

April 2003

WILDLAND FIRES

Better Information Needed on Effectiveness of Emergency Stabilization and Rehabilitation Treatments



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Highlights

Highlights of [GAO-03-430](#), a report to the Chairman, House Committee on Agriculture, and the Chairman, House Subcommittee on Department Operations, Oversight, Nutrition, and Forestry, Committee on Agriculture

Why GAO Did This Study

Wildfires burn millions of acres annually. Most burnt land can recover naturally, but a small percentage needs short-term emergency treatment to stabilize burnt land that threatens public safety, property, or ecosystems or longer-term treatments to rehabilitate land unlikely to recover naturally. The Department of the Interior (Interior) and the Department of Agriculture's (USDA's) Forest Service—the two departments that manage most federal land—spend millions of dollars annually on such treatments. GAO was asked to (1) describe the two departments' processes for implementing their programs, (2) identify the costs and types of treatments implemented, and (3) determine whether these treatments are effective.

What GAO Recommends

To ensure effective emergency stabilization and rehabilitation treatments, GAO recommends Interior and USDA (1) specify procedures to be used to monitor treatment effectiveness, including type and extent of monitoring data collected and methods to collect these data, and (2) develop an interagency system to collect, store, and disseminate information on monitoring results.

Commenting on the draft report, Interior and USDA generally agreed they can do more to ensure that funds for emergency stabilization and rehabilitation are used effectively.

www.gao.gov/cgi-bin/getrpt?GAO-03-430.

To view the full report, including the scope and methodology, click on the link above. For more information, contact Barry Hill at (202) 512-3841 or hillbt@gao.gov.

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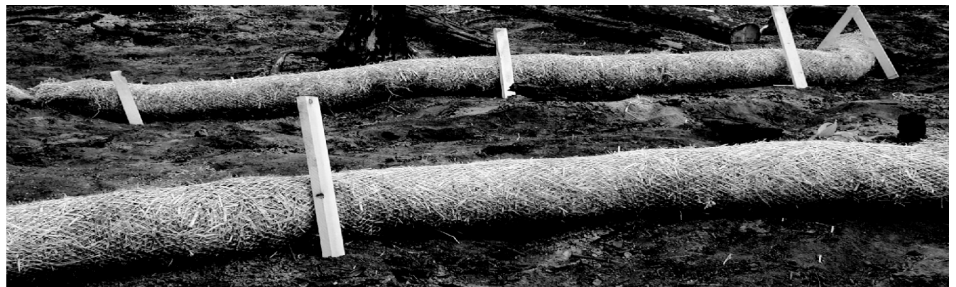
Better Information Needed on Effectiveness of Emergency Stabilization and Rehabilitation Treatments

What GAO Found

Both Interior and USDA's Forest Service use multidisciplinary teams of experts, such as ecologists and soil scientists, to assess damage and potential risks burnt land poses and to develop emergency stabilization and rehabilitation plans that identify needed treatments to reduce or eliminate those risks. The two departments differ in how they manage their programs, however. Interior uses a single process to assess damage and identify treatments for short-term emergency stabilization and longer-term rehabilitation, while USDA's Forest Service uses different processes for each of these two treatment types. The two departments recognize these differences and recently agreed to work toward standardizing certain aspects of their programs, such as definitions and time frames.

Following the 2000 and 2001 fires, the Forest Service obligated \$192 million and Interior \$118 million for 421 emergency stabilization and rehabilitation treatment plans GAO reviewed. Treatments included seeding; fencing; installing soil erosion barriers such as straw bundles, or wattles; and road or trail work. Most of Interior's land—managed by the Bureau of Land Management—consists of rangeland. Thus, the bureau primarily seeded native grasses to retain soils and forage for cattle and wildlife and fenced to prevent grazing. Forest Service land is often steeply sloped and includes watersheds used for drinking water and timber. The Forest Service primarily seeded fast-growing grasses and built soil erosion barriers for emergency stabilization, and worked on roads, trails and reforested for rehabilitation.

Neither the departments nor GAO could determine whether emergency stabilization and rehabilitation treatments were achieving their intended results. The departments require that treatments be monitored, but they do not specify how and the type of data to collect or analyze for determining effectiveness. The departments have stressed the need to systematically collect and share monitoring data for treatment decisions. Yet neither has developed a national interagency system to do so. Therefore, the nature and extent of data collection, analysis, and sharing vary widely. The departments recognize that they need better information on treatment effectiveness. However, they have not yet committed to this effort.



Source: GAO.

Bundles of Straw, or Wattles, Used as Erosion Barriers on Steep Slopes.

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Abbreviations

BLM Bureau of Land Management
USDA U.S. Department of Agriculture

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United States General Accounting Office
Washington, D.C. 20548

April 4, 2003

The Honorable Bob Goodlatte
Chairman, Committee on Agriculture
House of Representatives

The Honorable Gil Gutknecht
Chairman, Subcommittee on Department Operations,
Oversight, Nutrition, and Forestry
Committee on Agriculture
House of Representatives

In 2002—the second largest fire season in the past 50 years—wildland fires burned almost 7 million acres and destroyed timber, natural vegetation, habitat for wildlife, homes, and commercial businesses. Wildland fire is a natural occurrence and millions of acres burn annually. Some ecosystems rely on such fires to maintain their health, but unnatural fuel conditions have increased the severity and extent of some wildfires and, in some instances, the burnt landscape that remains after a catastrophic fire can threaten human safety, property, and the ecosystem. Rainstorms that pelt scorched and highly erosive soils can cause rock and mud slides in watersheds and ultimately contaminate municipal water supplies. In areas of steep terrain, sedimentary runoff can bury homes, destroy roads, and clog streams. Wildland fires can also create postfire environments that are ideal for the growth of noxious or invasive weeds. If these weeds replace native plant species, threatened or endangered animals can lose their habitat.

When burnt lands threaten human health and safety, property, and ecosystems, treatment measures, such as seeding, may be undertaken to stabilize soils and mitigate these risks. According to Department of the Interior (Interior) and U.S. Department of Agriculture's (USDA's) Forest Service data, only a small percentage of the many wildland fires that occur each year require such treatment. Specifically, of the roughly 39,000 wildfires that occurred in 2000 and 2001 on lands managed by Interior and the Forest Service, only about 600 required treatment.

The USDA's Forest Service and Interior's Bureau of Indian Affairs, its Bureau of Land Management (BLM), its Fish and Wildlife Service, and its National Park Service are responsible for implementing programs to manage wildland fire, including determining whether the burnt lands require treatment. Within Interior, BLM is the largest land manager and

oversees about half of the lands the department manages. In Interior agencies as well as in the Forest Service, local land units, such as national forests or national parks, are responsible for treating burnt lands that are not likely to recover on their own.

Interior and the Forest Service categorize postwildland fire treatments as either emergency stabilization or rehabilitation. Emergency stabilization treatments are those judged necessary to apply following a wildland fire to stabilize a burnt area and hence, any further damage; and protect valued resources, such as public health and safety. These actions usually are taken within a relatively short period of time following a wildfire, such as before the first storm event. On the other hand, rehabilitation treatments occur when the damages are deemed sufficiently severe that treatments for reestablishing habitat—such as planting shrubs and trees—and repairing fire damages—such as rebuilding burnt structures—when local land units judge them as being necessary. Interior funds emergency stabilization and rehabilitation treatments for up to 2 full growing seasons but no more than 3 years following a wildfire. The Forest Service specifies that emergency stabilization treatments generally be undertaken within the first 2 years following a wildfire, while rehabilitation treatments may be initiated for up to 3 years following a fire.

In response to the catastrophic wildland fires of 2000, Interior and USDA developed the National Fire Plan—a multibillion-dollar effort to address the nation's wildland fire threats. In supporting this plan, Congress targeted funds for treating burnt lands that were unlikely to recover naturally from the effects of wildland fire. In fiscal years 2001 and 2002, USDA received a total of \$205 million and Interior received a total of \$125 million for treating burnt lands.

You asked us to (1) describe Interior's and USDA's processes for implementing their emergency stabilization and rehabilitation programs, (2) identify the costs and types of treatments the departments have implemented, and (3) determine whether these treatments are effective. To answer these questions, we, among other things, reviewed 421 plans that the departments developed for carrying out emergency stabilization and rehabilitation treatments on lands burned by about 590 wildland fires in calendar years 2000 and 2001.¹ These plans represent about 90 percent of the plans that the departments developed for treating the wildland fires that occurred in 2000 and 2001. The plans identify the risks posed by these fires, the need for and type of emergency stabilization or rehabilitation treatments, estimated costs for those treatments, and the intended treatment results. In addition, we gathered monitoring data on up to 3, including some of the most expensive, treatments for 18 emergency stabilization and rehabilitation plans for fires that occurred in 2000 to determine if and how the departments are monitoring treatments, and whether treatments are effective. In total, the treatments we reviewed accounted for about 30 percent of the funding approved by the departments for treating the fires that occurred in 2000 and 2001. In addition, we reviewed departmental studies on monitoring and treatment effectiveness. We conducted our review from August 2001 through February 2003 in accordance with generally accepted government auditing standards. (See app. I for details on our scope and methodology.)

Results in Brief

Interior's and USDA's processes for stabilizing and rehabilitating severely burnt lands often start while a wildfire is still burning or immediately after it has been contained. To determine the need for emergency stabilization treatments, both Interior agencies and USDA's Forest Service use multidisciplinary teams of experts, such as wildlife biologists, ecologists, and soil scientists, who assess the extent of damage and the potential risks the burnt lands pose to public health and safety. However, Interior agencies and the Forest Service differ in their approaches to assessing the need for, and approval of, the longer-term rehabilitation of burnt lands. Interior uses the same process for emergency stabilization and rehabilitation by concurrently assessing both the need for and type of treatment after a wildland fire; and funding for such treatments. In contrast, the Forest

¹Some Interior and Forest Service plans covered more than one fire. In those instances, several fires on an agency's local land unit occurred at about the same time, and local land unit officials decided to include treatments for those fires under one plan.

Service uses a separate planning process and funding to identify and set priorities for rehabilitation treatments, after much of the fire season has ended. According to Interior officials, it is easier to administer the program through one process. Forest Service officials said that the agency has two separate processes. This is because emergency treatments to stabilize burnt lands must be undertaken quickly and generally do not have long-term consequences for land management, whereas rehabilitation treatments can potentially have long-term consequences and potentially involve a number of different Forest Service programs. The departments are not required to develop a single process to administer their emergency stabilization and rehabilitation programs, although federal policy encourages the departments to standardize their processes and procedures. To this end, in January 2003, the two departments agreed to work towards standardizing certain aspects of their programs, such as definitions and timeframes.

Following the calendar year 2000 and 2001 fires, Interior obligated about \$118 million, and USDA's Forest Service about \$192 million, on emergency stabilization and rehabilitation for the 421 wildland fire plans we reviewed. The bulk of these funds—82 percent—were to treat burnt lands in Idaho, Montana, Nevada, and New Mexico. These four states experienced a relatively high percentage of the catastrophic fires in 2000 and 2001 that required treatment. Most of the departments' individual emergency stabilization and rehabilitation plans called for spending less than \$1 million for one or more projects, but the plans varied widely in terms of the cost and scope of work, ranging from about \$2,000 to over \$40 million. Most of the funds were used to seed, reforest, and repair roads and trails. Although the Forest Service and Interior agencies used similar treatments, they varied in which treatments they used most frequently, primarily because the lands they manage have different characteristics. For example, most of Interior's land is managed by BLM. Because much of BLM's lands consist of rangeland, including land that is arid and semi-arid, it relies primarily on treatments such as seeding with native grasses to retain soils and forage for cattle and wildlife, and fencing to prevent grazing on burnt lands. In contrast, Forest Service land is often steeply sloped and includes watersheds that are used as drinking water sources and timber growth. As a result, the Forest Service relies primarily on emergency treatments, such as stabilizing soils and slopes by, for example, installing soil erosion barriers such as straw bundles, or wattles, and seeding with fast-growing grasses; the Forest Service's rehabilitation treatments include longer-term treatments such as road and trail work and reforestation.

The departments do not, and we could not, determine the overall effectiveness of emergency stabilization and rehabilitation treatments because most land units do not routinely document monitoring results, use comparable monitoring procedures, collect comparable data, or report monitoring results to the agencies' regional or national offices. Both departments either require or strongly encourage land units to monitor for treatment effectiveness, but neither department provides specific standardized guidance on how these units should monitor. As a result, we found that local land units used different monitoring methods, making it difficult to assess the effectiveness of treatments. Three national forests treating similarly burnt slopes with the same treatment—soil erosion barriers—illustrate this point. In one forest, staff only visually observed the treated slopes; in another the staff both visually observed and collected soil erosion data, which they analyzed to assess treatment effectiveness; and in the third the staff both visually observed and collected soil erosion data, which, because of data limitations, they were unable to analyze to assess treatment effectiveness. To judge whether soil erosion barriers were effective, each forest developed its own standard for treatment effectiveness. Because these national forests used different methods and standards to assess and judge treatment effectiveness, we could not draw overall conclusions about the effectiveness of erosion barriers in protecting resources at risk at these three forests. In addition, even when local land units collected data and made assessments of treatment effectiveness, they had not generally shared results with other land units or reported these results to the agencies' regional or national offices. The departments' internal reviews noted similar concerns about differences in monitoring procedures, the quality of monitoring data, the inability to assess the effectiveness of treatments, and the lack of data analysis and dissemination. The departments recognize the need for improved monitoring and data dissemination, but a lack of priority and concern about the extent of work that could be required to accomplish this has resulted in little effort being spent to address these issues. Consequently, the departments can neither compile nor verify the accuracy of monitoring results to determine overall treatment effectiveness or lessons learned.

To better judge the effectiveness of emergency stabilization and rehabilitation treatments in accomplishing their intended purposes and to benefit from lessons learned, we are recommending that the Secretaries of Agriculture and of the Interior specify the monitoring data that local land units should gather and require their agencies to collect, analyze, and disseminate the results of these data.

In responding to a draft of this report, the departments generally agreed with our recommendations and acknowledged that more needs to be done to ensure that funds for emergency stabilization and rehabilitation treatments on burnt lands are used as effectively as possible. The departments provided us with some examples on how they have tried or are trying to obtain and share better data on treatment effectiveness. For the most part, these examples are either (1) individual agency actions, as opposed to interagency or interdepartmental collaborative efforts, or (2) not extensive enough to ensure that sufficient data are routinely collected, analyzed, and disseminated.

Background

Recent fire seasons have shown that past fire suppression policies have not worked as effectively as was once thought. In fact, they have had major unintended consequences, particularly on federally owned lands. For decades, the federal wildland fire community followed a policy of suppressing all wildland fires as soon as possible. As a result, over the years, brush, small trees, and other vegetation accumulated that can fuel fires and cause them to spread more rapidly. This combination of accumulated underbrush and rapidly spreading fires heighten the potential for fires to become catastrophic. The buildup of excessive underbrush is not the only cause of catastrophic wildfires, however. The weather phenomenon known as La Nina, characterized by unusually cold Pacific ocean temperatures, changed normal weather patterns when it formed in 1998. It caused severe, long-lasting drought across much of the country, drying out forests and rangelands. This drought is cited by some as one of the major causes for the 2002 catastrophic wildland fires, which nearly surpassed those of 2000.

BLM, the Fish and Wildlife Service, the National Park Service, and the Forest Service manage about 700 million acres, or 96 percent of all federal lands. In addition, Interior's Bureau of Indian Affairs manages another 55 million acres. Most federal lands in the 48 contiguous United States are located in 11 western states, many of which have seen a dramatic surge in population over the last two decades, complicating the management of wildland fires. New development is occurring in fire-prone areas, often adjacent to federal lands, and creating a wildland-urban interface—an area where structures and other human development meet or intermingle with undeveloped wildland. This relatively new phenomenon means that more communities and structures are threatened by wildland fire and of potential postfire effects, including increased erosion and flooding.

Interior agencies and the Forest Service have undertaken postwildfire measures aimed at reducing potential postfire effects for several years. Since the early 1960s, BLM has had a program to curb damages often associated with wildfires—soil erosion and potential changes in vegetation. Similarly, the Forest Service has implemented postfire measures, such as seeding, since the 1930s. According to a Forest Service analysis of such measures implemented between 1973 and 1998 in the western United States, more than \$110 million, in total, has been spent on treating burnt lands.² Furthermore, postfire expenditures have increased substantially, especially during the 1990s, as the number of Forest Service acres that burn annually increased and as the Forest Service used treatments more extensively. This finding is consistent with Interior’s analysis of emergency stabilization fire treatments on BLM lands.³ Similarly, according to Fish and Wildlife Service officials, even though it has undertaken postwildfire measures for several years, its policy on what measures are appropriate has evolved from measures aimed primarily at “keeping the soil in place” to those having additional functions such as combating invasive or noxious weeds or plants.

²USDA, Forest Service, Rocky Mountain Research Station, *Evaluating the Effectiveness of Postfire Rehabilitation Treatments*, General Technical Report RMRS-GTR-63 (Fort Collins, Colo.: Sept. 2000).

³U.S. Geological Survey, Forest & Rangeland Ecosystem Science Center and Oregon State University, Department of Rangeland Resources, *Emergency Fire Rehabilitation of BLM Lands in the Intermountain West: Revegetation & Monitoring*, Interim Report to the BLM (Corvallis, Oreg.: Jan. 26, 2002).

Responding in the aftermath of the disastrous 1994 fire season, when several lives were lost, Interior, the Forest Service, and other federal agencies undertook an extensive interagency review and revision of federal fire management policies.⁴ The resulting 1995 Federal Wildland Fire Policy and Program Review proposed a set of uniform federal policies to enhance effective and efficient operations across administrative boundaries and improve the agencies' capabilities to meet challenges posed by wildland fire conditions.⁵

Large-scale wildfires continued to burn throughout the United States, with severe fire seasons in 1996, 1999, and 2000. Following the 2000 wildland fires, the administration asked USDA and Interior to recommend how best to respond to the 2000 fires and how to reduce the impacts of such fires in the future. The resulting report—the National Fire Plan—recommended increased funding for several key activities, such as suppressing wildland fires and reducing the buildup of unwanted hazardous fuels. The report also recommended expanded efforts to restore burnt lands because some of the fires burned with such intensity that they drastically changed ecosystems, and, without intervention, these ecosystems would recover slowly. The report recognized two key aspects of treatment activities: short-term treatments to remove hazards and stabilize soils and slopes, such as constructing dams to hold soil on slopes, and longer-term treatments to repair or improve lands unlikely to recover naturally from severe fire damage by, for example, reforesting desired tree species. To set priorities, restoration was to be undertaken on burnt lands that could affect

- public health and safety, as in the case of lands used as sources for domestic water supplies—that is, municipal watersheds;
- unique natural and cultural resources, such as salmon and bull trout habitat, and burnt land susceptible to the introduction of nonnative invasive species; and

⁴In addition to Interior and USDA, the Federal Emergency Management Agency, the Environmental Protection Agency, and the National Oceanic and Atmospheric Administration participated in the review.

⁵In 2001, the federal agencies responsible for the Federal Wildland Fire Policy updated the 1995 policy to clarify its purpose and intent and to address issues not fully covered in 1995. The 2001 review and update replaced the 1995 policy.

-
- other environmentally sensitive areas where economic hardship may result from a lack of reinvestment in restoring damaged land, such as land used for recreation and tourism.

To fund the National Fire Plan, Congress appropriated \$2.9 billion for the two departments' fiscal year 2001 wildland fire needs—an increase of \$1.4 billion over the departments' prior year funding of \$1.5 billion. Of the \$2.9 billion appropriated in 2001, \$227 million was to be used for treating burnt lands. For fiscal year 2002 wildland fire needs, Congress appropriated \$2.3 billion for the two departments and specified that \$103 million was to be used for treating burnt lands. To carry out national fire plan goals and objectives, including those for treating burnt lands, Interior and the Forest Service have each designated national fire plan coordinators. To achieve more consistent and coordinated efforts in implementing the Federal Wildland Fire Policy and the National Fire Plan, and in response to a recommendation made by the National Academy of Public Administration,⁶ the Secretaries of Agriculture and of the Interior established a Wildland Fire Leadership Council in April 2002. Comprised of members of both departments, the council is charged with, among other things, coordinating efforts to restore ecosystem health and monitoring performance.

Within the agencies of Interior and the Forest Service, wildland fire activities are largely carried out by local land units. Within Interior, BLM's local land units include district or field offices; the Fish and Wildlife Service's and the National Park Service's local land units consist of facilities, refuges, or parks; and the Bureau of Indian Affairs' local land units consist of agencies. The Forest Service's local land units consist of national forests and grasslands. BLM's state offices oversee the local land units, while the Bureau of Indian Affairs, Fish and Wildlife Service, National Park Service, and Forest Service regional offices oversee local land units.

⁶National Academy of Public Administration, *Managing Wildland Fire: Enhancing Capacity to Implement the Federal Interagency Policy* (Washington, D.C.: Dec. 2001).

Processes Differ between the Departments for Assessing the Need to Treat Burnt Lands and Approving Treatment Plans

Interior and USDA have different policies and procedures to assess whether burnt lands need to receive any short-term or longer-term treatments following wildland fire. Interior has one overall policy and procedure for its four land management agencies to determine the need for both short- and longer-term treatments. USDA's Forest Service has separate policies and procedures for assessing the need for short-term emergency stabilization treatments immediately following a wildland fire and for longer-term nonemergency treatments for rehabilitating burnt lands. Interior and the Forest Service have attempted to adopt the same policies and procedures for treating burnt lands, even though the National Fire Plan does not require them to do so and recently agreed to work towards standardizing certain aspects of their programs.

Interior Has a Single Process to Identify Both Emergency Stabilization and Rehabilitation Treatments

Under Interior's policy and procedure for implementing its emergency stabilization and rehabilitation program to treat burnt lands, its agencies are to take four key steps. The agencies are to (1) assess burnt lands to determine whether treatments should be taken to stabilize or rehabilitate them, (2) identify treatments when actions are considered necessary, (3) approve and fund necessary treatments, and (4) implement treatments once funding is available.

Local land unit managers are responsible for having burnt lands assessed to determine whether stabilization or rehabilitation is needed. Interior recommends that these managers start the process before a fire is contained in order to identify any emerging issues, conduct a preliminary risk analysis, and ensure a smooth transition from fire suppression to emergency stabilization and rehabilitation. Local land unit managers decide whether an intensive assessment of the burnt lands is warranted. In most cases, these managers decide that no such assessment is needed because they believe that the burnt lands pose no risk and that the lands will recover on their own within a relatively short period.

If local land unit managers decide that an intensive assessment is warranted, they assemble an interdisciplinary teams from the local land units to assess the burnt lands and where appropriate, propose treatment. The team's composition varies according to the complexity of the fire and availability of personnel with different skills and backgrounds. In general, Interior's interagency guidance recommends that teams comprised of staff specializing in, for example, wildlife, ecology, rangeland, soils, and watersheds. The guidance also suggests that managers include expertise

from cooperating agencies' offices, especially when needed skills are not available within the local office. The agencies can also have available state or regional staff assist local teams. While the teams are comprised of agency officials, they can and do consult, as needed, with other organizations and individuals, including those from local communities.

In some instances, wildland fires may encompass multiple agencies' lands, result in burnt conditions that are beyond the capability of the local staff to assess, or place many valued resources at risk. In these situations, the local land unit manager can ask Interior to deploy one of two interagency teams to assess large, multijurisdictional wildland fires. Interior's national wildland fire management office must approve any request for assistance. These teams include specialists from each of the affected agencies and represent a wide variety of skills. In 2000 and 2001, these multiagency teams were deployed eight times to assess fires we included in our review.

Both local and multiagency teams evaluate whether and what kinds of treatments are needed. They review any applicable land or resource management plans for the affected land management units to ensure that any recommended treatment action will be compatible with these plans.⁷ The teams also review other available data that may help identify resources at risk, including data on cultural resources; threatened and endangered species; vegetation inventories, including information on invasive species; and soil types.

⁷Land or resource management plans serve as a basis for activities that occur on lands managed by Interior agencies. The Forest Service is required to develop similar plans for lands that it manages.

Upon completing their field inspections, teams brief local land unit managers on whether and what type of treatments may be appropriate. If the local land unit managers decide to proceed with treatment, they direct the team to prepare a treatment plan, which includes, among other things, a summary of activities and costs. In developing these plans, the team must consider the requirements of the National Environmental Policy Act and any other relevant statutes.⁸ In general, a team requires about 2 to 3 weeks to review the necessary land and resource management plan, data associated with the wildland fire, and any other data that may identify resources at risk; conduct the site inspection; and prepare the treatment plan.

While Interior has a single process and uses the same funds and plans to identify both emergency stabilization and rehabilitation treatments, it recognizes that the treatments are intended for different purposes. Emergency stabilization treatments include those to (1) stabilize and prevent unacceptable degradation to natural or cultural resources, (2) minimize threats to life or property, or (3) repair, replace, or construct improvements to prevent land or resource degradation. Rehabilitation treatments include those to repair or improve lands unlikely to recover naturally. While Interior's guidance indicates that plans are to identify treatments undertaken for emergency stabilization purposes as opposed to rehabilitation, our review of Interior's emergency stabilization and rehabilitation plans for calendar year 2000 and 2001 fires indicates that they do not always make such a distinction. Interior's guidance also states that both emergency stabilization and rehabilitation treatments are to be designed to be cost-effective and to meet treatment objectives.

The agencies differ in how quickly they require that treatment plans be completed—from 5 days to 1 month. Once the treatment plan is completed,

⁸The National Environmental Policy Act requires all federal agencies to prepare detailed environmental impact statements for major federal actions that may significantly affect the quality of the human environment. Agencies may exclude categories of actions that do not significantly affect the environment from the act's environmental impact requirements. Some Interior agencies, such as the National Park Service and the Bureau of Indian Affairs, have developed categorical exclusions. Interior and USDA are currently proposing to categorically exclude stabilization and rehabilitation of all lands and infrastructure impacted by wildland fires or fire suppression. Other relevant statutes include the Endangered Species Act, which requires agencies to ensure that their actions are not likely to jeopardize the continued existence of species listed as threatened or endangered or to adversely modify habitat critical to their survival. In addition, the National Historic Preservation Act requires federal agencies to take into account the effects of their actions on sites or buildings on or eligible for inclusion on the National Register of Historic Places.

the Interior agencies must approve it, usually within 1 to 2 weeks. The agencies' processes for approval vary, depending upon the cost of the treatment. For example, BLM has delegated approval authority for plans of less than \$100,000 to its state offices, while its national office must approve plans of \$100,000 or more. In contrast, the National Park Service does not delegate any approval authority to its local land management units; its regional offices approve plans of less than \$300,000, while its national office approves plans of \$300,000 or more. When a treatment plan and funding is approved, the local land unit officials are generally responsible for having the treatments specified in the plan implemented. Interior requires that treatments be implemented within 3 years.

The Forest Service Has Different Processes to Identify Emergency Stabilization and Rehabilitation Treatments

The Forest Service distinguishes between short-term emergency treatments to stabilize lands burnt by wildland fires and longer-term rehabilitation treatments. Its process for short-term treatments is similar to Interior's. Under this process, local land units are responsible for assembling interdisciplinary teams of agency officials to survey fires that are 300 acres or larger to determine if emergency conditions exist and if so, whether treatments are needed. Forest Service teams can also consult with other agencies and individuals, as necessary. The Forest Service does not have a national team to assess large, multijurisdictional fires. However, Forest Service staff are members of Interior's interagency teams and these teams have assessed fires on National Forest System lands. The Forest Service's rehabilitation process, however, differs from Interior's.

Emergency Stabilization

Under the Forest Service's emergency stabilization process, local land units are to undertake only those treatments necessary to alleviate emergency conditions following wildfire. These treatments include those necessary to protect life and property and to prevent additional damage to resources. The Forest Service directs that treatments be undertaken only when an analysis of risks shows that planned actions are likely to reduce risks significantly and are cost-effective. Further, because the Forest Service funds emergency stabilization with emergency wildland fire funding, to qualify for funding the Forest Service requires that treatment measures provide essential and proven protection at minimum cost. According to Forest Service officials, because the treatments are considered as emergency actions, the Forest Service does not complete environmental impact statements.⁹ In keeping with the emergency status of these treatments, the Forest Service requires that plans be developed and approved within 10 to 13 days following total containment of the wildland fire. Delegated approval authorities vary by Forest Service region. Certain regions, with a history of more frequent and larger fires, have higher approval authorities than other regions. For example, the Forest Service's Pacific Southwest and Pacific Northwest regions (regions 5 and 6, respectively), which generally have most of the catastrophic wildfires, could approve plans costing up to \$200,000 in 2000, while the Southern and Eastern regions (regions 8 and 9, respectively), where large, catastrophic fires are rare, were delegated no approval authority. Forest Service headquarters must approve plans exceeding regional delegated levels of approval authority. As with the Interior agencies, once an emergency stabilization plan is approved, the local land unit officials implement the plan. The Forest Service generally requires that treatments be implemented within the first year, but provides for funding to maintain or install additional treatments the next year.

⁹The Council on Environmental Quality, in its regulations implementing the National Environmental Policy Act, states that there are "emergency circumstances [that] make it necessary to take an action with significant environmental impact without observing the provisions of these regulations." In such circumstances, however, agencies "should consult with the Council about alternative arrangements."

Longer-Term Rehabilitation

While the Forest Service's short-term process for emergency stabilization is similar to Interior's, its longer-term rehabilitation process is not. According to Forest Service officials, the agency developed a different process for undertaking longer-term treatment on burnt lands when the National Fire Plan was being developed and Congress was considering appropriating additional funds to the Forest Service for restoring damaged lands. Before the National Fire Plan, the Forest Service spent little money on rehabilitation because it did not receive appropriations specifically for such an effort. Once the agency realized that additional funding would be available through the National Fire Plan, it began planning a separate rehabilitation process. According to Forest Service officials, the agency decided to have two separate processes because emergency treatments to stabilize burnt lands are funded with emergency funding and must be undertaken quickly. Further, such treatments generally do not have long-term consequences for land management, whereas rehabilitation treatments can potentially have long-term consequences, which may require an environmental assessment,¹⁰ and involve a number of different Forest Service programs.

In October 2000, the Forest Service asked the regional foresters to identify proposed rehabilitation projects that supported the National Fire Plan. In accordance with that plan, the Forest Service's national fire plan coordinator gave primary responsibility to the regions for implementing the rehabilitation program. The coordinator instructed the regions to focus rehabilitation efforts on restoring watershed conditions, including protecting basic soil, water resources, and habitat for various native species such as plants and animals. Projects were envisioned to be those long-term efforts to rehabilitate or improve lands unlikely to recover naturally from wildland damage, or to repair or replace minor facilities damaged by fire. The coordinator also stressed the need for projects to be (1) consistent with long-term goals and approved land use plans; (2) based on sound analyses of the projects' potential consequences; (3) developed cooperatively with other federal, state, or local jurisdictions when wildland fires crossed their jurisdictional boundaries; (4) those that meet the basic objective of protecting life, property, and unique or critical cultural and natural resources; and (5) undertaken within the perimeter of the burned area. Funding to the regions was allocated based on acres burned and acres

¹⁰The Forest Service is currently proposing to categorically exclude stabilization and rehabilitation of lands and infrastructure damaged by wildland fires or fire suppression from further analysis under an environmental assessment or an impact statement.

severely burned. The funding for such projects can be available for up to 3 years.

Building on these instructions, the Forest Service regions developed different processes to identify proposed rehabilitation projects, as illustrated by the experiences of the Northern and Intermountain regions, respectively (regions 1 and 4) and the Southwestern Region (region 3). Regions 1 and 4—which encompass Idaho, Montana, Nevada, North Dakota, Utah, and portions of South Dakota and Wyoming—were most affected by catastrophic wildland fires in 2000.¹¹ The two regions jointly developed additional criteria to use in identifying and reviewing rehabilitation projects for fires that occurred in 2000. These criteria included whether the proposed project would

- improve or protect water quality, or restore long-term watershed functions;
- restore municipal watersheds;
- involve community partnerships;
- involve nonfederal partners;
- integrate several components in the project;
- restore threatened or endangered species habitat;
- protect public health and safety;
- improve infrastructure as a necessary step in completing the project;
- address noxious or invasive weeds as a component of the project;
- be emphasized by the regional forester; or
- have visible accomplishments within the first year.

¹¹Of the 275,036 Forest Service acres that were severely burned in 2000, about 176,062 acres, or 64 percent, were located in regions 1 and 4.

According to region 1 and 4 officials, the regions developed these additional criteria for reviewing their forests' rehabilitation proposals because Forest Service guidance was too general to assess and set priorities for projects. These additional criteria allowed the two regions to better compare proposals that the forests submitted.¹²

Region 3, which encompasses Arizona and New Mexico, and which was the next region most affected by wildland fires in 2000, used a different approach to identify and set priorities for projects.¹³ According to the region 3 emergency stabilization and rehabilitation program coordinator, while Congress was considering appropriating additional funding for the National Fire Plan, the region assembled a team to determine which fires were catastrophic in 2000 based on the (1) value of the losses incurred as a result of the fire, (2) capability to repair or restore the loss, and (3) potential cost to repair or restore the loss. Given these criteria, region 3 considered as catastrophic 5 of the 18 largest fires that occurred in 2000 and eligible for rehabilitation projects.

Forest Service officials said that the agency and regions undertook similar processes to identify rehabilitation projects in 2002. However, the Forest Service did not distribute all of the \$63 million appropriated in fiscal year 2002 because it needed some of these funds for wildfire suppression. The agency used some of this appropriation for suppression because putting out fires is the agency's top priority.¹⁴ According to the Forest Service

¹²In 2001, USDA's Office of Inspector General reviewed controls over the National Fire Plan funds in Forest Service region 1 and concluded that the Washington office had not sufficiently overseen the selection process to ensure that projects met National Fire Plan goals and objectives. The Forest Service agreed to review selected projects as part of its fiscal year 2002 management review of regional operations. USDA, Office of Inspector General, *Forest Service National Fire Plan Implementation*, Western Region Audit Report No. 08601-26-SF (Washington, D.C.: Nov. 2001).

¹³Of the 275,036 Forest Service acres that were severely burned in 2000, about 41,800 acres, or 15 percent, were located in region 3.

¹⁴When fire suppression costs exceed annual fire suppression appropriations, including emergency funds, the Forest Service can transfer funds from any appropriation available to the agency to the fire management appropriation. While Congress provided emergency funding to the Forest Service in August 2002, the amounts provided were not sufficient to cover that year's suppression costs. As a result, the Forest Service was required to borrow funds from other programs, including rehabilitation. According to Forest Service officials, the agency's fiscal year 2003 appropriation was not sufficient to fully reimburse all the programs from which it borrowed in fiscal year 2002, and, as of March 2003, it was unclear how the rehabilitation program would be affected.

national rehabilitation program coordinator, the severe wildland fires in 2002 required the Forest Service to use \$84 million in rehabilitation funding—a portion of the \$63 million appropriated in fiscal year 2002 and a portion of the \$142 million appropriated in fiscal year 2001 but not yet expended.

The Departments Are Working to Coordinate Their Processes for Administering Treatments Even Though Their Missions and Types of Land Differ

As noted previously, prior to receiving additional funding under the National Fire Plan, USDA's Forest Service largely limited its postwildland fire treatments to emergency stabilization. However, in 1998, Interior and USDA initiated an effort to apply a consistent approach for both emergency stabilization and longer-term rehabilitation. This included an effort to develop an interagency handbook that agencies in both departments could use. This effort was undertaken, in part, in response to the 1995 Federal Wildland Fire Policy, which recommended that agencies work toward standardizing their policies and procedures. The Wildland Fire Leadership Council recently addressed this effort, which was abandoned in 2002 because of differences the agencies perceived in their missions, lands, and use of resources.

According to Interior and Forest Service officials, they had worked to integrate their different approaches, but discontinued this effort in 2002 because they decided that integration would be too difficult. The difficulty arose because, according to these officials, their agencies and the lands they manage are too dissimilar to have a consistent approach for treating burnt lands. For example, BLM's emergency stabilization and rehabilitation efforts focus on stabilizing soils and ensuring a diversity of animal and plant species because its mission emphasizes sustaining its lands for multiple uses. The National Park Service's emergency stabilization and rehabilitation efforts focus on naturally preserving the lands and resources for use by people. In contrast, the Forest Service stated that, historically, its efforts have focused on short-term stabilization treatments that are intended to protect life and property and prevent additional resource damage because its mission emphasizes protecting and improving forests and preserving watersheds. With the advent of the National Fire Plan, however, the Forest Service enlarged this focus to consider not only watersheds but also longer-term treatments to improve lands unlikely to recover naturally by, for example, planting trees or monitoring for and treating noxious plants or weeds. Because of this emphasis and the funding specifically authorized for rehabilitation, the Forest Service established a separate process for these longer-term efforts. The following illustrates the extent of the difference between Interior and the Forest Service: Interior uses the same process, staff, and funds to implement its emergency stabilization and rehabilitation program because, according to Interior officials, it is easier to do so. The Forest Service uses different processes, staff, and funds to implement its emergency stabilization program and its rehabilitation program because emergency stabilization has existed for about 25 years while it considers rehabilitation as an expanded mission based on the National Fire Plan appropriations language.¹⁵ The difference in how the two departments fund emergency stabilization and rehabilitation treatments resulted in the Office of Management and Budget directing the Department of the Interior to identify nonemergency funding options for its nonemergency treatments by March 2003.

Interior and Forest Service officials acknowledged that the Federal Wildland Fire Policy encourages federal agencies to standardize processes and procedures and said that their respective departments are working together to better coordinate their programs. Even though the Fire Policy

¹⁵Interior uses both emergency and nonemergency funds for its program, while the Forest Service limits its use of emergency funds to its emergency stabilization program.

and the National Fire Plan do not require that the departments have the same processes for their respective programs or that they be fully integrated, the Wildland Fire Leadership Council addressed differences in the departments' emergency stabilization and rehabilitation programs. In January 2003, the council decided that both departments should have standard and uniform definitions, time frames, and funding mechanisms for efforts they take under their respective programs. According to the Forest Service's national emergency stabilization program coordinator, the council's decision will result in the two departments resuming their efforts to develop and adopt the same interagency handbook for carrying out their emergency stabilization and rehabilitation programs.

Rehabilitation Plans Vary Widely in Cost and in the Number and Types of Treatments

Following the calendar years 2000 and 2001 fires, Interior and USDA's Forest Service approved 421 plans for stabilization and rehabilitation treatments for an estimated total of more than \$310 million. Nearly all of the plans and costs were to treat fires that occurred in western states. Within Interior, BLM accounted for the most plans—210 out of 266—and approved the bulk of Interior's funds—\$88 million out of \$118 million. The Forest Service accounted for the next largest number of plans—155—and approved \$192 million—\$53 million for short-term emergency stabilization and \$139 million for longer-term rehabilitation. While the two departments implemented the same types of treatments on their lands following wildland fire, such as seeding, the frequency with which they relied on these treatments varied, primarily because of the types of lands they manage.

Emergency Stabilization and Rehabilitation Plans Were Concentrated in Western States and the Cost of Treatment Varied

As shown in table 1 for both Interior and the Forest Service, most emergency stabilization and rehabilitation treatments occurred in western states. Treatments occurred there primarily because much of the lands Interior and the Forest Service manage are in these states. Furthermore, during the summers of 2000 and 2001, states in the intermountain west were especially hard hit by drought and persistently dry conditions, which gave rise to two of the worst wildfire seasons in the past 50 years.

Table 1: Amount of Funding and Number of Plans Approved, by State Where Wildland Fire Occurred, 2000 and 2001

Dollars in millions

State	Funding	Percent of total ^a	Number of plans	Percent of total
Montana	\$96.0	30.9	33	7.8
Idaho	59.7	19.2	99	23.5
Nevada	56.1	18.1	98	23.3
New Mexico	42.9	13.8	26	6.2
Oregon	15.7	5.1	40	9.5
Utah	10.8	3.5	49	11.6
Other	29.0	9.3	76	18.1
Total	\$310.2	100.0	421	100.0

Source: Forest Service and Interior.

Note: GAO analysis of Forest Service and Interior data.

^aThe sum of the numbers does not add to the total because of rounding.

As table 1 shows, Montana and Idaho received more than 50 percent of the stabilization and rehabilitation funding for the 2000 and 2001 fires. Montana, which received the largest allocation, proposed to use almost half of its funds for longer-term rehabilitation treatments in the Bitterroot National Forest.

According to the estimates provided in the stabilization and rehabilitation plans, the costs to treat wildfires varied widely. About 56 percent (\$174.3 million) of the estimated \$310 million was associated with only 18 of the 421 plans. Most of the plans (87 percent) estimated that treatment costs would be under \$1 million and the majority of those were less than \$100,000. Table 2 shows the number and percentage of plans that fall within various cost estimate ranges and the total estimated costs and percentage within these ranges.

Table 2: Number and Percent of Plans in Different Cost Ranges and Total Costs and Percentage of Total Costs within Those Ranges, 2000 and 2001

Dollars in millions

Range of costs per plan	Number of plans	Percent of plans	Cost	Percent of total cost
\$10 million and over	5	1.2	\$96.2	31.0
\$4 million to \$9.999 million	13	3.1	78.1	25.2
\$2 million to \$3.999 million	14	3.3	37.0	11.9
\$1 million to \$1.999 million	22	5.2	30.7	9.9
Under \$1 million	367	87.2	68.1	22.0
Total	421	100.0	\$310.1	100.0

Source: Forest Service and Interior.

Note: GAO analysis of Forest Service and Interior data.

The cost of individual emergency stabilization and rehabilitation treatments ranged from about \$2,000 to about \$42 million. Cost differences occurred primarily because of the number and type of treatments included in the plan and the number of acres to be treated. This is illustrated in the following examples:

- The most costly plan involved longer-term rehabilitation for the Bitterroot National Forest in Montana. In this plan, the Forest Service regional office included 5 different but almost simultaneous fires that engulfed about 185,000 acres in 2000.¹⁶ This plan includes planting trees, roadwork—including cleaning drainage structures, restoring road surfacing, and taking roads out of service—and removing dead and dying timber. The entire proposed cost of the plan is about \$42 million, which, according to Forest Service officials, would be spent over a period of several years.
- One of the least costly plans—for the Lower Rio Grande Valley National Wildlife Refuge in southern Texas—proposed spending only about \$2,500. While the fire was relatively small and only grew to about 10 acres, the tract was in an urban area, surrounded by many homes and

¹⁶Similarly, all five fires were covered by one emergency stabilization plan.

farms. Given the fire's location and the unique climate, geology, vegetation, and wildlife of the site, the Fish and Wildlife Service proposed to revegetate 5 of the burnt acres with native brush.

Interior's Bureau of Land Management Used the Most Treatments, Primarily for Restoring Forage Used for Grazing and Wildlife Habitat

Interior's 4 agencies approved 266 plans, costing about \$118.5 million. Of the four agencies, BLM approved the largest number of plans and had the largest share of total costs. Table 3 provides information on the number and cost of plans approved by Interior's agencies in 2000 and 2001.

Table 3: Number and Cost of Emergency Stabilization and Rehabilitation Plans Approved by Interior, 2000 and 2001

Dollars in millions

Agency	Number of plans	Percent of plans	Cost	Percent of cost
BLM	210	78.9	\$87.9	74.2
Bureau of Indian Affairs	26	9.8	17.6	14.9
Fish and Wildlife Service	17	6.4	8.7	7.3
National Park Service	13	4.9	4.3	3.6
Total	266	100.0	\$118.5	100.0

Source: Interior.

Notes: GAO analysis of Interior data.

Interior's plans include both emergency stabilization and rehabilitation treatments.

Most of the funds Interior approved were used for seeding and fencing, primarily because most of the fires occurred on rangelands BLM manages in Idaho, Nevada, and Utah. About \$67.2 million, or 70 percent, of the \$96.1 million were for these two treatments. Table 4 provides data on the treatments Interior used most frequently and the cost of these treatments.

Table 4: Costs of Different Interior Emergency Stabilization and Rehabilitation Treatments, 2000 and 2001

Dollars in millions		
Treatment	Cost of treatment in agency plans ^a	Percent
Seeding	\$57.5	59.8
Fencing	9.7	10.1
Reforestation	6.6	6.9
Cultural resource survey and/or cultural resource protection	5.2	5.4
Noxious or invasive plant monitoring and/or weed treatment	6.9	7.2
Checkdams, ^b straw wattles, contour felled trees or log terraces, mulch	2.9	3.0
Road or trail work	1.6	1.7
Other ^c	5.7	5.9
Total	\$96.1	100.0

Source: Interior.

Note: GAO analysis of Interior data.

^aTreatment cost excludes other costs associated with plans, such as plan development and monitoring costs.

^bCheck dams are small structures made of rocks, logs, plant materials, or geotextile fabric. They are designed to stabilize slopes and store small amounts of sediment.

^cOther includes a number of infrequently used and less costly treatments, such as building or cleaning out catchment basins, repairing or replacing minor structures, signs, felling trees that pose a hazard, constructing racks to trap large debris, removing horses, and installing flood warning systems.

Of the four Interior agencies, BLM accounted for the largest share of treatment costs and included some type of seeding as a treatment in about 190, or 90 percent, of its 210 plans. Similarly, BLM accounted for about \$50 million of the \$57.5 million that Interior approved for seeding. Much of the lands managed by BLM consist of rangelands that produce forage for wild and domestic animals, such as cattle and deer, as well as many other forms of wildlife; its lands include grasslands and deserts—both arid and semiarid land. Seeding was done to prevent soil erosion and to restore forage used by cattle, mule deer, or elk; habitat used by other species such as sage grouse; or reduce the potential for the invasion of undesirable or noxious plants or weeds. According to BLM officials, the method used to seed—whether by air or by drilling—depends primarily on the terrain, soil, and seed or seed mixture used. This is illustrated by the following examples:

-
- **Aerial seeding.** One of the largest seeding treatments occurred to aerially seed about 40,000 acres in Nevada burned by the Twin Peaks Fire in 2000, at a cost of \$5.4 million. For seeding the entire burnt area with a native seed mixture of wheat grasses, sagebrush, and wildrye, the local office decided that aerially seeding would be the most appropriate method. The seeded area was hilly to mountainous and because of this, the use of a helicopter or fixed-wing aircraft was proposed to spread seed across the burnt area. The seeding was intended to reduce the invasion and establishment of undesirable or invasive species of vegetation, particularly noxious weeds. In addition, the seeding—if successful—would provide mule deer and livestock with critical forage.
 - **Drilling.** According to BLM officials, BLM frequently uses rangeland drills to seed. For example, following the Flat Top, Coffee Point, and Tin Cup wildfires, which burned about 117,000 acres of the Big Desert in Idaho, BLM approved \$1.5 million to drill and aerially seed the burnt acreage. For seeding a mixture of wheatgrass, ricegrass, needlegrass, wildrye, and rice hulls, the local office decided to use a rangeland drill because the terrain was relatively flat and could be easily drilled. According to BLM, if BLM had not seeded, the lack of remaining seed could have impaired the land’s recovery and, in the long term, reduced species diversity and degraded habitat conditions for all wildlife species that used the Big Desert. Figure 1 depicts BLM seeding with a rangeland drill.

Figure 1: Rangeland Drill Seeding in Idaho



Source: BLM, Elko Field Office.

Interior agencies also frequently repaired or installed fencing following wildland fire, primarily to protect burnt rangelands from cattle grazing to allow for regeneration. Under Interior policy, BLM can exclude burnt lands from grazing that are recovering from wildfire for a minimum of 2 years. Of Interior's 266 plans, 171 included fencing at a cost of \$9.7 million. Most of this cost—about \$8.1 million—was for fencing on BLM lands. This is illustrated by the following examples:

- After the West Mona Fire burned more than 22,500 acres in Utah, BLM approved a \$1.7 million plan, which included about \$241,000 to remove about 28 miles of fencing that was destroyed by the fire, construct 34 miles of new protective fence, repair 11 miles of existing fence, and install 6 cattleguards. The new fencing was to be installed after the area was seeded. The fencing was to protect the burnt and seeded areas from livestock grazing for 2 years.
- After the Abert Fire burned 10,000 acres in Oregon, BLM approved a \$61,000 plan that included about \$10,500 for fencing. Much of the burnt

acreage, before the fire, consisted mainly of sagebrush and native bunch grasses. BLM concluded that the majority of the burnt area retained sufficient native seeds and plant material in the soil for it to recover naturally. However, to help ensure natural vegetative recovery, BLM concluded that the burnt area needed to be protected from livestock grazing for at least 2 years.

Figure 2 shows BLM grazing lands that were burnt and will require new fencing to exclude cattle.

Figure 2: Burnt BLM Lands Needing Fencing to Exclude Grazing



Source: BLM, Idaho.

Reforestation, while not frequently used, was fairly costly. Reforestation was used in 24 of the 266 plans, for a cost of \$6.6 million, or an average of about \$275,000 per treatment. The only other treatment that was comparable in cost was seeding, which averaged about \$248,000 per treatment. Reforestation was generally approved for funding to control the spread of invasive species or to reduce wind and water erosion. For example, the Fish and Wildlife Service developed a \$181,500 plan to treat the Ash Meadows National Wildlife Refuge in Nevada following a fire that

burned about 658 acres. The assessment team recommended that staff from the local land unit collect seeds from mesquite and ash trees, contract with nurseries to grow seedlings, and plant seedlings and cuttings primarily to control the spread of invasive species and reduce erosion.

In addition, the Bureau of Indian Affairs used reforestation to replace commercial timber trees that were lost as a result of wildfires. Beginning in 1998, the Bureau of Indian Affairs began to allow a limited amount of this treatment to help ensure that Indian forest land continued to be perpetually productive—a management objective established by the National Indian Forest Resources Management Act. According to bureau officials, catastrophic wildland fires can destroy viable seed necessary for regrowth and the additional funding provided by the National Fire Plan allowed the bureau to better meet reforestation needs after such wildfires. For example, following the Clear Creek Divide Fire in 2000 on the Salish and Kootenai Indian Reservation, the bureau approved \$2 million to collect ponderosa and lodgepole pine and western larch tree seeds on the reservation, grow 2.5 million seedlings, and plant them on about 8,000 acres.

In conjunction with seeding and fencing, Interior agencies frequently included monitoring burnt areas to see if noxious or invasive plants or weeds had regenerated or moved into the area and treating them as necessary. Of Interior's 266 plans, 166, or more than 60 percent, included monitoring and/or treating noxious or invasive plants or weeds as a treatment, for a total cost of \$6.9 million. BLM accounted for most of these treatments. According to BLM officials, noxious or invasive weeds, particularly cheatgrass, are one of the factors that has caused an increase in the number and size of wildland fires.¹⁷ Such noxious or invasive weeds, which grow vigorously in the early spring, can crowd out native grasses and, during the arid summer months, can dry and provide excessive fine fuels for wildland fires to spread over large expanses of land. Because fire does not destroy some noxious or invasive plant seeds, the plants can resprout and grow with even greater vigor following a wildland fire. According to BLM officials, many local land units had completed the necessary environmental assessments to use selected herbicides on specified noxious or invasive weeds on its lands. As a result, the local land units could include noxious or invasive weed treatments in their emergency stabilization and rehabilitation plans. Figure 3 shows dried, flammable noxious or invasive weeds prone to wildfire.

¹⁷Cheatgrass is a winter annual plant introduced from Europe and Asia. It grows during the fall and winter and sets its seed in the early summer. Cheatgrass can take valuable mineral and water resources from the soil, leaving native grasses, which are summer annuals, with little nutrition. Because winter annuals set their seeds prior to the wildfire season in the summer, they can quickly resprout in the fall. However, because native grasses set their seeds in the fall, if they are consumed by wildfire in the summer, they are unable to leave any seed.

Figure 3: Burnt and Unburnt Flammable Noxious or Invasive Weeds



Source: BLM, Idaho.

Interior agencies also included cultural resource surveys in many plans and treatments for known artifacts damaged or threatened by wildfire. Over half of the plans included cultural resource surveys, for a total of \$5.2 million. Although cultural surveys are not treatments, but activities, they were included as treatment costs. According to BLM, which conducted many of these surveys, it routinely conducts cultural surveys before conducting ground-disturbing activities that have the potential to affect sites or objects that could be or are eligible for the National Register of Historic Places. When BLM anticipated any ground-disturbing treatment, such as rangeland drill seeding or installing new fencing, it included cultural resource surveys.

Most Forest Service Funds Were Used for Rehabilitation

Most of the funds the Forest Service approved for emergency stabilization or rehabilitation were for longer-term rehabilitation. Of the \$192 million that the Forest Service approved, \$139 million was for longer-term rehabilitation while \$53 million was for short-term emergency stabilization. As noted previously, the Forest Service did not use all of its fiscal year 2002

appropriation of \$63 million on longer-term rehabilitation because it needed to spend some of these funds on suppressing wildfires.

Table 5 provides information on treatments and their costs in the Forest Service’s 113 emergency stabilization plans and its 42 rehabilitation plans.

Table 5: Costs of Different Forest Service Emergency Stabilization and Rehabilitation Treatments, 2000 and 2001

Dollars in millions

Treatment	Cost of emergency stabilization treatments ^a	Percent	Cost of rehabilitation treatments ^b	Percent
Checkdams, straw wattles, contour felled trees or log terraces, mulch	\$14.4	31.5	\$0.0	0.0
Seeding	12.5	27.4	0.1	0.1
Road or trail work	12.3	26.9	39.7	28.8
Noxious or invasive weed monitoring and/or treatment	1.3	2.8	25.1	18.2
Fencing	0.8	1.8	4.2	3.0
Reforestation	0.5	1.1	35.3	25.6
Build or clean out catchment basins	0.5	1.1	0.8	0.6
Repairing or replacing minor structures	0.2	0.4	2.1	1.5
Cultural resource survey or protection	0.1	0.2	3.6	2.6
Other ^c	3.1	6.8	27.0	19.6
Total	\$45.7	100.0	\$137.9	100.0

Source: Forest Service.

Note: GAO analysis of Forest Service data.

^aTreatment cost excludes other costs associated with plans, such as plan development and monitoring costs.

^bThe Forest Service distinguishes between emergency stabilization treatments and rehabilitation treatments and includes them in separate plans.

^cOther primarily includes wildlife, fish, threatened or endangered species habitat or watershed restoration, which the Forest Service did not allocate to categories such as check dams, seeding, road or trail work, weed treatment, or fencing.

According to Forest Service officials, for short-term emergency stabilization, the agency relies on treatments that are intended to reduce soil erosion in watersheds that have the greatest potential to create further damage to people, property, or other valued resources if the agency does not act before the first major storm event after a wildfire. For example, some watersheds are used as sources of drinking water supplies for municipalities. Because much of its lands are steeply sloped, the agency relies on check dams, straw wattles (tubes of straw wrapped in netting), and other similar structures, such as logs, to retain soil, as well as seeding with fast-growing grasses. In contrast, for longer-term rehabilitation, the agency repairs resource damage caused by the fire through treatments, such as road or trail work to reduce erosion in other watersheds, reforestation to replace timber growth, and monitoring for or treating noxious or invasive weeds.

As shown in table 5, for stabilization treatments, the agency approved about 31.5 percent of its 2001 and 2002 funds for erosion treatments such as building check dams with rocks, logs, or straw, which are then placed in stream beds or in steeply sloped channels on hillsides in order to slow runoff from storm events and help prevent soil erosion. This runoff can consist of water, soil, rocks, branches, and trees. To trap sediment, the Forest Service uses felled logs or log terraces placed perpendicular to sloped hillsides. It may specify the use of straw wattles placed perpendicular to slopes to trap sedimentation when the number of logs is insufficient to trap erosion effectively. Straw mulch or branches cut from trees may also be placed on slopes to retard soil erosion. For example, following the Trail Creek Fire, which burned about 32,000 acres on the Boise National Forest in Idaho, the Forest Service approved an emergency stabilization plan that included about \$3 million for straw wattles, \$344,000 for cutting down burnt trees and positioning them along slopes, \$203,000 for mulch, and \$203,000 for straw bales and other soil erosion control structures. The Forest Service plan included multiple soil erosion treatments because the property at risk from soil erosion included homes, community centers, and businesses. Figures 4 and 5 show slope stabilization treatments on Forest Service lands, including straw wattles and mulch.

Figure 4: Straw Wattles Used to Help Retain Soils and Reduce Erosion



Source: GAO.

Figure 5: Mulching Used to Stabilize Soils



Source: Forest Service, Region 3.

As table 5 also shows, the Forest Service used more than 25 percent of both its stabilization and rehabilitation funds for road and trail treatments because, according to Forest Service officials, it has an extensive network of roads and trails on its forests that required treatment after the 2000 and 2001 fires. Road work includes installing and enlarging culverts so that additional runoff anticipated from burnt lands can pass under roadways, and regrading roads so that storm runoff will be less likely to erode road surfaces. Similarly, trail work includes regrading or repairing trails to reduce erosion and protect public safety. If the roads or trails pose a public health or safety risk, and if the treatments need to be implemented before a major storm event occurs, then short-term stabilization funds are used. In contrast, if the roads or trails do not pose a health or safety concern, then the Forest Service uses longer-term rehabilitation funds. For example, following the Bitterroot Complex of five fires or fire complexes that burned about 185,000 Forest Service acres, the Forest Service recommended about \$4 million in emergency road and trail treatments, to prevent damage by

debris torrents and runoff. Treatments included installing larger culverts, cleaning ditches and culverts, recontouring roads, and repairing trails. If these treatments were not taken, the Forest Service anticipated that (1) fish habitat could be degraded and (2) private residences, a recreational development, and an irrigation system that were downstream from the burnt area could be harmed. In contrast, the rehabilitation plan included about \$11 million for road and trail treatments. This funding is for roadwork along 400 miles of roads within the areas that burned with moderate to high intensity. Because vegetation no longer existed to stabilize road surfaces and slopes, the Forest Service stated it needed to perform work to reduce erosion from them. Similarly, 150 miles of trail were located in intensely burnt areas, which rendered some trails unsafe. Figure 6 shows a culvert installed to handle anticipated increased storm runoff.

Figure 6: Upgraded Culvert to Withstand Increased Storm Runoff



Source: GAO.

Seeding was another widely used stabilization treatment. This treatment accounted for more than 25 percent of the stabilization costs for 2000 and 2001 fires. Seeding was generally used to reduce erosion and thereby better protect watersheds. Forest Service plans included treatments such as seeding with fast-growing grasses—such as barley and winter wheat—that would be more likely to grow quickly or would be less likely to compete with the longer-term recovery of natural vegetation. For example, the Forest Service approved about \$7 million for the Cerro Grande Fire for seeding to help stabilize soils. The assessment team concluded that natural regrowth of vegetation would be too slow to prevent significant runoff and soil erosion. It recommended grass seeding with annual ryegrass, barley, mountain brome, and slender wheatgrass, to quickly restore vegetation and reduce soil erosion, protect soil productivity, and reduce runoff.

Reforestation treatments were almost entirely done as a longer-term rehabilitation treatment and accounted for about 25 percent of the rehabilitation costs for the 2000 and 2001 wildfires. The Forest Service uses reforestation treatments sparingly and restricts their use as a stabilization treatment because (1) replanting commercial species burned by wildfire is viewed as the responsibility of the forest management program, as opposed to an emergency measure to be funded by the wildland fire program, and (2) planting trees does not meet the emergency stabilization objective of preventing additional damage to resources. Rather, replanting trees is generally considered as repairing resource damage caused by wildfire and therefore not a large part of the rehabilitation program. In keeping with its interpretation of the need to restrict emergency stabilization treatments as those necessary to prevent additional resource damage, the Forest Service generally restricts the use of reforestation to no more than \$25,000 per treatment. However, once it received funding under the National Fire Plan for longer-term rehabilitation, the Forest Service used this funding to develop reforestation proposals for 21 national forests burned by wildland fire.

Similarly, the percentage of funding the Forest Service used for noxious or invasive weed monitoring or treatment varied depending on whether the treatment was for emergency stabilization or rehabilitation. According to Forest Service officials, noxious or invasive weed monitoring or treatment is not generally viewed as an emergency treatment. For example, the Forest Service proposed spending \$1.3 million for noxious or invasive weed monitoring or treatment as an emergency stabilization measure; however, it proposed spending \$25.1 million for such monitoring and treatment as a rehabilitation measure. Similarly, in its rehabilitation plan

for the Salmon Challis National Forest in Idaho, the Forest Service proposed spending \$9.5 million on noxious or invasive weed treatments because of known infestations of noxious weeds where several fires occurred in 2000. The weeds were expected to spread rapidly through the burnt areas, especially where fire suppression activities, such as bulldozing, exposed bare soils. The Forest Service also proposed to conduct a National Environmental Policy Act analysis for treating noxious or invasive weeds in another portion of the forest that had also been burnt in 2000 and which had not yet had an environmental analysis completed for such a treatment.

Interior and the Forest Service Cannot Determine Overall Treatment Effectiveness

Neither we nor the Forest Service or Interior know the overall effectiveness of emergency stabilization and rehabilitation treatments because local land units do not routinely document monitoring results, collect comparable monitoring information, and disseminate the results of their monitoring to other land units or to the agencies' regional or national offices. As a result, it is difficult to compile information from land units to make overall assessments about the extent to which treatments are effective or about the conditions in which treatments are most effective. Furthermore, the departments have not developed an interagency system to collect, store, and disseminate monitoring results. Consequently, it is difficult for agency officials to learn from the results of treatments applied on other sites in order to most efficiently and effectively protect resources at risk.

Lack of Comparable Monitoring Data at the Local Land Unit Makes It Difficult to Comprehensively Assess Treatment Effectiveness

As noted previously, both Interior and the USDA's Forest Service require local land units to install treatments that are effective. In addition, Interior requires, and the Forest Service strongly encourages, local land units to monitor for treatment effectiveness. However, neither department specifies how land units should conduct such monitoring or how they should document monitoring results. Both our and the departments' own internal reviews found that inconsistencies in monitoring methods prevent a comprehensive assessment of treatment effectiveness.

Local Land Units We Reviewed Do Not Use Comparable Methods to Monitor and Document the Effectiveness of Identical Treatments

To determine the methods local land units use to monitor and document the effectiveness of their treatments, we reviewed 18 emergency stabilization and rehabilitation plans that were implemented on 12 local land units—6 of Interior’s and 6 of the Forest Service’s. We selected these 12 local land units because they obligated the most funds for emergency stabilization and rehabilitation treatments within their regions in 2000, the most recent year since the establishment of the National Fire Plan in which local land units could have accomplished significant monitoring at the time of our review.¹⁸ For each of the 18 plans, we reviewed up to 3 of the most costly treatments, for a total of 48 treatments.¹⁹ These 48 treatments are not a representative sample of all emergency stabilization and rehabilitation treatments implemented by the departments, and therefore our findings cannot be projected. However, the data do represent monitoring practices for a significant proportion of departmental outlays for treatments, since the total cost of the treatments we reviewed was \$84 million, or 30 percent of the total funds obligated by Interior and the Forest Service for emergency stabilization and rehabilitation treatments undertaken for wildfires that occurred in 2000 and 2001.

Local land units monitored all of the 48 treatments we reviewed, but documented conclusions about treatment effectiveness for only half of the 48 treatments. Land units monitored some treatments through visual inspection alone and other treatments through both visual inspection and data collection. For treatments that entail building or repairing infrastructure—such as roadwork, trail repair, and fencing—local land units typically monitored treatment effectiveness solely through visual observation. Of the 19 such treatments, local land units visually observed all and collected monitoring data for only 1. For example, national forests often resurface roads and install drainage systems, such as culverts, to prevent storm runoff from concentrating into torrents, eroding road surfaces and depositing sediment into streams. To monitor the effectiveness of such treatments, according to local national forest officials, staff typically drive along repaired road segments and visually

¹⁸We did not select emergency stabilization and rehabilitation plans for wildland fires that occurred in 2001 because, at the time of our review, local land units would have had little time to monitor treatments that had been implemented.

¹⁹Of the 18 plans we selected for review, one included only two treatments—both of which we reviewed. In addition, the most costly treatments in some of the 18 plans had either not yet been fully implemented, or we could not get timely information on the treatment’s status. We did not include these treatments in our analysis.

observe road surfaces for gullies or other signs of erosion. In contrast, for treatments designed to restore natural conditions—such as seeding, reforestation, weed treatment, and erosion barriers—staff often collect monitoring data, in addition to visually observing treatment sites. Of the 30 such treatments, local land units collected monitoring data on treatment effectiveness for 22 and visually observed all 30. For example, one BLM district office used two methods to monitor their seeding treatment: (1) they visually observed the seeded acreage and estimated the proportion of the burnt area covered by native plants, weeds, and bare soil; and (2) they collected data on the most abundant plant species, precipitation levels, soil types, and terrain within a selected number of small, delineated sections within the seeded acreage. Local land units documented conclusions about treatment effectiveness for 24 of the 48 treatments we reviewed. In documenting these results, land units used a wide variety of different formats, including summaries of visual observations, tables of data analyses, and presentations for academic conferences.

Even though the 12 local land units we reviewed generally monitored the effectiveness of treatments, each used a different method to do so. According to local land unit officials, departmental guidance does not identify the methods they should use to visually inspect different types of treatments, when they should collect and analyze monitoring data, the types of data they should collect, or the techniques they should use to collect and analyze monitoring data. In some instances, local land unit officials said they used monitoring methods prescribed for programs other than emergency stabilization and rehabilitation. For example, on three national forests, Forest Service officials said that they used monitoring methods specified by the agency's forestry, or silviculture, program to monitor reforestation treatments. In another instance, an interagency technical reference describes 12 procedures for monitoring vegetation, but the departments do not indicate which of these methods should be used to monitor the seeding applied to burnt lands.

As a result of the lack of clarity, the 12 local land units differed significantly in the methods they used to monitor the 30 treatments designed to restore natural conditions. Of these 30 treatments, local land units collected data to monitor the effectiveness of 22 of the treatments, in addition to making visual observations, and relied solely on visual observations to monitor the remaining 8 treatments. Likewise, local land units monitored untreated sites for comparison with treated sites in 17 instances, while they monitored just the treated sites in the remaining 13 instances. Furthermore, in judging whether a treatment was effective, local land units established

measurable standards of effectiveness for 9 of the 30 treatments and relied purely on the knowledge of local land officials to make this judgment for the other 21. As one local land unit official said, each staff member has his or her “own definition of success.” Overall, local land unit officials judged most of the treatments as effective. However, because local land units (1) collected different monitoring data, (2) used different methods to collect monitoring data, and (3) developed their own definitions of treatment effectiveness, the results of monitoring treatments we reviewed for these 18 emergency stabilization and rehabilitation plans cannot be compared to determine if the treatments were effective.

For example, three national forests we reviewed spent more than \$5 million to install erosion barriers on severely burnt slopes to protect homes and streams from flooding and sedimentation after catastrophic wildfires in 2000. Although all three forests installed the same treatment to accomplish the same objective, the forests’ monitoring methods differed in the extent to which they collected monitoring data, type of monitoring data they collected, methods used to collect and analyze monitoring data, and standards for judging treatment success. This situation is illustrated by the following examples:

- In one forest, local land unit officials observed treated slopes for evidence of erosion but did not collect monitoring data or document their findings. Because the officials observed that only small amounts of sediment washed to the bottom of slopes after a rainstorm, they concluded that the treatments had been effective. Without collecting monitoring data, however, these officials could not accurately estimate the amount of erosion prevented by the barriers placed on the slope or the level of precipitation that would render the barriers ineffective.
- In another forest, local land unit officials worked with Forest Service researchers to collect data on precipitation levels and soil erosion from both treated and untreated slopes, in addition to conducting visual observations. The researchers used a computerized hydrological model to analyze the monitoring data and concluded that the erosion barriers decreased the risk of erosion by 19 percent—from an 86 percent risk on untreated slopes to a 67 percent risk on treated slopes—and documented these results in a presentation to a professional conference. However, during visual observations, local land unit officials disagreed on whether the presence of sediment trapped behind the erosion barriers constituted treatment success: some believed that the barriers were effective because they had trapped erosion from

washing further down the slope, while others concluded that the barriers were ineffective because they had not prevented soil from eroding at the top of the slope.

- In a third forest, local land unit officials collected monitoring data and visually observed the erosion barriers. However, they said it was difficult to accurately measure soil erosion and water quality in order to determine treatment effectiveness. They therefore did not report on their data collection and analysis and relied on visual observations to judge treatment effectiveness: after observing significant amounts of erosion, they concluded that the treatments were not effective.

Because these national forests used different methods to judge treatment effectiveness, we could not draw overall conclusions about the effectiveness of erosion barriers in protecting resources at risk at these three forests. We found similar inconsistencies in monitoring data, monitoring methods, documentation, and standards for treatment effectiveness among other Forest Service land units as well as Interior's. For example, at two BLM district offices, we reviewed how local land unit officials monitored seeding of burnt areas that was intended to establish native species and prevent the spread of noxious weeds. One district collected data from both seeded and unseeded plots, while the other only collected data from seeded plots. In addition, one district used a measurable standard to judge treatment success, while the other relied on the professional judgment of land managers.

Departments' Studies Could Not Determine Overall Treatment Effectiveness

Similarly, a 2000 USDA Forest Service study and a 2002 Interior study found that it is difficult to determine overall treatment effectiveness because land units use different methods to monitor identical treatments and rarely document monitoring results.²⁰ For example, as part of its study, Forest Service officials reviewed more than 150 monitoring reports for emergency stabilization and rehabilitation treatments undertaken at national forests. As part of its study, Interior reviewed techniques that BLM field offices in Idaho, Nevada, Oregon, and Utah used to monitor seeding treatments. Both of these studies concluded that local land units often did not collect or record data important to interpreting treatment effectiveness, including data on site conditions and treatment outcomes. In addition, both studies found that only approximately one third of local land units collected monitoring data, and among these local land units, few collected the same type of data or used the same data collection methods. Because of the lack of documentation and the differences in monitoring methods, neither study was able to determine the validity of monitoring results, to calculate the extent to which treatments were effective, or to compare the effectiveness of treatments in different regions or land units. According to Interior and Forest Service officials, including the authors of these studies, the departments know little about the extent to which emergency stabilization and rehabilitation treatments prevent erosion, protect water quality, restore native vegetation, reduce invasive weeds, or protect wildlife. In a separate 2001 study of its emergency stabilization program in the Northern and Intermountain regions, the Forest Service concluded that the agency is "often . . . uncertain that [treatments] actually work. There is a concern that treatments may look good, but their functional effectiveness is unknown."²¹

Improved monitoring would provide critical information to departmental officials making decisions about emergency stabilization and rehabilitation treatments, according to the Interior and Forest Service studies. According to the Forest Service study, knowing the effectiveness of particular

²⁰USDA, Forest Service, Rocky Mountain Research Station, *Evaluating the Effectiveness of Postfire Rehabilitation Treatments*, General Technical Report RMRS-GTR-63 (Fort Collins, Colo.: Sept. 2000); and U.S. Geological Survey, Forest & Rangeland Ecosystem Science Center and Oregon State University, Department of Rangeland Resources, *Emergency Fire Rehabilitation of BLM Lands in the Intermountain West: Revegetation & Monitoring*, Interim Report to the BLM (Corvallis, Oreg.: Jan. 26, 2002).

²¹ USDA, Forest Service, Watershed, Fish, Wildlife, Air and Rare Plants Staff, *Burned Area Emergency Rehabilitation (BAER) Program Review Report: Northern and Intermountain Regions*. (Washington, D.C.: June 2001).

treatments would help local land units select the most appropriate treatments for installation and could assist them in defending and explaining their decisions. For example, knowing the likelihood that erosion barriers will effectively prevent erosion on a certain soil type could help land unit officials determine whether installing such barriers is worthwhile, according to the lead author of the study. Likewise, the Interior study noted that a synthesis of monitoring data could assist BLM in restoring native plants and reducing invasive weeds in the Intermountain West.

In order to gather such information, these studies recommended that the agencies improve monitoring. The Forest Service study of treatment effectiveness recommended that national forests “increase monitoring efforts” to determine the effectiveness of treatments under various conditions, while the agency’s review of the emergency stabilization program recommended “a quick format for minimal quantitative monitoring.” Similarly, the Interior study recommended that BLM districts adopt a common monitoring technique and report whether treatments meet their objectives.

The departments have not implemented these recommendations, however. According to departmental officials responsible for overseeing their emergency stabilization and rehabilitation efforts, implementation has not occurred because of the difficulty associated with the development of standardized monitoring and data collection methods and the collection of such data. At the local level, even though land units typically conduct some type of monitoring and view monitoring as valuable, agency officials consider extensive monitoring to be a less important use of their time than other immediate wildland fire duties, such as serving on emergency stabilization and rehabilitation assessment teams and overseeing the installation of treatments. These wildland fire duties are in addition to their normal duties they must carry out on a routine basis. Furthermore, departmental officials said that because land characteristics and treatment objectives vary significantly from land unit to land unit and from agency to agency, it is difficult to establish standard monitoring or data collection methods that would apply in all circumstances. At the same time, however, they acknowledged that there are enough commonalities among land units, agencies, and treatments, that some aspects of monitoring and data collection could be standardized, such as consistently collecting and documenting data on precipitation, soil type, and terrain. BLM officials added that they have recently begun to discuss the development of standardized monitoring methods and possible criteria for treatment

success. Departmental officials commented, however, that if monitoring methods were standardized and data were routinely collected and analyzed, it might be more appropriate for an independent organization such as the department's science agency—the U.S. Geological Survey—to conduct this work and assess the relative success and failure of treatments.

The Departments Do Not Routinely Collect, Archive, and Disseminate Monitoring Results Collected by Local Land Units

Interagency and departmental policies direct the departments to collect, archive, and disseminate monitoring results collected by local land units so that the departments can make more informed decisions on the effectiveness of the treatments being used. According to Interior, for example, "Priority should be given to developing a simple interagency electronic mechanism for archiving and broadly disseminating the treatment and technique results." Similarly, the Forest Service cited the need for the agency to develop a clearinghouse of monitoring plans and a system for sharing monitoring results. Nevertheless, neither Interior nor the Forest Service developed an interagency system to collect, store, and disseminate monitoring results of emergency stabilization and rehabilitation treatments.

Based on our review of treatments for 18 emergency stabilization and rehabilitation plans at 12 local land units, we found that local land units did not routinely share monitoring results with other land units or with program management, even in instances when they learned valuable lessons about treatment effectiveness. For example, according to local land unit officials, they shared information with their peers through informal means such as phone calls to neighboring land units and conversations at regional meetings for only 24 of the 48 treatments we reviewed. Similarly, these officials said that they submitted their monitoring results to their agency's state or regional offices for only 19 of the 48 treatments. At the same time, local land unit officials said they learned lessons while monitoring that would be worth sharing with other land units in 37 of the 48 cases.

Currently, the departments do not have an interagency database that local land units can submit monitoring data and then use to determine the relative success of different treatments, according to Forest Service and Interior emergency stabilization and rehabilitation officials. Several local land unit officials said that if such information were accessible, they would be better able to select the most appropriate treatment to meet certain objectives in specific conditions. Officials in one BLM Nevada land unit said that the BLM state office was developing a database to collect, store,

and disseminate monitoring results. BLM Nevada officials said that the database would be used to collect and store the specifications and results of seeding treatments that have been applied on BLM lands in the entire state. When BLM officials in Nevada then consider using a seeding treatment following a wildfire, they would be able to search the BLM Nevada database to identify the results of prior seeding treatments that were applied in similar terrain, on similar soil types, at similar elevations, and with similar precipitation levels, according to these officials. Local land unit officials could use this information to make treatment decisions, such as whether to seed a burnt area or whether to allow it to recover naturally. BLM Nevada officials said that such a database would be “worth its weight in gold” because of the difficulty in identifying the most appropriate plant species and seed application techniques that will be effective in Nevada’s arid rangelands.

According to Interior and Forest Service officials responsible for their emergency stabilization and rehabilitation programs, the departments had not developed an interagency monitoring database for the same reasons that they have not standardized monitoring and data collection methods: coordinating such a task with multiple agencies would require a substantial amount of work and monitoring has historically been considered a lower priority than other more pressing tasks. Departmental officials said that it would be time-consuming to develop a database to meet the needs of multiple agencies, each of which manages different types of land. Other departmental officials said that the departments typically respond well to emergencies, such as fire suppression, but have placed less emphasis on monitoring. These officials acknowledged, however, that a monitoring database would be valuable and said that they had scheduled interagency meetings in early 2003 to discuss developing such a database.

While the Forest Service has already begun work on a database of monitoring results, the database is limited in scope and application. The database includes information that the Forest Service collected as part of its 2000 study of the effectiveness of emergency stabilization treatments, according to the agency official who led that study. Beginning in 2003, this official said that local Forest Service land unit officials will be able to access information collected during the course of that study, including any monitoring information, to help inform their treatment decisions. This official noted, however, that because of differences and shortcomings in the ways that national forests collected and retained monitoring information for the emergency stabilization plans that were reviewed for that study, the database has several limitations: it will (1) not provide

quantitative data on the extent of treatment effectiveness; (2) not provide information necessary to determine the conditions—such as soil characteristics or vegetation types—under which treatments are most effective; (3) not provide a means by which local Forest Service land unit officials could report their current monitoring results to other local land units or to Forest Service regional or national offices.

Conclusions

Most lands burned by catastrophic wildfires will recover naturally, without posing a threat to public safety or ecosystems. However, in those relatively few instances where burnt lands threaten safety, ecosystems, or cultural resources, emergency stabilization and rehabilitation treatments can play a critical role—a role that is emphasized by the appropriations Congress has dedicated to postwildfire treatments.

The treatments Interior and the Forest Service use to protect and restore burnt lands—slope stabilization measures such as mulching to prevent soil from eroding into rivers and streams, seeding to regenerate important grasses and shrubs, and noxious or invasive weed monitoring and control—appear, on the face of it, to be reasonable. For the most part, however, Interior and the Forest Service are approving treatment plans without comprehensive information on the extent to which a treatment is likely to be effective given the severity of the wildfire, the weather, soil, and terrain. Such information could help ensure that the agencies, including the local land units, are using resources effectively to protect public safety, ecosystems, and cultural resources.

Interior and USDA's Forest Service have also done studies that recognize the need for information on treatment effectiveness, but they have not emphasized the importance of collecting, storing, analyzing, and disseminating such data. Nor can they reasonably take action to collect, store, analyze, or disseminate such data until the departments have comparable monitoring data from their local land units. Interior and the Forest Service have yet to set standards for data collection, develop reporting procedures, or establish criteria for judging treatment effectiveness, which makes it possible to assess treatment effectiveness. As their and our own analyses have shown, this situation has resulted in local land units using different monitoring methods, even when similar treatments are being used under similar conditions, and a lack of consistency in judging whether treatments have been effective.

Recommendations for Executive Action

In order to better ensure that funds for emergency stabilization and rehabilitation treatments on burnt lands are used as effectively as possible, we recommend that the Secretaries of Agriculture and of the Interior require the heads of their respective land management agencies to

- specify the type and extent of monitoring data that local land units are to collect and methods for collecting these data, and
- develop an interagency system for collecting, storing, analyzing, and disseminating information on monitoring results for use in management decisions.

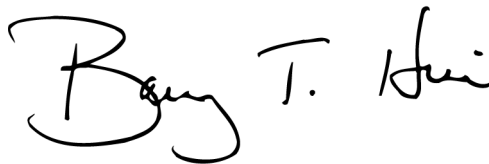
Agency Comments and Our Evaluation

We provided a draft of this report to the Secretaries of Agriculture and of the Interior for review and comment. The departments provided a consolidated response to our draft report, which is included in appendix II of this report. They generally agreed that more can be done to ensure that funds for emergency stabilization and rehabilitation on burnt lands are used as effectively as possible and with our recommendations that they obtain and disseminate better data for determining treatment effectiveness. In commenting on our recommendation that the departments obtain better data on treatment effectiveness, the departments said that they were aware that some of their own studies had previously identified the need to obtain and disseminate better data for determining treatment effectiveness. They cited several examples where they have or are trying to accomplish this, including an effort to determine the effectiveness of log erosion barriers, which is cited in this report. The departments, in their comments, said they recognize that many of the efforts are individual agency initiated actions, as opposed to a systematic approach, to collect data on treatment effectiveness. They said that they are currently planning actions that would address data collection concerns in a more collaborative manner by establishing an interdepartmental committee of scientists and managers to identify the dominant postfire stabilization and rehabilitation treatments for which monitoring methods will be established. An interdepartmental approach is essential, not only for identifying the amount and type of data that local land units should collect, but also for developing an interagency and interdepartmental system for routinely collecting, storing, analyzing, and disseminating these data. The departments also provided several technical changes that we incorporated into the report, as appropriate.

As arranged with your offices, unless you publicly announce the contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies of this report to the Chairman and Ranking Minority Member, Subcommittee on Public Lands and Forests, Senate Committee on Energy and Natural Resources; the Chairman and Ranking Minority Member, House Committee on Resources; the Chairman and Ranking Minority Member, Subcommittee on Forests and Forest Health, House Committee on Resources; the Chairman and Ranking Minority Member, Subcommittee on Interior and Related Agencies, House Committee on Appropriations; the Ranking Minority Member, House Committee on Agriculture; the Ranking Minority Member, Subcommittee on Department Operations, Oversight, Nutrition and Forestry, House Committee on Agriculture; and other interested congressional committees. We will also send copies of this report to the Secretary of Agriculture; the Secretary of the Interior; the Chief of the Forest Service; the Directors of BLM, the National Park Service, and the Fish and Wildlife Service; the Deputy Commissioner, Bureau of Indian Affairs; the Director, Office of Management and Budget; and other interested parties. We will make copies available at no charge to others upon request. This report will also be available at no charge on GAO's home page at <http://www.gao.gov/>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841. Key contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in black ink that reads "Barry T. Hill". The signature is written in a cursive style with a large, looped initial "B".

Barry T. Hill
Director, Natural Resources
and Environment

Scope and Methodology

To describe the Department of the Interior's and the U.S. Department of Agriculture's Forest Service processes for implementing their emergency stabilization and rehabilitation programs, we obtained departmental manuals, handbooks, and other guidance that describe Interior's process for implementing emergency stabilization and rehabilitation and the Forest Service's emergency stabilization program. We also interviewed Interior and Forest Service officials responsible for overseeing the department's respective programs to obtain an overview of Interior's and the Forest Service's processes for their programs. Because the Forest Service's rehabilitation program is relatively new and has not yet been incorporated into the Forest Service manual or handbook, we obtained guidance developed by the Forest Service and provided to Forest Service regional offices on the process used to implement that program. We also obtained additional guidance and documentation from the Forest Service's Northern, Southwestern, and Intermountain regions (regions 1, 3, and 4, respectively)—the three regions that received the largest share of Forest Service rehabilitation program funding in fiscal year 2001—to determine what additional processes these regions developed and used to implement the program. Further, we interviewed Bureau of Land Management (BLM), Bureau of Indian Affairs, Fish and Wildlife Service, National Park Service, and Forest Service officials at regional, state, and local land management units that had experienced wildland fires in 2000 or 2001 to discuss procedures used in assessing burnt lands and identifying appropriate treatments.

To identify the costs and types of treatments the departments have implemented, we obtained 266 emergency stabilization and rehabilitation plans that Interior agencies prepared for wildfires that occurred in calendar years 2000 and 2001 on

- BLM managed lands in Idaho, Nevada, Oregon, and Utah;
- Bureau of Indian Affairs managed lands in its Northwest, Rocky Mountain, Southwest, and Western regions;
- Fish and Wildlife Service managed lands in its Mountain Prairie, Pacific, Southeast, and Southwest regions; and
- National Park Service managed lands in its Intermountain and Pacific West regions.

For the Forest Service, we requested and obtained 155 emergency stabilization plans and rehabilitation plans for wildfires that occurred in calendar years 2000 and 2001 on Forest Service lands managed in its Intermountain, Northern, Pacific Northwest, Pacific Southwest, and Southwestern regions (regions 4, 1, 6, 5, and 3, respectively). We selected these Interior and Forest Service regions because they accounted for about 90 percent of the plans that the departments developed for treating wildfires that occurred in 2000 and 2001.

To identify the types of treatments implemented, we reviewed these 421 plans and identified treatments proposed and approved in the plans. To identify the costs of the plans and the treatments, we obtained estimated costs that the departments approved to carry out the plans and implement the individual treatments. Because these costs are estimates, they do not necessarily reflect actual costs that could be incurred in carrying out the plans during the 3 years that may be required to implement them. We did not obtain actual costs incurred, to date, in carrying out these plans because this data are not readily available.

To determine whether emergency stabilization and rehabilitation treatments are achieving their intended results, we reviewed 18 emergency stabilization and rehabilitation plans that were implemented on 12 land units—6 of Interior's and 6 of the Forest Service's. We selected these 12 land units because they obligated the most funds for emergency stabilization and rehabilitation treatments within their regions in 2000, the most recent year since the establishment of the National Fire Plan in which local land units could have accomplished significant monitoring at the time of our review. We did not select emergency stabilization and rehabilitation plans for wildland fires that occurred in 2001 because, at the time of our review, local land units would have had little time to monitor treatments that had been implemented. For each of the 18 plans, we reviewed up to 3 of the most costly treatments. One of the 18 plans we selected had only 2 treatments, both of which we reviewed. In addition, we did not review five treatments we initially selected either because the treatments had not yet been fully implemented, or because we were unable to obtain timely information on the treatment's status. Therefore, the total number of treatments we reviewed was 48. For each of these treatments, we interviewed the land manager responsible for monitoring and reviewed associated documentation of monitoring results, when available. These 48 treatments are not a representative sample of all emergency stabilization and rehabilitation treatments implemented by the departments, and therefore our findings cannot be projected. However, the data do represent

monitoring practices for a significant proportion of departmental outlays for treatments, since the total cost of the treatments we reviewed was \$84 million, or 30 percent of the total funds obligated by Interior and the Forest Service for emergency stabilization and rehabilitation treatments undertaken for wildfires that occurred in 2000 and 2001.

In addition, we obtained program reviews or other studies conducted by the Forest Service or Interior on their emergency stabilization and rehabilitation reports to determine if the departments monitor treatments and, if so, the type and quality of departmental monitoring data. We also interviewed emergency stabilization and rehabilitation officials at the departments' national, regional, or state levels, and local land unit offices to determine what monitoring is being conducted by local land unit offices, whether data are collected, and what use is made of these data for assessing treatment effectiveness or sharing lessons learned.

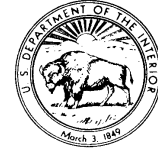
We conducted our review from August 2001 through February 2003 in accordance with generally accepted government auditing standards.

Comments from the Departments of the Interior and Agriculture



THE DEPARTMENT OF AGRICULTURE

WASHINGTON



THE DEPARTMENT OF THE INTERIOR

March 6, 2003

Barry T. Hill, Director
Natural Resources and Environment
United States General Accounting Office
441 G. Street, N.W.
Washington, D.C. 20548

Dear Director Hill:

Thank you for the opportunity to review GAO's Draft Report entitled, "Wildfires: Better Information Needed on Effectiveness of Emergency Stabilization and Rehabilitation Treatments" (GAO-03-430).

In general, we agree with the Results In Brief that 1) Interior and the Forest Service have differences in the way the emergency stabilization and rehabilitation program has been administered in the two departments, 2) there are differences as well as similarities in the type and costs of treatments, and 3) to date effectiveness monitoring of these treatments has been inconsistent. We believe, however, that much has been accomplished in the relatively short time since the Departments of the Interior and Agriculture received direction and funding for these National Fire Plan activities.

A joint departmental committee has been established and is working to address revisions in policies and procedures to incorporate decisions made by the Wildland Fire Leadership Council in January 2003, which is referenced in the report. This effort makes significant organizational changes that will result in common program administration in both Departments at the national and field levels.

In general, the Departments of the Interior and Agriculture agree with the Recommendation for Executive Action that more can be done to ensure that funds for emergency stabilization and rehabilitation treatment on burnt lands are used as effectively as possible. The recommendation is consistent with reviews of this topic previously completed by the Forest Service in 2000 and the Department of the Interior in 2001. Responding to the earlier reports, the Forest Service and Department of the Interior have taken steps over the last three years aimed at developing the means to perform effectiveness monitoring. Both agencies view these efforts as only first steps and have plans to develop a more structured monitoring program as part of an adaptive management strategy to improve the Emergency Stabilization and Rehabilitation program.

Appendix II
Comments from the Departments of the
Interior and Agriculture

The Wildland Fire Leadership Council directed the agencies to adopt standardized definitions for emergency stabilization, rehabilitation, and restoration in January 2003. Agreement on the definitions is an important first step in standardizing treatment practices across the agencies. For example, Interior will begin to differentiate between emergency stabilization and restoration. The agencies' budget and accounting practices will also reflect this agreement. Interior has included a proposal in the 2004 President's Budget to realign its budget structure to correspond to that of the Forest Service. Emergency stabilization after a fire will be grouped with emergency suppression operations while burned area rehabilitation will be a separate budget subactivity.

In response to the first recommendation to specify the type and extent of monitoring data that local land units are to collect and methods for collecting these data, the Departments previously identified this gap and offer the following examples reflecting some of the efforts we have initiated or accomplished.

- The Forest Service has implemented a program of effectiveness monitoring of log erosion barriers, a widely used post-fire practice, following a consistent protocol of treatments and quantitative measurements. The study will provide data to test the effectiveness of the treatments for controlling water and sediment runoff and also develop and validate new monitoring techniques for both Departments.
- The National Park Service has prepared two reports on the effectiveness of extensive treatments to protect cultural resources in severely burned areas at Mesa Verde National Park. These reviews will be used to help managers provide effective protection for cultural resources after future severe wildland fires.
- The Forest Service, the U.S. Geological Survey and the Joint Fire Science Program are conducting stabilization and rehabilitation research on a variety of techniques in both forest and rangeland ecosystems. Results of this research, when applied, will improve the planning and delivery of emergency stabilization and rehabilitation treatments.

We recognize that many of these actions to date have been individual agency initiated actions, but the intent is to share the results with all the agencies working on emergency stabilization and rehabilitation efforts. We are currently planning actions that will address these concerns in a more collaborative manner. An inter-departmental committee of scientists and managers will identify the dominant post-fire stabilization and rehabilitation treatments for which monitoring protocols will be established. Technical experts will then develop the monitoring protocols and identify research needs.

In response to the second recommendation to develop an interagency system for collecting, storing and disseminating information on monitoring results for use in management decisions, the Departments also previously identified this need and have initiated several efforts. Some of these efforts include:

Appendix II
Comments from the Departments of the
Interior and Agriculture

- The National Fire Plan Operations and Reporting System (NFPORS), a joint USDA-DOI data management system, will be the mechanism for recording and reporting on projects for rehabilitation of burned areas. NFPORS is currently under development, with implementation of the rehabilitation component scheduled for late winter 2003.
- The Bureau of Land Management currently has a system for sharing lessons learned with some state organizations. These lessons will be distributed more widely to provide information to other states and agencies. The Forest Service is in the process of developing a comprehensive database for cataloging treatment effectiveness.
- Monitoring results are shared at interagency training sessions for burned area emergency rehabilitation practitioners. Two sessions were held in 2002 and another is planned in early 2004.
- The Fire Research Coordination Council, which includes broad membership from the Forest Service, Joint Fire Science Program, U.S. Geological Survey, National Association of Professional Forestry Schools and Colleges, Environmental Protection Agency and others, provides leadership in coordinating wildland fire science research. The council is vigorously promoting a program to transfer research knowledge on postfire rehabilitation to field managers to improve on-the-land performance.

In closing, let us restate that much has been accomplished in the time that the Agencies received funding for the National Fire Plan Rehabilitation and Restoration program. Even though overall funding has changed significantly from the \$210 million obligated in FY 2001 and FY 2002 to the \$27.1 million appropriated in FY 2003, the Agencies continue to work seamlessly across departments to protect communities from unnecessary damage after wildfires and to rehabilitate lands unlikely to recover naturally.



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In addition, Mark Braza, Marcia Brouns McWreath, Carol Herrnstadt Shulman, and Katheryn Summers made key contributions to this report.

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