forestry division with using a collaborative process to develop goals and principles for watershed restoration that will include reducing the risk of wildfire. A committee of state and federal agency leaders is overseeing the process and providing interested stakeholder groups and citizens with opportunities for input. In addition, the New Mexico Legislature passed a law in 2003 establishing a fire planning task force of federal, state, tribal and local officials to develop strategies and establish priorities for community protection across the state.

Four tasks in the Comprehensive Strategy address project selection and priority setting (see Figure 13). The first progress toward collaborative selection of fuels reduction projects was achieved in January 2003 with the signing of a memorandum of understanding between the USDA Forest Service, Department of Interior, National Association of Counties, and NASF. The memorandum provides a framework for interagency collaboration on the annual selection of the fuels treatment program of work within the respective jurisdictions.

A second effort by NASF was the development of field guidance for identifying and prioritizing communities at risk. The field guidance builds on the intent of the memorandum of understanding by suggesting that collaborative processes be used at state and regional levels to set project priorities. The field guidance includes four criteria for assessing fire risk that could be used in all regions and states, providing some national consistency without unnecessarily constraining collaboration. The four criteria are: (1) fire occurrence or probability of ignition; (2) fire hazard based on fuel conditions; (3) values protected including the social and economic uses of forests; and (4) protection capabilities of communities, organizations, and agencies, as well as the community resilience to wildfire.

The field guidance suggests that participants in the collaborative process focus on identifying priority projects, not on ranking the fire risk to communities. In making this distinction, the authors modified their objective from assessment of communities at risk to development of a logical list of priority fuel treatment projects. Several states have started collaborative processes to move forward with the priority-setting task that will be further aided by the NASF field guidance (see sidebar).

Key Points

- The NASF field guidance to identify and prioritize fuel treatments applies the framework for collaboration from the Comprehensive Strategy to the difficult task of priority setting. State-led collaborative processes to set fuels reduction and restoration priorities and develop action plans are already underway in several states, including Arizona and New Mexico.

- The field guidance suggests that participants in the collaborative process focus on identifying priority projects, not on ranking the fire risk to communities. In making this distinction, the field guidance authors reframe the objective and take steps to set treatment actions in motion.

FOCUS ON CONDITION CLASS

Condition class is a classification of risk based on the degree of departure from historical fire regimes. The condition class classification is based on a USDA Forest Service, Rocky Mountain Research Station publication, Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management (Schmidt *et al.* 2002) that introduces a national level system for classifying an ecosystem's degree of departure from historic fire regimes and the risk to those systems of losing key ecosystem components. The condition class concept has appeal to legislators because it can be used consistently across the country.

Description of Condition Class

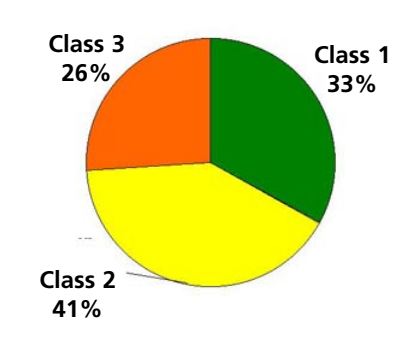
Condition class data is spatial, commonly presented as maps depicting "the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components" (Schmidt *et al*. 2002). The coarse-scale map of the nation assigns one of three rankings to all of the land comprising the 48 conterminous states (see Figure 14). The map was developed by synthesizing existing information, consulting with experts, and measuring departure from historical land cover and forest density.

Figure 14. **Condition Class**

Condition Class 1	Lands where fire regimes are within an historical range, and the risk of losing key ecosystem components is low.
Condition Class 2	Lands where fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more fire return intervals.
Condition Class 3	Lands where fire regimes have been significantly altered from their historical range.The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals.

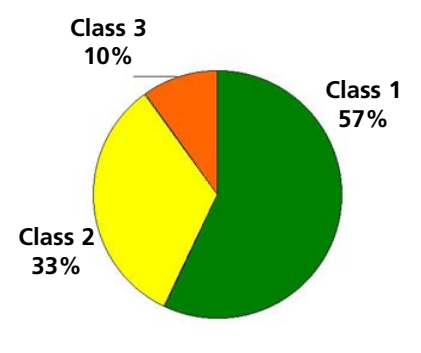
Source: Schmidt 2002.

Figure 15
USDA Forest Service Lands by Condition Class



Souce: Schmidt 2002

Figure 16
US Department of the Interior by Condition Class



Souce: Schmidt 2002

According to the coarse-scale condition class data, 51,125,000 acres, or one quarter of all lands managed by the USDA Forest Service are in condition class 3, the highest level of condition class, and an area roughly the size of the state of Utah (see Figure 15). Forty percent of National Forest System lands are in condition class 2, the medium level classification, and an area that exceeds the size of the state of New Mexico. One tenth of the lands managed by the Department of the Interior are in condition class 3 (see Figure 16). Approximately one third of DOI lands, or an area larger than Arizona, are mapped as condition class 2.

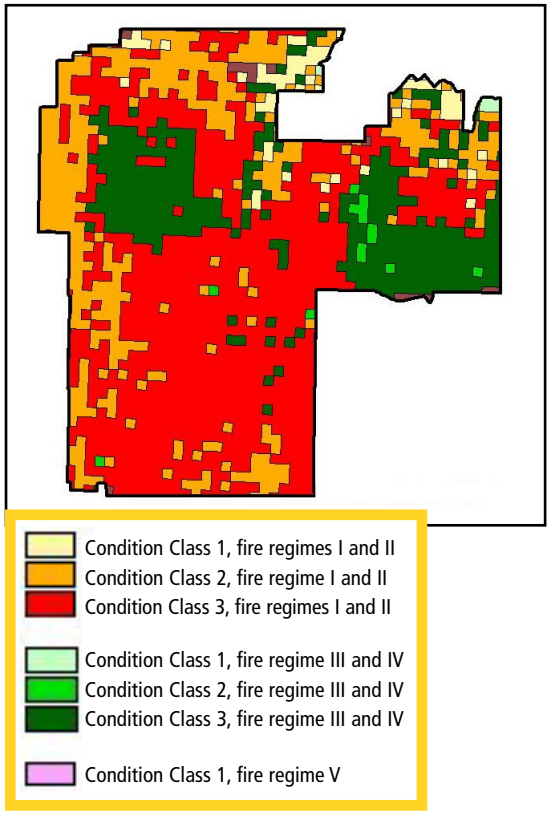
Limits of Coarse-Scale Condition Class Map

The coarse-scale condition class map is an important first effort to provide a national picture of fire risk based on scientific information. Schmidt *et al.* are very clear about the intended use and the limitations of this map. "The objectives of this mapping project were to provide national-level data on the current condition of fuel and vegetation. Therefore, the data are most useful at that scale. The end products were not intended to be used at scales other than a coarse scale..." (Schmidt *et al.* 2002). The authors add, "end products are not intended to be absolute or precise in terms of accuracy in minute detail. It is the regional perspective and analysis that are most important in using the maps" (Schmidt *et al.* 2002 from Zhu and Evans 1992).

A field check of the national condition class map shows that the warnings of inappropriate applications across scales are warranted. For example, on the Santa Fe National Forest in New Mexico, areas that were clearcut in the 1960s and 1970s and have required three replantings before successful tree regeneration could be noticed, are mapped as condition class 3 (see Figure 17). These areas have very low fuel loads and do not pose a fire risk. A field check of the Santa Fe and Carson National Forests shows that areas burned within the last 20 years are mapped as though they have missed multiple fire return intervals and are at high risk of a catastrophic fire. Some spruce-fir forests that should have 200+ natural fire return intervals are mapped as though they should experience a fire every 0-35 years and therefore need to be treated to avoid catastrophic fire. Field checks in the Pacific Northwest show that some areas that were mapped as the highest forest density classification of 67-100% were actually clearcut patches (Wilmer 2003).

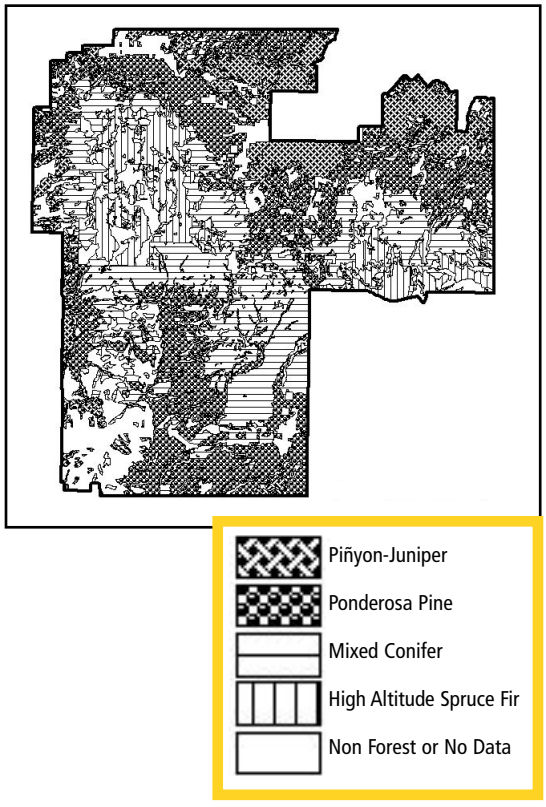
Figure 17. **Coarse-Scale Condition Class Map of the Santa Fe National Forest**

CONDITION CLASS



Source: Schmidt *et al.*, 2002
Area: Approximately 360,000 acres

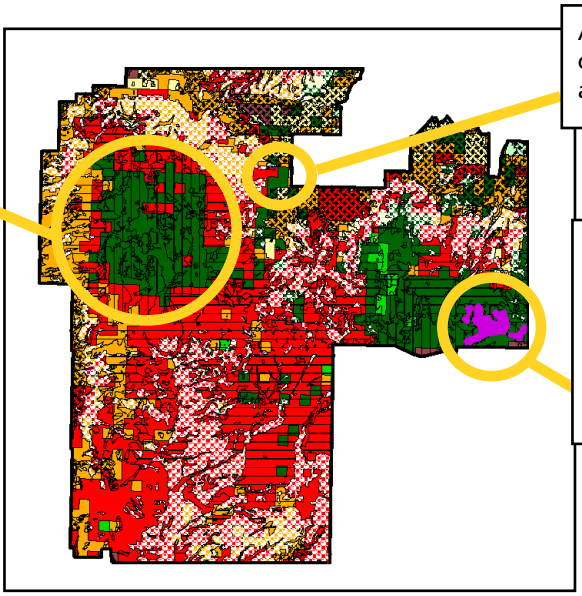
CURRENT VEGETATION



Source: Santa Fe National Forest

CONDITION CLASS & VEGETATION

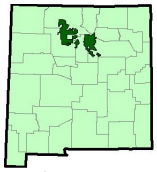
Areas designated as condition class 3 in fire regimes I and II that are actually spruce fir and aspen that should be fire regime V and condition class 1.



Areas designated as condition class 3 for areas that are actually non-forest.

Areas designated as condition class 3 for areas that are actually clearcuts from the 1960-70's that did not regenerate and have few fuels present.

NEW MEXICO VICINITY MAP



Santa Fe National Forest

Source: The Forest Trust

Fuel load data were not used to calculate and assign coarse-scale condition classes. According to the authors, a "weakness of our methodology was using forest density as a surrogate for structural stage.... It was beyond the scope of this project to develop a National Forest structure map. Therefore, we used one of the few available spatial datasets covering the conterminous United States as a proxy for structure" (Schmidt *et al.* 2002). The forest cover density data used did not incorporate any fuel measurements, did not address crown fire issues, such as the presence of overlapping crowns, and did not use an estimate of the available combustible material on the ground, a prerequisite for an active crown fire (DeBano *et al.* 1998). Thus, the condition class map makes assumptions about fuels given the vegetation type and the canopy cover. These assumptions are useful to make broad generalizations about the landscape across a large scale. Since forest density is underestimated at one point on the landscape and overestimated at another, the map has a reasonable degree of accuracy when viewed as a whole. However, the assumptions about fuels are not appropriate for information to guide, prioritize and direct project-specific planning. For example, the aggregation process could lead to significantly overestimating forest density if used at a finer scale (Morton 2003).

Policymakers became interested in uses of the coarse-scale condition class map in 2002. Condition class entered into the language of proposed federal legislation in 2002 and 2003. The Healthy Forest Restoration Act that passed the House in May 2003 included a provision that would have used condition class to determine where to apply project-specific expedited environmental review processes. Specifically, forests in condition class three would have been prioritized for treatment and immune from appeal and other provisions of the National Environmental Policy Act (NEPA). If this requirement had not been removed in the final version of the Bill, condition class would have been used to prioritize project level decisions and many projects would have been poorly placed.

The monitoring section of the Healthy Forests Restoration Act of 2003 mandates that changes in condition class be measured before and after treatment, and agency policies requires that a condition class be determined for every project area in the funding pipeline. Three initiatives are underway (Interagency 2003). First, federal researchers are developing medium- and fine-resolution data to use in regional, state, and project-level planning and monitoring. These data will be about 70% accurate, which is sufficient for planning in landscapes of 10,000 acres or more. Second, land management agencies are conducting site-specific assessments of fire regime condition class in watersheds and other project-scale landscapes. These assessments are developed through a rigorous and replicable process that managers are being trained to perform. Finally, federal scientists are developing fine-resolution condition class data for the nation, through a project called Landfire, that is expected to provide data for Western states in 2006.

Key Points

- The purpose of the coarse-scale condition class map is to provide managers with spatial data "to describe regional trends in current conditions and to support fire and fuel management program development and resource allocation" (Schmidt *et al.* 2002).

- Use of the national condition class map for public policy that sets project-level direction could apply resources to areas that are not actually at high risk.

- Condition class data is not meant to drive fire and fuel management and resource allocation.

- The coarse-scale condition class research provides a valuable methodology that, when replicated at medium- and fine-scales, will be useful for monitoring progress to reduce the national fire risk.

SUMMARY

The National Fire Plan provided little direction to field managers about how to set priorities for fuel reduction treatments. Congress initially instructed the agencies to focus on identifying high-risk communities, but the process was poorly conceived and did not provide satisfactory results. The Western Governors' Association suggested a focus on collaborative priority setting through the 10-Year Comprehensive Strategy. Finally, the federal agencies developed a tool for classifying risk and assessing ecological health, called fire regime condition class, that managers are using to determine fuel treatment priorities.

- Consistent identification of treatment priorities did not occur in the first three years of the National Fire Plan. However, new policies and tools are in place that may result in collaborative priority setting in 2004.

- The 10-Year Comprehensive Strategy Implementation Plan led to a new policy for a collaborative process to identify and set priorities for fuel treatment at the state and regional level. This policy is supported through an interagency memorandum of understanding committing to joint federal, state, local and tribal government planning of annual treatment plans beginning in 2004.

- The agencies recognize that coarse-resolution fire regime condition class data are insufficient to assist project planning. The new Forest Service Landfire project will develop high-resolution condition class data for the nation in five years, and for the West by 2006.

fuel treatment outcomes:

The treatment of hazardous fuels is a primary goal of the National Fire Plan. In describing what the National Fire Plan does, it is important to consider how fuels reduction treatments affect forest conditions. However, a comprehensive evaluation of progress to reduce the likelihood of catastrophic fire with fuel treatments is not possible with existing data. Instead, a summary of reports from two major wildfires in 2002 is provided, along with descriptions of changes in the fuel profiles of treatment areas in the Southwest and northern Rocky Mountains.

Fuel reduction treatments are considered separately from treatments to restore fire-adapted forests (McCarthy and Yanoff 2003). Though there are similarities, fuels reduction prescriptions are less detailed in their instructions and provide only a few guidelines for reducing tree density and basal area (see Figure 18). In contrast, restoration prescriptions are usually based on returning the forest to an estimated historical condition and include detailed guidelines to address many forest variables.

Figure 18. **Sample Fuel Reduction Prescription**

Project Name:	Ruedas Thinning
Project Location:	Carson National Forest, New Mexico
Prescription:	Thin to 60 - 70 basal area. Leave 110 to 100 trees per acre, depending on the size of trees in the area. Create 14 to 20 feet spacing between trees. Follow thinning with prescribed fire.

Source: Schumann 2004

FUEL TREATMENT EFFECTS

Several large fires that burned in different parts of the West characterized the 2002 wildfire season. For example, in June the Rodeo-Chediski fire burned in Arizona and the Hayman fire in Colorado. In August, the Biscuit fire in burned in Oregon. These fires provided the opportunity to seek evidence of the effectiveness of fuel treatments. As Congressman Mark Udall of Colorado described it, the Hayman fire could be reviewed to "take a close look at the behavior of the fire, examine the factors that led to its intensity, and see if the way it behaved when it encountered previously affected or treated areas can be instructive in designing future risk-reduction projects." This section summarizes key findings from review studies of the Hayman and Rodeo-Chediski fires.

Hayman Fire

The Hayman fire in the Front Range of Colorado's Rocky Mountains burned for twenty days in forests that were predominantly ponderosa pine and Douglas fir (Graham *et.al.* 2003). Extreme environmental conditions on the first two days, June 8 and 9, caused the fire to grow by more than 60,000 acres in one day. A second period of extreme weather on June 17 and 18 pushed the fire to its final size of 138,000 acres.

Key Points

- Extreme environmental conditions, created by the combination of winds, weather and fuel moisture, overwhelmed most treatments designed to change fire behavior (Graham *et al.* 2003). On June 9, under extreme weather conditions, the Hayman ran "over 60,000 acres that included several areas of fuel modifications with little apparent effect on fire intensity…." This included almost all treatment methods, including prescribed burning and thinning.

- On the other hand, when the Hayman fire burned under moderate environmental conditions (June 17 and 18), and reached areas where fuels had been modified, growth of the fire slowed. In fact, the final fire perimeter corresponds with "the boundaries of fuel modified areas, suggesting that they may have helped prevent further fire spread."

- The growth pattern of the fire was strongly influenced by two areas that had previously burned. One was a prescribed fire (Polhemus fire in 2001) and the other was a wildfire (Schoonover fire in 2002). Both had burned within the last two years. When the Hayman fire reached these previous burns, the fire appeared to stop growing, at least locally. The conclusion of the review team was that "removal of surface fuels alone (irrespective of thinning or changes to canopy fuels) can dramatically alter fire behavior within 1 year of treatment," and that benefits of the treatment decline thereafter.

- The size of the treatment areas relative to the size of the fire was important. In a big fire like the Hayman, the 8,000-acre Polhemus prescribed burn was more effective in stopping the fire than the 51-acre Cheesman Ridge fuel break.

Rodeo-Chediski fire

The Rodeo-Chediski fire in southeastern Arizona started as two fires on June 18 and June 20, 2002. The fires merged and continued burning until July 7 when they reached a combined size of 468,000 acres (Apache-Sitgraves 2002, BIA 2002). The fire burned in forests that were predominantly ponderosa pine forests, with isolated pockets of mixed conifer forest.

Key Points

- The effect of the Rodeo-Chediski fire on vegetation was variable and patchy. Some areas, considered a high-severity burn, were scorched and no live trees remained. On the other hand, some areas were unburned, while other areas had brown needles on live trees (low-severity burn), or brown needles and more than 50% dead trees (moderate-severity burn).

- Forests in the Rodeo-Chediski fire that did not receive fuels reduction treatments burned at different levels of intensity. That is, 25% of the untreated forest was not burned, 25% burned at low severity, 20% burned at moderate severity, and 30% burned at high severity.

- The Rodeo-Chediski fire burned through areas that were previously treated with prescribed fire, pre-commercial thinning, commercial thinning, and salvage logging. With one exception, the treated forests had less area with high severity burns than the untreated forest.

- Prescribed fire was effective at reducing fire severity, especially when the burn was less than 10 years old.

- Some areas in the Rodeo-Chediski fire that had been mechanically treated and where slash had been piled, burned with higher intensities. The slash created additional surface fuels that fed the fire and caused a high severity burn.

DESCRIPTION OF FUEL TREATMENT OUTCOMES

Most fuel reduction treatments are accomplished in several phases. The first step is usually mechanical thinning. The second step is slash reduction to dispose of woody debris. The third step, performed in some treatments, is a controlled fire to burn remnant slash. The slash treatments are important because the untreated slash creates additional surface fuels. If not removed, the new ground fuels will increase the risk of fire ignition (Scott 1998). Depending on the size of trees to be removed, mechanical thinning is accomplished through a service contract or a commercial timber harvest.

The manner in which fuel reduction prescriptions are written plays a role in the post-treatment appearance of the stand. Developing a fuels reduction project typically involves writing the prescription, marking the trees to be cut, cutting and removing the trees and woody material, and disposing of the slash. It is common for these tasks to be performed by different people. An agency forester writes the prescription, a forest technician marks the trees, a contractor cuts the trees, a different contractor may dispose of the slash, and an agency crew may burn piles or light a broadcast burn. With all these people carrying out the project, the prescription becomes an important communication tool. Therefore, prescriptions with a high level of detail and clearly articulated treatment goals have a higher likelihood of achieving desired results.

Two descriptive studies of fuels reduction and restoration prescriptions in the Southwest and northern Rocky Mountains are summarized to provide a generalized picture of the outcomes of fuel reduction treatments (Schumann 2004, Gunderson 2003).

Key Points

- All fuels reduction treatments in the review focus on removing small diameter trees. In addition, some sites with large trees include timber sales to remove merchantable timber.

- Most treatments in the review reduce tree density and basal area (a measure of tree volume per acre), and some treatments in the Southwest reduce tree density beyond what was planned.

- When any single attribute is the focus of a treatment, such as tree density or canopy cover, the results are more uniform tree spacing and forest structure. When a number of forest characteristics are considered together, the results tend to be more diverse.

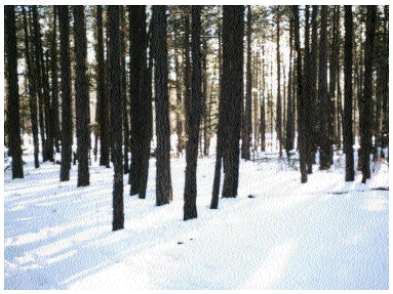
- Historically, tree crowns in ponderosa forests were interlocked, in clumps, and widely spaced, in gaps. These tree crown arrangements are not usually maintained by simple prescriptions for fuels reduction (see Figure 18).

- In general, fuels reduction treatments improve stand vigor by removing stressed trees with small crowns.

- Sites in the Southwest visited one year after treatment had grown sufficient ground cover (usually grasses) to carry a surface fire.

- Occasionally, treatments stimulate a high rate of regeneration, which increases future fire risks by creating new ladder fuels.

LANL, US Department of Energy, New Mexico



Untreated

Treated

Tree density and basal area were much lower in the treated area than in the untreated area. Note the lack of shadows on the snow in the treated stand.

Spring Valley, Kaibab National Forest, Arizona

Untreated

Treated

The treated stand was thinned uniformly in many areas.

Bruno Tank, Apache-Sitgraves National Forest, Arizona

Untreated

Treated

Dense regeneration presented significant ladder fuels in the untreated stands, but was reduced in the treated stand.

Ruedas, Carson National Forest, New Mexico

H. Lopez

Pre-Treatment

Post-Treatment

Percent canopy closure is lower in the treated area than in the untreated area. Tree crowns obscure the sky in the pre-treatment photo, but the sky is visible after the treatment because the crowns are no longer touching.

SUMMARY

Comprehensive evaluation of progress to reduce the likelihood of catastrophic fire by altering fire behavior is not possible with existing data. Instead, we review reports from the major 2000-2003 wildfires and provide descriptions of changes in the fuel profiles of treatment areas in the Southwest and northern Rocky Mountains.

- Reports describing wildfire behavior and burn patterns indicate that strategically placed fuel breaks are effective at dropping crown fire to the ground and in particular, that wildfires slow when they burn into large areas where ground fuels have been cleared out by prescribed fire. The reports also indicate that the behavior of wind-driven wildfire is rarely influenced by fuel treatments, and the severity of large wildfires is patchy.

- Most prescriptions for fuels reduction adjust tree space and canopy closure, and remove ladder fuels, yet do not address tree regeneration even though the regrowth creates new ladder fuels.

- When any single attribute is the focus of a treatment, such as tree density or canopy cover, the results are more uniform spacing and structure. Historical tree crown arrangements are not usually maintained by simple prescriptions for fuels reduction.

natural fire:

The National Fire Plan was originally conceived as a supplement to the Federal Wildland Fire Management Policy, that recognizes the role of natural fire in managed forests. The scientific basis for restoring natural fire is well established (Carey and Schumann 2003). The effectiveness of prescribed fire as a treatment that modifies fire behavior is also well documented. Thus, according to the Ecological Society of America, "Once fuel reduction treatments have begun, attention must be given to the means by which appropriate fuel conditions are maintained, either through prescribed burns or naturally occurring fires. Without such attention, our forests will soon return to their present condition" (Ecological Society of America 2003).

The 1995 Federal Wildland Fire Management Policy provides direction for prescribed and natural fire to be used to restore public forests (USDA and USDI, 2000). However, by 2000 it was clear that implementation of the 1995 Policy was not restoring natural fire regimes. A review committee was convened in 2001. The committee reaffirmed the 1995 Policy and in their 2001 update stated that the idea of fire as an essential ecological process is "the philosophical and policy foundation for activities such as the National Fire Plan" (2001 Policy).

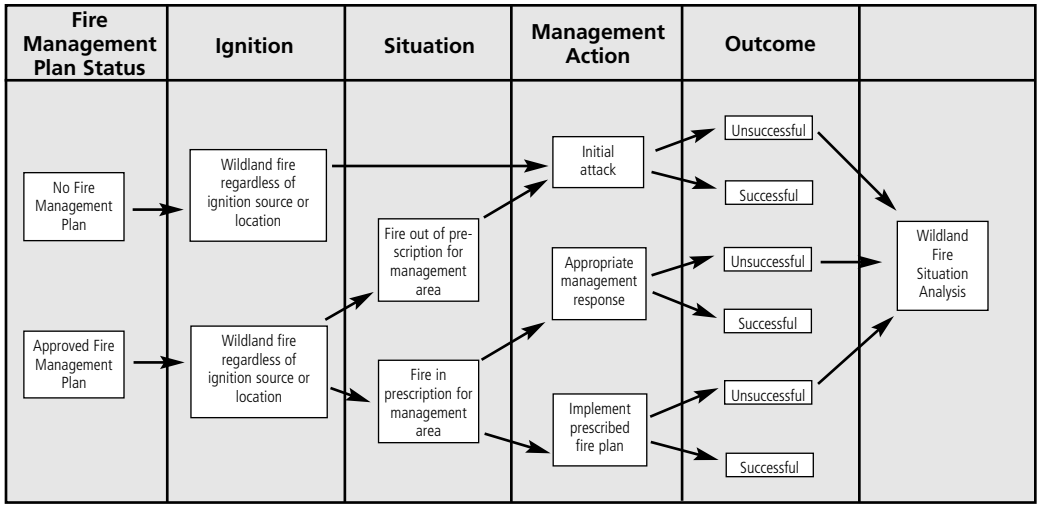
This chapter focuses on the use of prescribed fire and restoration of natural fire through the National Fire Plan. The chapter includes a summary of key elements of the 1995 Policy, discussion of prescribed burns and "wildland fire use," and a review of Fire Management Plans from New Mexico and Idaho where wildland fire use is sometimes employed.

FEDERAL WILDLAND FIRE MANAGEMENT POLICY

The 1995 Policy states as one of its key points that "wildland fire, as a critical natural process, must be reintroduced into the ecosystem." This statement marks a historic shift from the 85-year old practice of fire suppression to a new era of fire management based upon the ecological role of wildfire. The 1995 policy includes protection of human life as the first priority and does not completely abandon fire suppression. However, the policy affirms the natural role of wildfire, calls for pretreatment of vegetation in order to safely reintroduce wildland fire, and initiates a system of Fire Management Plans for every burnable acre of public land in order to guide decisions about when to let fires burn or suppress them.

Fire Management Plans (FMP) are the tools that federal land managers use to put the policy into practice. The plans allow managers to move beyond the old policy of fire suppression by including criteria for either suppressing natural fires or letting them burn to accomplish resource management objectives (see Figure 19). The policy states that "fires in areas without approved Fire Management Plans, or with Fire Management Plans that are not consistent with the 2001 Federal Fire Policy, must be suppressed" (2001 Policy). As a result, current wildfire practice is to employ both suppression and wildfire use tactics.

Figure 19. **Wildland Fire Flowchart**

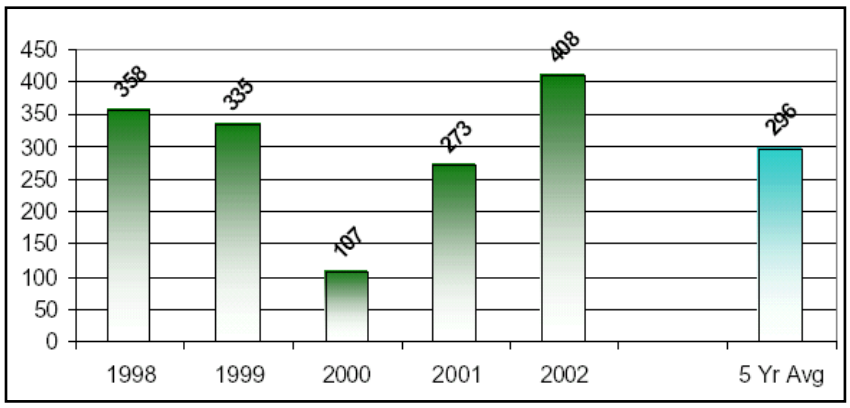


Source: 2001 Federal Wildland Fire Management Policy

The differences between fire suppression and wildland fire use are illustrated by the way in which fire managers take action once an ignition has taken place. A fire suppression action would extinguish the fire are soon as practicable. In contrast, a wildland fire use action would allow an intentional prescribed burn or a naturally-ignited wildfire in a pre-defined geographic area. For both prescribed burns and wildland fire use, the defined geographic area must be stated in the FMP (see Figure 19). Land management units without a FMP cannot employ wildland fire use.

The National Interagency Fire Center has tracked the acres of land treated with wildland fire use since 1998. The area treated with wildland fire varies year to year, and is significantly less than the area where wildfires are suppressed (see figure 20). The number of land management units that have a FMP in place and can use wildland fire has grown since 1998. However the weather has not always been suitable to allow fires to burn. For example, extreme drought conditions in 2000 prompted most land management units to suppress fires, while wet weather in the spring and early summer of 2002 allowed many wildland use fires to proceed.

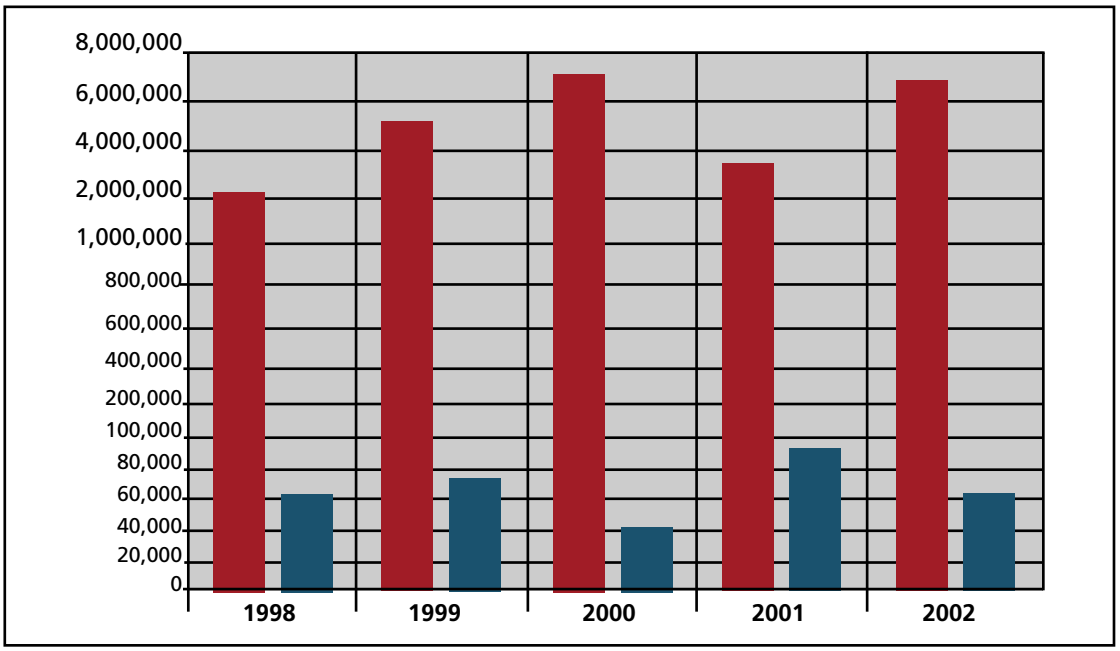
Figure 20. **Wildland Fire Use Acres Burned, 1998-2002**



Source: NIFC Wildland Fire Statistics

National Fire Plan reports to Congress for 2001 and 2002 show the total acres burned with wildland fire use (see Figure 21). The acreage that was allowed to burn was significantly higher in 2002 than in 2001, again because the weather in 2002 was suitable for wildland fire. The agencies also report wildland fire use as a treatment for hazardous fuels (see Figure 22) in both years, with more acres treated in 2002. Wildland fire is primarily used to treat lands that are in designated Wilderness, roadless areas, and other remote tracts of forest where fires can burn without threatening human life or property.

Figure 21. **Comparison of Wildland Fire Use to Fire Suppression Acres**



Source: FY2001 & FY2002 Performance Report: National Fire Plan

Key Points

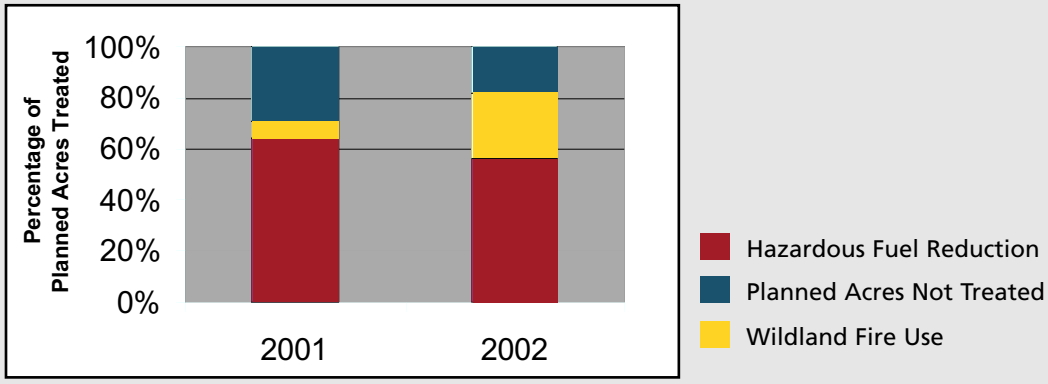
- The 1995 Federal Wildland Fire Management Policy signaled an important policy shift by recognizing fire as an important ecological process. However, the policy has not been fully implemented. For example, the acres treated with wildland fire use each year is still substantially less than the acres on which fires are suppressed.

- Consistent with the 1995 Policy, prescribed fire accounts for the majority of hazardous fuel reduction treatment accomplishments. In 2002, the agencies treated 1.78 million acres with prescribed fire. In this same time period, the agencies treated 1.02 million acres with wildland fire and 82,588 acres with mechanical and other treatments.

- Wildland fire use is employed by some national forests to reduce hazardous fuels on as much as 100,000 acres in one treatment. Generally these large treatments are in or adjacent to Wilderness or roadless areas.

- Accomplishments of wildland fire use vary year to year depending on weather conditions.
- A recent change in agency policy now prohibits wildland fire use accomplishments from being reported as hazardous fuel treatments. This policy change removes one of the few incentives for managers to use wildland fire.

Figure 22. **Wildland Fire Use as Hazardous Fuels Reduction**



Source: FY2001 & FY2002 Performance Report: National Fire Plan

FIRE MANAGEMENT PLANS TO RESTORE NATURAL FIRE

The first directive to the federal land management agencies to write FMPs came in 1995, but by 2001 few administrative units had fully compliant FMPs. The policy review in 2001 resulted in major changes to the guidelines for writing FMPs. An interagency template for FMPs was issued in May 2002 and the agencies were given until December 2004 to develop compliant FMPs.

The interagency template requires that the FMPs carry out the direction of the land and resource management plans. Since many units are operating under Forest Plans that do not address fire management, they have to add fire management to their plan goals, objectives, standards, guidelines, and desired future conditions. New regulations for revision of Forest Plans are still pending, and this has slowed down the ability of many national forests to revise or create FMPs.

FMPs must also comply with the National Environmental Policy Act, and can be "tiered" to a land and resource management plan. For example, the Bureau of Land Management's resource management plans and Forest Service Land and Resource Management Plans are NEPA documents, so their fire management plans need not be. In contrast, units of the National Park Service are developing fire management plans that stand alone as NEPA documents. Proposed changes to Forest Service planning regulations are likely to create Forest Plans that are not NEPA documents, and the impact of this change on Forest Service FMPs is not clear.

The FMPs in two states have been evaluated by non-governmental organizations. The Forest Trust reviewed FMPs in New Mexico and the Idaho Conservation League reviewed plans in Idaho (Oppenheimer and Dickenson 2003).

Fire Management Plans in New Mexico

The Gila National Forest was the first national forest in the Southwest to complete its FMP and to use wildland fire on a significant scale. In the 10-year period from 1988 to 1998, the Gila managed more than 167,500 acres with wildland fire. In 2003 alone, the Gila reported 104,700 acres treated with wildland fire (Bryan 2003).

Several factors helped the Gila to develop a FMP that complies with the 1995 Policy and to use wildland fire as a fuel treatment. The Forest Plan includes direction to manage fire through fire use application in five of the major ecosystem types found in the area. The Forest Plan specifies a fire management objective – to return fire to its natural role in the ecosystem -– as well as to reduce the risks and consequences of unwanted wildland fire and to reduce unnatural fuel buildups.

The Gila's FMP specifies where wildland fire will be allowed, linking fire management units to management areas in the Forest Plan. The FMP includes guidelines for wildland fire use size and intensity that allow the managers to assess when conditions are right to let a wildland fire burn or when a fire should be suppressed.

The Gila FMP outlines steps for collaboration with other agencies and organizations to create local plans for wildland urban interface fire risk management and interagency fire suppression. As guidelines for working with wildland urban interface areas, the Gila FMP recommends: (1) open communication; (2) access to decision making; (3) group deliberation and action; (4) the building of long-lasting relationships so the goals are envisioned and realized. Suggested partners include private landowners, land developers, fire departments, conservation groups and other agencies. "Recognizing the many political, social, and economic factors that limit treatment of the forest, it remains essential to continue participation in grassroots, community-based and driven programs that are seeking solutions and developing methods for improving conditions" (Gila 2002).

Four other national forests in New Mexico used the Gila FMP as their template, but their ecological goals were not as well articulated and fewer partners were involved in collaboration. The Santa Fe National Forest had a mid-size "wildland use" fire in 2003, when a 10,000 acre fire burned for weeks in the Pecos Wilderness, and was eventually suppressed when a wind shift caused the fire to burn onto Tribal lands and cause damage to the tribe's water supply. In another example, the National Park Service and Bureau of Land Management collaborated to write a FMP for the El Malpais National Monument in 2001. This interagency plan considers wildland fire use in the context of the adjacent lands, which include National Forest, Tribal and private lands. As of the 2003 fire season, no wildland fires had ignited in the area yet.

Fire Management Plans in Idaho

The Idaho Conservation League reviewed FMPs for eight national forests, one national monument and four Bureau of Land Management field units (Oppenheimer and Dickinson 2003). They found that only four of the thirteen plans were compliant with the 2001 fire policy, although many of the non-compliant FMPs followed the template format. The most common deficiencies in the plans were little or no collaboration across jurisdictions, lack of recognition of fire as an essential ecological process, and failure to specify areas where wildland fire use could be permitted.

The Idaho Conservation League observed that wildland fire use in Idaho was confined to designated Wilderness areas and that fire suppression was still aggressively pursued outside those protected areas. Only two of the national forest FMPs they examined identified areas outside of Wilderness where wildland fire use was permitted.

Five of the eight national forests in Idaho reported wildland fire use acres in the past 10-years, but they burned on average only 2,250 acres per year. The Bureau of Land Management in Idaho did not use wildland fire on any of their lands. In northern Idaho, the scattered nature of BLM holdings made wildland fire use difficult, but in southern Idaho the generally consolidated tracts made fire use feasible.

Key Points

- Prescribed fire is used to treat more acres for hazardous fuels than any other form of treatment, and its effectiveness at changing fire behavior is well documented in the scientific literature.

- The use of wildland fire on public lands varies widely, with a few land management units that actively use wildland fire, and most units not using it at all.

- Most federal land management units do not have Fire Management Plans that are fully compliant with the 2001 fire policy. That is, most units have plans that follow the template format, or will have them done by December 2004, but many do not have the content to support a decision to employ wildland fire use.

SUMMARY

Federal policy recognized fire as an important ecological process for the first time in 1995 when the Federal Wildfire Management Policy was created. This historic new policy established protocols to allow natural fires to burn and to limit the century-old practice of fire suppression.

- The acreage where natural fires are allowed to burn is small compared to the acres where fire is suppressed.

- Most management units are slow to adopt Fire Management Plans, a prerequisite for using natural fire to accomplish management goals, and many units write plans that lack the necessary substance for wildland fire use.

- The federal agencies do not have a system to review Fire Management Plans and provide quality control.

- Prescribed burning and wildland fire use are the least expensive methods of reducing hazardous fuels (see Figure 6 on page 19). Wildland fire use treatments are only used to restore areas of 10,000 acres or more by a few management units and is usually only employed in or adjacent to designated Wilderness Areas.

restoration treatment outcomes:

The National Fire Plan goal of restoring fire-adapted ecosystems is most clearly articulated in the 10-Year Comprehensive Strategy Implementation Plan. This plan describes the following expected outcome for restoration: "Fire-adapted ecosystems are restored, rehabilitated, and maintained, using appropriate tools, in a manner that will provide sustainable environmental, social and economic benefits."

Restoration is a different activity from fuels reduction (McCarthy and Yanoff 2003). As described in chapter six, fuels reduction treatments alter forest fuels to lessen the amount of fuel and modify the structural arrangement of fuel. In contrast, restoration treatments are concerned with achieving a desired forest condition, often based on an estimate of historical conditions, and that usually includes a return of natural fire regimes. To achieve these conditions, restoration treatments often include fuels reduction in the prescription.

The difference between restoration and fuels reduction treatments is illustrated by the prescriptions to carry them out. Prescriptions are written by foresters as a communication tool to describe the planned treatment to the people who help carry it out – forest technicians, thinning contractors, loggers, and fire crews. An example of a restoration prescription is provided in Figure 23. This prescription seeks to reduce stand densities to pre-1870 conditions; increase the average tree diameter; create clumps of trees interspersed with openings; reduce the cover of woody plants; increase the cover and richness of native herbaceous plants; regenerate ponderosa pine; and increase the frequency of low-intensity fire disturbance. In contrast, the fuels reduction prescription, provided in Figure 18 on page 51, seeks only to reduce the basal area, reduce the number of trees per acre, and create space between trees so their crowns do not touch.

Restoration and fuels reduction treatments are achieved with the same sets of tools – mechanical thinning, slash reduction, and prescribed fire. However, the treatments are best suited for different situations: fuels reduction where the purpose is protection of property and fire-risk reduction, and restoration where the purpose is forest health and increasing resilience to wildfire.

Evaluation of the effect of restoration treatments under the National Fire Plan is difficult to accomplish in a systematic manner. For example, restoration treatments are carried out with hazardous fuels reduction funds and there is no way to determine the proportion of funds spent on restoration treatments. Instead, we provide in this report a description of changes in forest structures in restoration treatments in the Southwest and northern Rocky Mountains (Schumann 2004, Gunderson 2003).

Figure 23. **Sample Restoration Prescription**

Project:	Beaver Railroad Restoration
Project Location:	San Juan National Forest, Colorado
Prescription:	Reduce current stand densities to pre-1870 conditions, post-treatment basal area of 45-55 ft^2 per acre with a clumpy distribution. Increase the average stand diameters (post-treatment average 14 inch dbh or larger), create a clumpy distribution, accentuating uneven-aged character. Increase the crown base height by 20% or more. Reduce cover of woody plants (e.g. Gambel oak) and detritus (litter and woody debris). The canopy cover percent of Gambel oaks should be reduced by 10-30%, the depth of litter layer should be reduced to less than 1 inch, and the quantity of 1 to 10-hour fuels should be less than pre-harvest conditions. Reduce down woody fuels. The tons per acre of 100-hour fuels should be below pre-harvest conditions. Increase cover and diversity of native herbaceous plants and increase pine reproduction. There should be measurable change in richness and cover of herbaceous plants. Pine regeneration should occur within 20 years at a rate of 50 seedlings and saplings per acre. Increase habitat diversity on a landscape scale. Leave clumps of trees up to 3/4 acres in size. Create openings up to 1/2 acre in size. Create more open stand structures in the widespread second growth ponderosa pine type, manage for two or more snags per acre, reduce conifer competition around the scarce inclusions of aspen, protect piñon pine, juniper, and Douglas fir where found, and save clumps of oak-brush where average stem diameter is 3 inches or greater. Increase the frequency of low intensity fire disturbance including some level of summer fire. Prescribe burn twice within 10 years post-harvest, third burn within 20 years. At least one burn should occur during the height of the growing season. Save all snags. Leave all trees with old growth attributes (yellow platey bark and flat-topped crowns).

Source: Schumann 2004

Key Points

- Restoration treatments tend to consider a number of forest characteristics. The structure and composition of stands treated for restoration purposes are usually more diverse than stands treated for fuels reduction purposes.
- Historically, ponderosa pine forests had tree crowns that were interlocked in clumps, and widely spaced, in gaps. These historical tree crown arrangements are usually maintained in restoration prescriptions.
- The pretreatment condition of forest stands has some bearing on the treatment outcome. For example, if a stand is uniform before restoration treatment, it will probably remain uniform afterwards. Conversely, the diversity of stands that have varied structure and large diameter trees before treatment is usually maintained.
- Some restoration treatments diversify tree spacing, where the starting stand has regular spacing, by leaving denser clumps and creating interspersed openings. The clumps are usually separated from the surrounding tree canopies to create an irregular pattern.

- Restoration treatments usually seek to increase understory plant cover, for wildlife habitat, protection against soil erosion, to inhibit dense tree regeneration, and to provide fine fuels to carry a low-intensity ground fire.

- Large, old trees are usually retained in restoration treatments because of their fire-resistant characteristics. The large trees also perpetuate genetic diversity and contain in their growth rings important records of past climate and disturbance events.

- In general, the northern Rocky Mountain sites started with significant diversity in terms of species composition, habitat type and stand structure. Prescriptions were typically complex enough to successfully perpetuate or improve stand diversity.

Beaver Railroad, San Juan National Forest, Colorado

Untreated

Treated

Small natural openings exist in the untreated area. To mimic these, openings were created in the treated site, increasing cover and diversity of grasses and herbaceous plants.

Colt Restoration, San Juan National Forest, Colorado

Untreated

Treated

Density of trees is higher in the untreated site than in the treated site.

Fort Valley, Coconino National Forest, Arizona

Untreated

Treated

The density of small trees is low in the treated area compared with density in the untreated area. Tree density is high in the background of the treated photo because the photo was taken near the boundary of the treated stand.

Chain of Lakes, Lolo National Forest, Montana

Untreated

Treated

The removal of small trees created an open forest structure with multi-storied tree clumps.

Holbrook, Flathead National Forest, Montana

Untreated

Treated

The prescription significantly reduced the presence of saplings and seedlings, created a more open canopy, and removed ladder fuels without excessive opening of the canopy.

West Fork, Bitterroot National Forest, Montana

Untreated

Treated

The treated area had open spacing, but was uniform with few clumps.

Mouth of Munson, Lolo National Forest, Montana

Untreated

Treated

This treatment used only prescribed fire to reduce surface fuels, and although the stand density was not much changed, there was an increase in large, fire-resistant trees.

SUMMARY

- Restoration treatments are used to improve forest health and increase forest resilience to wildfire, although the treatment methods – mechanical thinning, slash reduction and prescribed fire – are the same as for fuels reduction.

- The 10-Year Comprehensive Strategy Implementation Plan offers the vision that restoration of fire-adapted forests will be achieved through the National Fire Plan. Yet restoration outcomes are currently reported as hazardous fuels treatment accomplishments.

- Prescriptions for restoration treatments usually diversify forest structure and modify surface, ladder and crown fuels. Restoration treatments usually retain a varied arrangement of trees.

- Fuels reduction treatments that rely on simply parameters such as basal area and trees per acre to describe the desired future condition usually result in a uniform structure.

- Restoration treatments reduce fuels and are funded as hazardous fuels reduction projects. Thus it is not possible to differentiate the proportion of the National Fire Plan budget used for restoration treatments.

accountability:

Public pressure to "do something" about catastrophic wildfire led to the National Fire Plan and created strong public interest in the outcomes of the Plan. Accountability was stressed in the first governmental response to the 2002 wildfires, the September 2000 report, Managing the Impact of Wildfires on Communities and the Environment. This report called on the Departments of Agriculture and the Interior to establish performance objectives for the National Fire Plan. Congress also addressed accountability in the 2001 Interior Appropriations Bill, stating in the conference report, "the managers are especially concerned that the agencies perform," and requiring the agencies to submit a financial plan, action plan and annual performance reports. Finally, the 10-Year Comprehensive Strategy calls for "accountability through performance measures" and provides measures in its Implementation Plan.

Three years after the National Fire Plan's adoption, the federal land management agencies are still working to develop a comprehensive system for tracking their programs. It remains difficult for people outside the federal government to piece together a comprehensive picture of how the Fire Plan is affecting forests and communities. Many people seek information about the Fire Plan, for example, contractors who want to know how much thinning work to expect in the coming year. When outside constituencies ask questions of the federal agencies, they may be provided with lists of project names and acres treated that are organized by agency or land management unit. Yet these piecemeal reports do not provide a clear picture of the context in which the activities are taking place, nor of their effectiveness and outcomes.

This chapter begins with an evaluation of the systems established by the federal land management agencies to help them be accountable. The performance measures set through the 10-Year Comprehensive Strategy are described and progress to use the measures is assessed. Next, a review is provided of systems created by community groups to track effects of the National Fire Plan.

SYSTEMS TO ESTABLISH ACCOUNTABILITY

The need for accountability for the National Fire Plan is clearly demonstrated in a November 2001 audit report by the USDA Office of Inspector General. This audit examined Forest Service controls to ensure that National Fire Plan funding is properly used. The auditors reviewed the use of FY 2001 funds for rehabilitation and restoration in the Northern Region of the Forest Service (R-1) and questioned $2.5 million of planned expenditures that were outside the scope of the purposes for which the funds were appropriated. The auditors noted that the regions were allowed to pick their own projects without oversight and concluded that "without close monitoring and supervision from the Washington Office…there is no assurance that regions will only select those projects that meet NFP goals and objectives."

The General Accounting Office also challenged the federal land management agencies to implement a performance accountability framework (GAO 2001). Such a framework would include "clearly defined and outcome-oriented goals and objectives, as well as quantifiable long-term and annual performance measures to assess progress…[and] a comprehensive long-term strategy that incorporates criteria, goals, objectives and measures." The GAO suggested that the Government Performance and Results Act of 1993 be used as a framework to implement the National Fire Plan, along with the 1995 Federal Wildland Fire Management Policy and Congressional direction.

In May 2002, the Secretaries of Agriculture and the Interior adopted the 10-Year Comprehensive Strategy, which calls for accountability through performance measures. The Comprehensive Strategy goes further than the GAO's recommendations by providing a framework for "tracking performance, monitoring, and assuring that projects and activities are consistent with relevant science and new information." Specific performance measures are presented in the Implementation Plan (see Figure 24).

The Forest Service took steps to correct the problems raised by the USDA Office of Inspector General and, with the Department of the Interior, to address the GAO's concerns. For example, the federal land management agencies created the National Fire Plan Operations Reporting System (NFPORS) and structured the system to reflect the 10-Year Plan performance measures. NFPORS helps the agencies to fulfill their Congressional mandate and makes it possible for them to record expenditures and accomplishments in one system (USDA OIG 2001).

Early in 2003, the federal land management agencies were directed by the Secretaries of Agriculture and Interior to use a comprehensive list of inputs, data standards and formats for collection of baseline data in FY 2003 and to lay the foundation for a transition to performance measurements in FY 2004. Beginning with FY 2004, the agencies started using NFPORS exclusively to report their accomplishments.

NFPORS does not serve all the needs for accountability of either land managers or the public. For example, NFPORS can be used to report on the number and type of projects by land management unit, congressional district and state. However, NFPORS cannot be used to explain how treatments accomplished their objectives (GAO 2002).

The agencies recognize that NFPORS does not track all of the variables needed to measure performance. Thus, "fire sciences research funded by the National Fire Plan is assessing monitoring schedules and protocols to meet the requirements" of both the NFP and the Healthy Forests Restoration Act. "Recommendations for implementation will be made to the Wildland Fire Leadership Council" (USDA FS and DOI 2004).

TRACKING THE EXTENT AND LOCATION OF TREATMENTS

Individual state maps on the National Fire Plan web site (www.fireplan.gov), produced with data from NFPORS, show fuels reduction and restoration treatment locations as points, with symbols indicating the type of treatment and ownership of the treated area. However, these maps do not provide information about the size or spatial arrangement of the treatments. Nor do the maps indicate the combination of activities that make up the treatment -– for example an initial entry of

Figure 24. **Performance Measures in the 10-year Comprehensive Strategy Implementation Plan**

Promote Community Assistance	a) Percent of states with a prioritized list of at-risk wildland urban interface communities. b) Percent of communities at risk with completed and current fire management plans or risk assessments. c) Percent of communities at risk with fire prevention programs in place and being implemented. d) Percent of communities at risk that initiate volunteer and community funded efforts to reduce hazardous fuels resulting in removal of the community from the at risk list. e) Percent of acres treated to reduce hazardous fuels by mechanical means with by-products utilized.
Reduce Hazardous Fuels	a) Number of acres treated that are (i) in the wildland urban interface or (ii) in condition classes 2 or 3 in fire regimes 1, 2, or 3 outside the wildland urban interface, and are identified as high priority through collaboration consistent with the Implementation Plan, in total, and as a percent of all acres treated. b) Number of acres treated per million dollars gross investment in measures a) (i) and (ii) respectively. c) Percent of prescribed fires conducted consistent with all Federal, State, Tribal and local smoke management requirements.
Restore Fire-Adapted Ecosystemns	a) Number of acres in fire regimes 1, 2, or 3 moved to a better condition class, that were identified as high priority through collaboration consistent with the Implementation Plan, in total, and as a percent of total acres treated. b) Percent of acres degraded by wildland fire with post-fire rehabilitation treatments underway, completed or monitored. c) Number of acres in measure a) moved to better condition class per million dollars of gross investment.
Improve Fire Prevention and Suppression	a) Amount of time lost from firefighter injury in proportion to number of days worked from across all agencies. b) Number of acre burned by unplanned and unwanted wildland fire. c) Percent of unplanned and unwanted wildland fire controlled during initial attack. d) Number of homes and significant structures lost as a result of wildland fire. e) Average gross costs per acre for suppression and emergency stabilization and rehabilitation by size class and fire regimes for fires (i) contained within initial attack, (ii) escaping initial attack, (iii) within wildland urban interface areas, (iv) outside wildland urban interface areas, (v) in areas with compliant fire management plans and (vi) in areas without compliant fire management plans. f) Percent of burnable acres covered in federal fire management plans in compliance with Federal Wildland Fire Policy. g) Percent of burnable acres covered by state fire management plans in compliance with state policy.

mechanical thinning, followed by slash disposal and prescribed fire – nor of the timing and sequence of the treatment activities. In addition, the state maps on the Fire Plan web site do not provide a context for assessing the impact of fuel treatments. For example, the maps do not show the treatments in relation to communities and wildland urban interface areas, nor do they provide sufficient information to assess the extent of treatments in relation to roadless areas, old growth forests, or threatened and endangered species habitat.

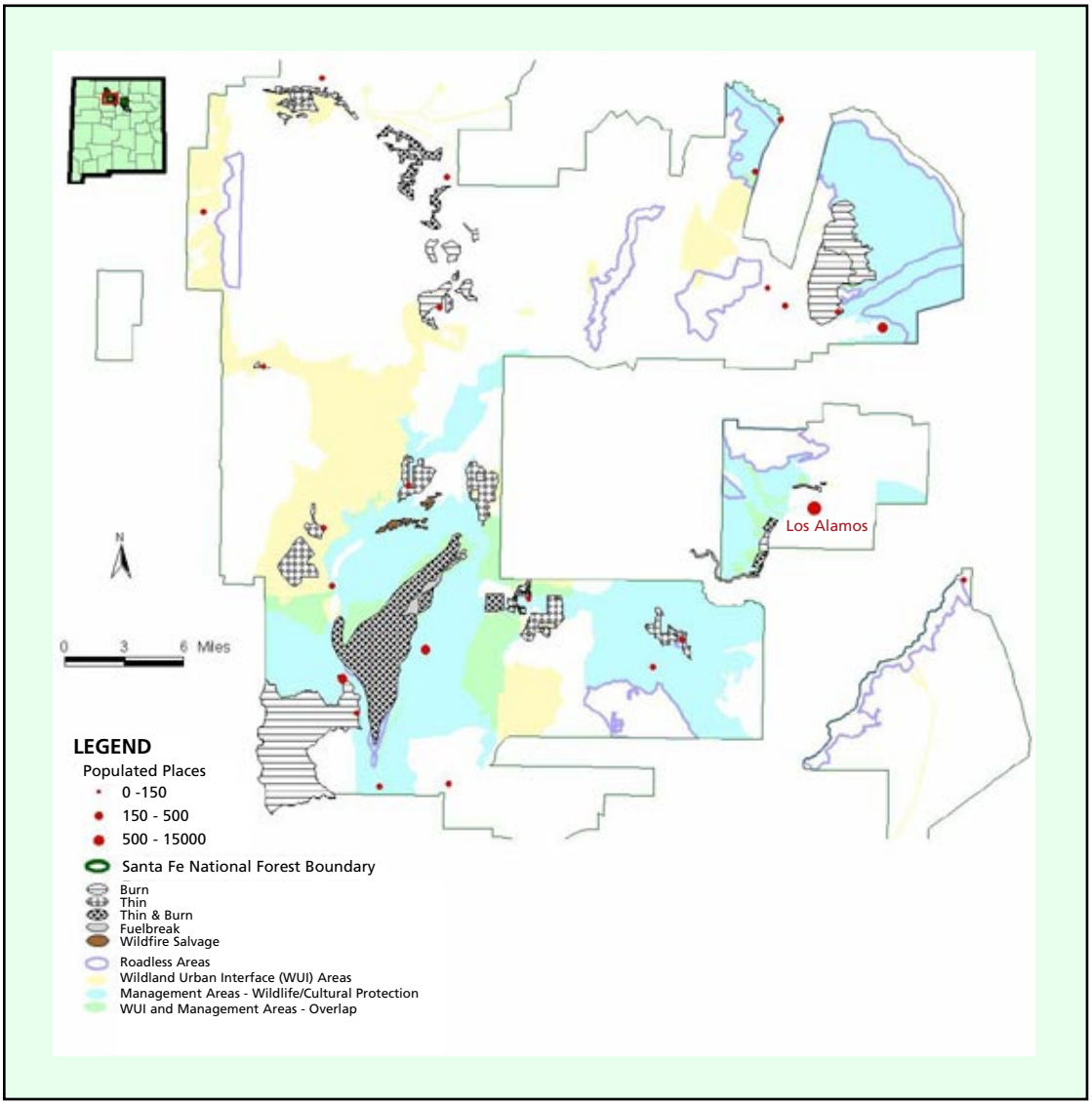
Some communities are tracking the location and extent of National Fire Plan projects on their own. These communities use maps to depict hazardous fuel reduction treatments and to analyze the projects

in terms of other forest attributes and resources. Sometimes the maps are created as part of a community process to create a fire protection plan. Examples are provided from the Jemez Mountains and East and Manzano Mountains in New Mexico and the Applegate Valley in Oregon.

Jemez Mountains, New Mexico

The map in Figure 25 depicts projects funded entirely or partially with National Fire Plan dollars in the Jemez Mountains of the Santa Fe National Forest. The hazardous fuel reduction projects are a mixture of thinning, prescribed burn, fuelbreaks and wildfire salvage logging projects (because they were funded as a rehabilitation activity of the Fire Plan. The National Fire Plan directed the federal land management agencies to concentrate much of their work in the WUI to protect people and property from catastrophic fire.

Figure 25. **Jemez Mountains, New Mexico**



Key Points

- The Santa Fe National Forest planned and implemented more thinning projects of relatively small acreage near areas with human settlement than it did prescribed burns. Thinning is used primarily to create fuelbreaks. In remote areas of the forest, prescribed fire is the most prevalent mode of treatment.

- As the map shows, a large proportion of the fuel reduction projects planned are within or in close proximity to WUI areas.

- Two hazardous fuels reduction projects with mechanical thinning and prescribed burning on the Santa Fe National Forest are in roadless areas. Roadless areas retain important ecological values and are potential future wilderness areas. The Forest Plan for the Santa Fe National Forest does not allow road building in these areas.

- Over one half of the proposed fuels reduction projects are situated in Forest Plan Management Areas designated as essential habitat for threatened and endangered species. In these special habitat areas, the management emphasis in the Forest Plan is to protect, improve and enhance wildlife habitat. Thus, projects planned in threatened and endangered species habitat listed habitat enhancement among the primary purposes.

East and Manzano Mountains, New Mexico

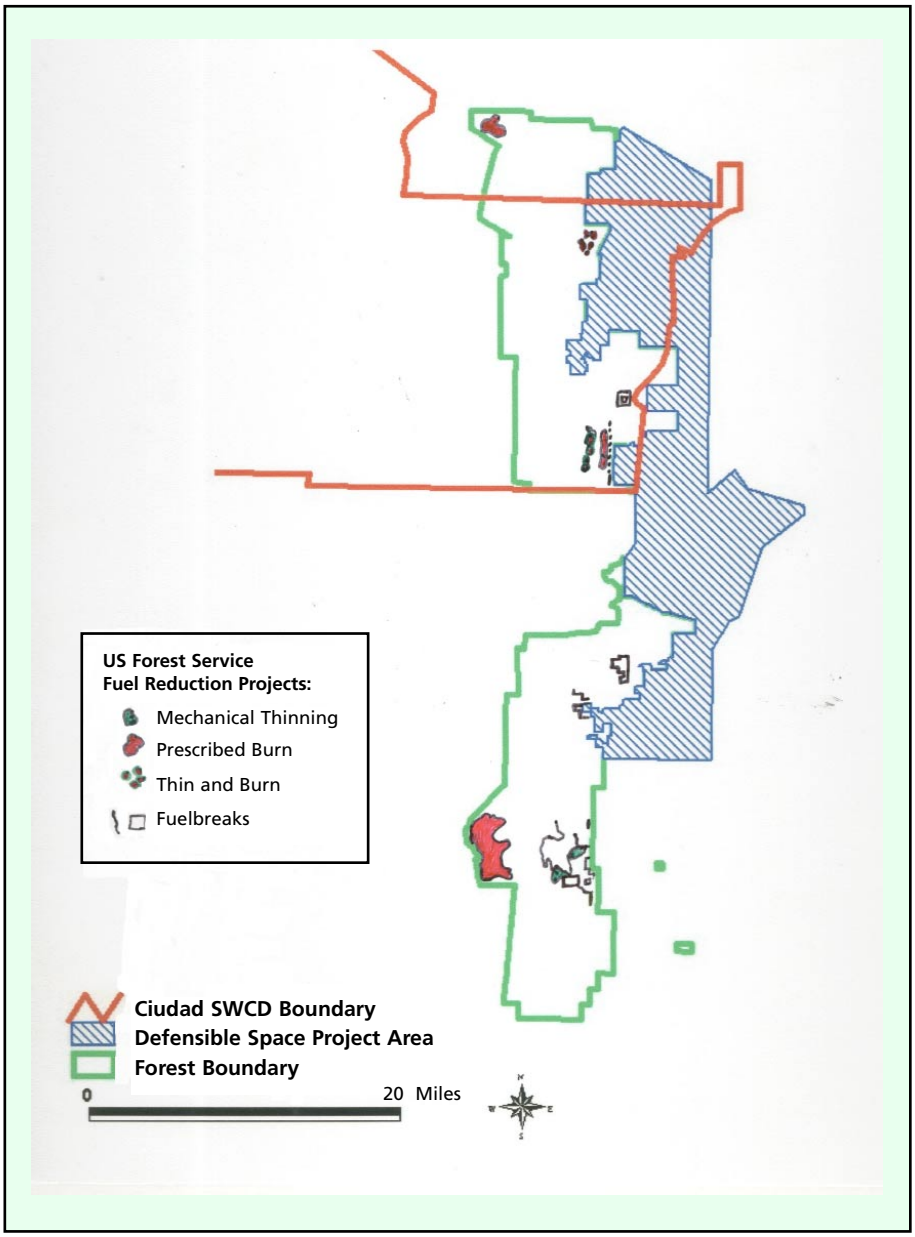
The map in Figure 26, hazardous fuel reduction projects on the Mountainair District of the Cibola National Forest, was created by Las Humanas, a collaborative group of five Hispano land grant communities. The diagonal hatching is a wildland urban interface area of private land that was identified by the New Mexico Division of Forestry as high-risk. The national forest is adjacent to these private lands.

Key Points

- All of the fuel breaks and mechanical thinning treatments on national forest are to protect the human settlements on adjacent private lands. Many of the treatments are within 1 mile of private lands. One larger treatment area is several miles away from the interface, yet is sited appropriately given the prevailing winds and likely points of ignition.

- The areas treated with prescribed fire are further from human settlements and on the west slope of the mountains where prevailing winds would push a fire to higher elevations and away from homes.

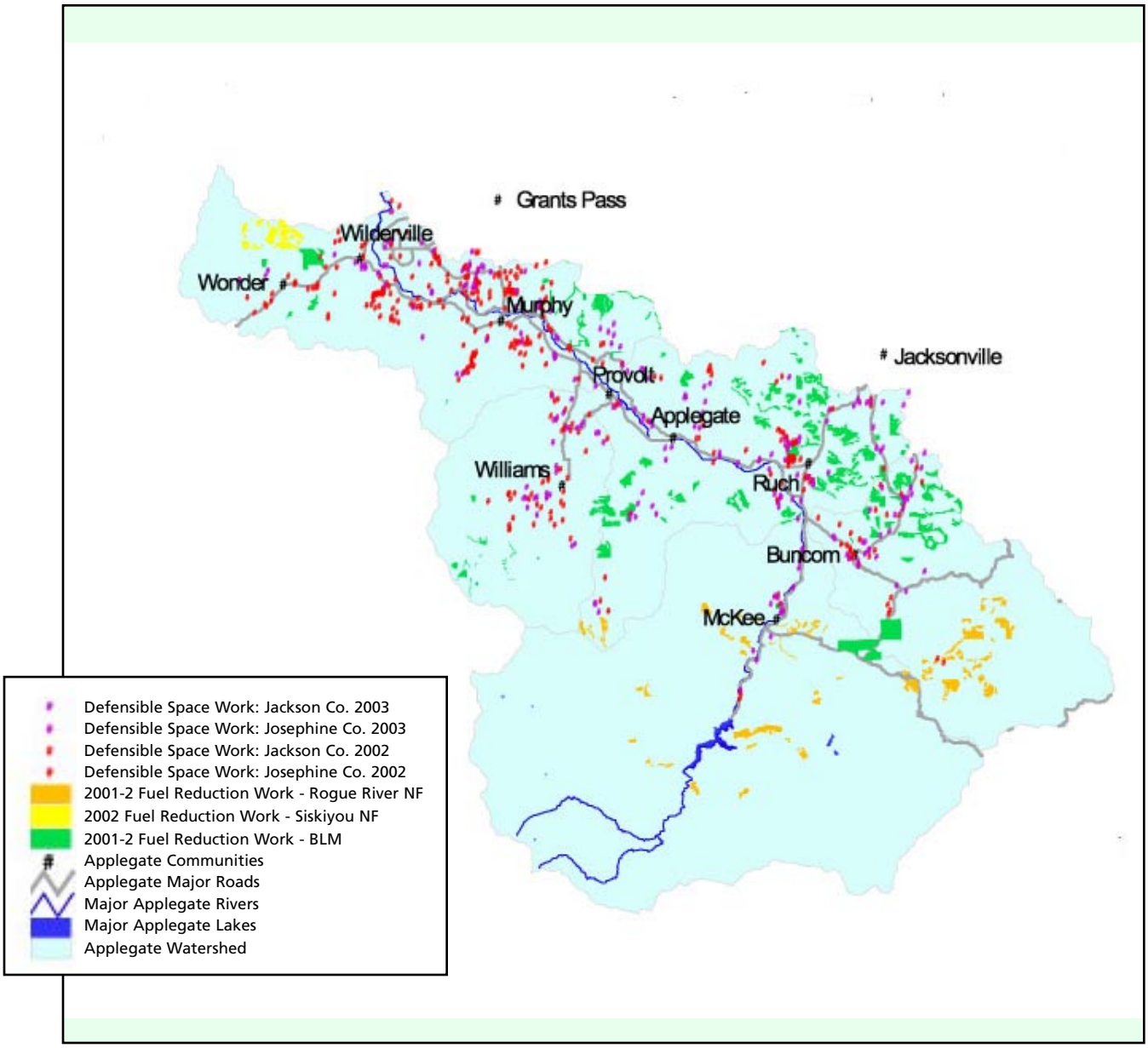
Figure 26. **East and Manzano Mountains, New Mexico**



Applegate Valley, Oregon

The Applegate Valley is a 4th field watershed, encompassing nearly 500,000 acres, eighty-four percent of which is either high or moderate fire hazard (Shaffer 2004). Land ownership in the Applegate is evenly split between two national forests, the Bureau of Land Management, and private ownership. Eight unincorporated communities in the valley, with approximately 7,400 residents, are considered to be "at-risk." These communities created the Applegate Communities Collaborative Fire Protection Strategy, and one of their map products is displayed in Figure 27.

Figure 27. **Applegate Valley, Oregon**



Source: The Applegate Fire Plan

The Applegate Fire Plan, partially funded in FY 2001 with a Fire Plan community planning grant, was a joint effort of the community and local, state, and federal agencies. These groups assessed the entire watershed for fire hazard and risk, regardless of land ownership, and identified fuel reduction strategies across all lands. Work to implement these strategies has progressed over the last two years and the accomplishments are shown in Figure 27. Most of the treatments on private lands were funded with grants through the National Fire Plan and in-kind landowner contributions. The maps developed by participants in the Applegate Communities Collaborative Fire Protection Strategy resulted in the following analysis.

Key Points

- A total of 388 landowners in the Applegate Valley thinned 550 acres to create defensible space around their homes and along access roads in 2002.
- In 2003, 220 additional landowners thinned over 535 acres to provide defensible space and access.
- Local fire officials estimate that roughly another 20% of Applegate landowners have completed reduced fuels without rebates from the National Fire Plan.
- During FY 2001-2002, the Forest Service and the BLM treated a combined 18,200 acres for fuels reduction in the Applegate Valley.
- The outreach and education that stemmed from the Applegate Fire Plan increased resident awareness of fire issues so that human-caused fire starts declined below the 10-year average in 2003.

SUMMARY

Despite the emphasis in the National Fire Plan on accountability, it is still difficult to assess how the plan is affecting forested areas.

- Consistent data to assess outcomes of the Plan across the West were nearly impossible to obtain, underscoring the need for a better system for documenting the effects of this important federal policy.
- The National Fire Plan Operations Reporting System (NFPORS) will be fully operational in 2004. However, some important questions about the effects of the National Fire Plan cannot be answered with this data system, and a monitoring framework that is expected to fill in the gaps is being developed.
- Some proactive communities created their own maps, which reveal that many fuel reduction projects are, in fact, usually located in areas where significant housing development has occurred in the wildland urban interface.

APPENDIX

METHODS

The methods and data for each chapter are summarized in this appendix.

Funding the National Fire Plan

We wrote this chapter using statistics about the National Fire Plan from a variety of published sources, including the National Interagency Fire Center, National Academy of Public Administration, and the National Fire Plan web site with reports by the Departments of Agriculture and the Interior. We also used three research reports about the costs of fuels treatments.

Economic Opportunities

This chapter contains data collected from a wide variety of sources. First we present national data about community assistance programs that fund capacity building endeavors. Next we summarize a variety of data regarding local employment and business opportunities that were directly attributed to the National Fire Plan. These studies in Oregon, Washington, and California compare the employment effects of National Fire Plan contracting to other kinds of ecosystem service contracting. Then we present case studies of National Fire Plan projects with data collected by the Forest Trust including: a case study of local employment with non-traditional contracting tools; interviews with a handful of micro-businesses involved in value-added production in the Southwest; information about the award of best value contracts to local businesses from community-based organizations in various states, including New Mexico, Oregon, Washington, California and Idaho; interviews about barriers encountered by local contractors in New Mexico; and case studies of training to build local workforce capacity and engage youth in the Southwest. The case studies and interviews are not intended to be representative of the full range of production enterprises and facilities that are linked to the National Fire Plan.

Community Protection

The first part of the chapter is based on information in the 2001 and 2002 NFP Performance Reports. The second part of the chapter incorporates findings from a study by the University of Oregon's Center for Watershed and Community Health, that documents evidence of the disproportionate effects of wildfire on low-income communities. The case studies in the remainder of the chapter are from New Mexico and Washington. Analysis for the New Mexico case study was conducted by gathering economic data from the United States Census Bureau (2000) about the communities in the study area. A database of all the capacity building and fire protection grants distributed through the National Fire Plan was created. The case study from Washington was developed through interviews.

Setting Priorities

We reviewed the 2001 Interior Appropriations Bill and federal register notices published by the agencies on January 4, 2001 and August 12, 2001. We interviewed federal and state officials who were involved in setting the process of identifying communities at risk and gathered additional

information from meetings with leaders of the National Fire Plan and at public meetings such as the 2003 National Fire Plan Conference. We collected data about implementation of the WGA approach to setting priorities by studying the Comprehensive Strategy, Implementation Plan, and Field Guidance to States. We also interviewed members of the WGA stakeholders committee and NASF staff responsible for developing the guidance to states for identifying and prioritizing communities at risk.

We reviewed the published literature about fire regime condition class as well as many background studies used by the developers of condition class. We also interviewed several of the scientists who worked on condition class. We tested the accuracy of the national-scale condition class data with case studies of the Santa Fe and Carson National Forests.

Collaboration

We studied published documents, including legislation, and interviewed individuals about their experiences with collaboration, and included some of the research literature on collaboration. We gathered additional information at meetings of the Wildland Fire Leadership Council, Western Governor's Association, and the 2003 National Fire Plan Conference.

Fuel Treatment Outcomes

This chapter is based primarily on reviews of three government reports about two large wildfires that burned in 2002. The first study was of the Hayman fire and the second two reports were about the Rodeo-Chediski fire. In addition, two descriptive studies by the Southwest Community Forestry Research Center were included for information about the outcomes of fuel treatments in the Southwest and northern Rocky Mountains.

Natural Fire Restoration

We reviewed a number of documents to determine the extent to which the National Fire Plan has expedited the policy shift from fire suppression to natural fire use. These included the 1995 and 2001 Federal Wildland Fire Management Policy documents, and published statistics about fire suppression and wildland fire use from the National Interagency Fire Center. We also reviewed Fire Management Plans (FMP) in New Mexico to assess their compliance with national policy and reviewed a report by the Idaho Conservation League on FMPs for federal land management units in Idaho.

Restoration Treatment Outcomes

This chapter is based on two studies by the Southwest Community Forestry Research Center providing information about fuels treatments in the Southwestern and northern Rocky Mountains. The studies used the descriptive method of research to systematically document treatment sites with data, photographs, observations and site-related documents. Study sites in the Southwest were located in ponderosa pine forest types, while in the northern Rocky Mountains, projects in ponderosa pine and mixed conifer forests were considered. Descriptions were provided of stands within a project area that were either "treated" or "untreated." Forest stands that were not treated but that were of

the same forest type, had a similar management history, and evinced similar site attributes (such as slope and aspect) were used as a proxy for actual, pre-treatment conditions. Sampling plots were established to capture the range of variability of forest conditions within the treated and adjacent areas.

Accountability

We reviewed government documents and reports to write the section on performance measures. For the second section, we used maps created by three community groups – the Forest Trust, Las Humanas, and Applegate Partnership. The maps were created with agency data and include thinning, prescribed burning, and salvage sales. The fuel treatments were compared to overlays of roadless areas, wildland-urban interfaces, private lands, forest units of old growth, and soils.

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