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WILDLAND FIRE MANAGEMENT

Better Information and a Systematic Process Could Improve Agencies' Approach to Allocating Fuel Reduction Funds and Selecting Projects

GAO-07-1168

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Highlights

Highlights of GAO-07-1168, a report to congressional requesters

WILDLAND FIRE MANAGEMENT

Better Information and a Systematic Process Could Improve Agencies' Approach to Allocating Fuel Reduction Funds and Selecting Projects

Why GAO Did This Study

Recognizing that millions of acres are at risk from wildland fire, the federal government expends substantial resources on thinning brush, trees, and other potentially hazardous fuels to reduce the fire risk to communities and the environment. However, questions have been raised about how the agencies responsible for wildland fire management—the Department of Agriculture's Forest Service and the Department of the Interior's (Interior) Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS)—allocate their fuel reduction budgets and select projects.

GAO was asked to report on the agencies' processes for allocating funds and selecting projects, and on how, if at all, these processes could be improved to better ensure that they contribute to the agencies' overall goal of reducing risk. To obtain this information, GAO visited headquarters and field offices of all five agencies; obtained data on fuel reduction funding and accomplishments; and reviewed previous evaluations of the fuel reduction program.

What GAO Recommends

GAO is recommending a number of actions to improve the agencies' ability to ensure that fuel reduction funds are directed where they will most effectively reduce risk from wildland fire. In commenting on a draft of this report, the Forest Service and Interior agreed with its findings and recommendations.

To view the full product, including the scope and methodology, click on GAO-07-1168. For more information, contact Robin M. Nazzaro at (202) 512-3841 or nazzaror@gao.gov.

What GAO Found

In allocating fuel reduction funds and selecting projects, the Forest Service, Interior, and the four Interior agencies use both quantitative processes (such as computer models or scoring systems) and professional judgment. At the national level, the Forest Service uses a computer model to help determine the amount of each regional office's allocation, although the model is being refined and the agency still relies largely on past funding levels. Interior and BLM are also developing computer models—based in part on the Forest Service's—to help allocate funds; of Interior's other agencies, BIA allocates funds based on past regional performance in reducing fuels, FWS uses a computer model, and NPS relies on historical funding levels that were based on a now-discontinued model. At the regional and local levels, the agencies use a variety of quantitative and judgmental processes.

Although the Forest Service and Interior are taking steps to enhance their funding allocation and project selection processes, there are several improvements they could make to better ensure that they allocate fuel reduction funds to effectively reduce risk. Specifically, when allocating funds and selecting projects, the agencies could improve their processes by

- consistently assessing all elements of wildland fire risk—including hazard, risk, and values—at the national, regional, and local levels, in order to identify those lands at highest risk from wildland fire and incorporate this information in the allocation and project selection process;
- developing and using measures of the effectiveness of fuel reduction treatments in order to estimate how much risk reduction is likely to be achieved through particular treatments and for how long;
- using this information on effectiveness, once developed, in combination with existing information on treatment costs, to assess and compare the cost-effectiveness of potential treatments in deciding how to optimally allocate funds;
- clarifying the relative importance of the numerous factors they use in allocating funds, including those factors (such as funding stability and the use of forest products resulting from fuel reduction activities) that are unrelated to risk, treatment effectiveness, or cost effectiveness; and
- following a more systematic process in allocating funds—that is, a process that is methodical, based on criteria, and applied consistently—to ensure that funds are directed to locations where risk can be reduced most effectively.

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Abbreviations

BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
FPA	Fire Program Analysis
FWS	Fish and Wildlife Service
GAO	Government Accountability Office
GIS	Geographic information system
HFI	Healthy Forests Initiative
HFRA	Healthy Forests Restoration Act
NEPA	National Environmental Policy Act
NPS	National Park Service
USDA	United States Department of Agriculture
WUI	Wildland-urban interface

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United States Government Accountability Office
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September 28, 2007

The Honorable Norman D. Dicks
Chairman
The Honorable Todd Tiahrt
Ranking Member
Subcommittee on Interior, Environment, and Related Agencies
Committee on Appropriations
House of Representatives

The Honorable Raúl M. Grijalva
Chairman
The Honorable Rob Bishop
Ranking Member
Subcommittee on National Parks, Forests, and Public Lands
Committee on Natural Resources
House of Representatives

The Honorable Greg Walden
House of Representatives

Decades of fire suppression in the nation's forests, together with such practices as logging followed by dense tree planting, have resulted in the accumulation of brush, small trees, and other vegetation that can fuel wildland fires. Similarly, the nation's rangelands have suffered from decades of fire suppression and livestock overgrazing, which have degraded ecosystems and made the rangelands vulnerable to the invasion of flammable, nonnative species, such as cheat grass. This accumulation and alteration of vegetation, as well as drought and other stresses related to climate change, have fueled wildland fires. Collectively, these fires have cost billions of dollars to suppress, forced thousands from their homes, and damaged cultural and natural resources. The impacts of these fires have intensified as more and more communities develop in areas that are adjacent to fire-prone lands—the wildland-urban interface.

In response to the increasing threat of wildland fires, the federal agencies responsible for wildland fire management developed the National Fire

Plan.[1] These agencies are the Department of Agriculture's Forest Service and the Department of the Interior's (Interior) Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS). Two components of the National Fire Plan are a 10-year strategy and an implementation plan for protecting communities and the environment that were developed in 2001 and 2002, respectively, by the Secretaries of Agriculture and of the Interior, along with governors of western states and other interested parties, and updated in December 2006. The 2002 plan emphasized reducing hazardous fuel in forests and rangelands to mitigate the risk from wildland fire. In 2003, Congress passed the Healthy Forests Restoration Act (HFRA),[2] with the stated purpose of reducing wildland fire risk to communities, municipal water supplies, and other at-risk federal land through a collaborative process of planning, setting priorities, and implementing fuel reduction projects.[3] HFRA also authorized grants to commercial facilities that use biomass—that is, small-diameter trees and branches—to offset the costs incurred to purchase biomass. Fuel reduction projects can generate substantial amounts of biomass.

According to the updated 10-Year Strategy Implementation Plan, the goal of the fuel reduction program is to reduce the risk of wildland fire to communities and the environment. Fuel reduction projects—using prescribed fire, mechanical thinning, herbicides, grazing, or combinations of these methods—are intended to remove or modify wildland fuel to reduce the potential for severe wildland fires, lessen the damage caused by fires, limit the spread of flammable invasive species, and restore and maintain healthy ecosystems. Local land management units, such as

[1]The National Fire Plan comprises multiple documents, including (1) a September 2000 report from the Secretaries of Agriculture and of the Interior to the President in response to the wildland fires of 2000, (2) congressional direction accompanying substantial new appropriations in fiscal year 2001, and (3) several strategies to implement all or parts of the plan. For a description of these documents and their contents, goals, and relationships to one another, see *Severe Wildland Fires: Leadership and Accountability Needed to Reduce Risks to Communities and Resources*, GAO-02-259 (Washington, D.C.: Jan. 31, 2002).

[2]Pub. L. No. 108-148 (2003).

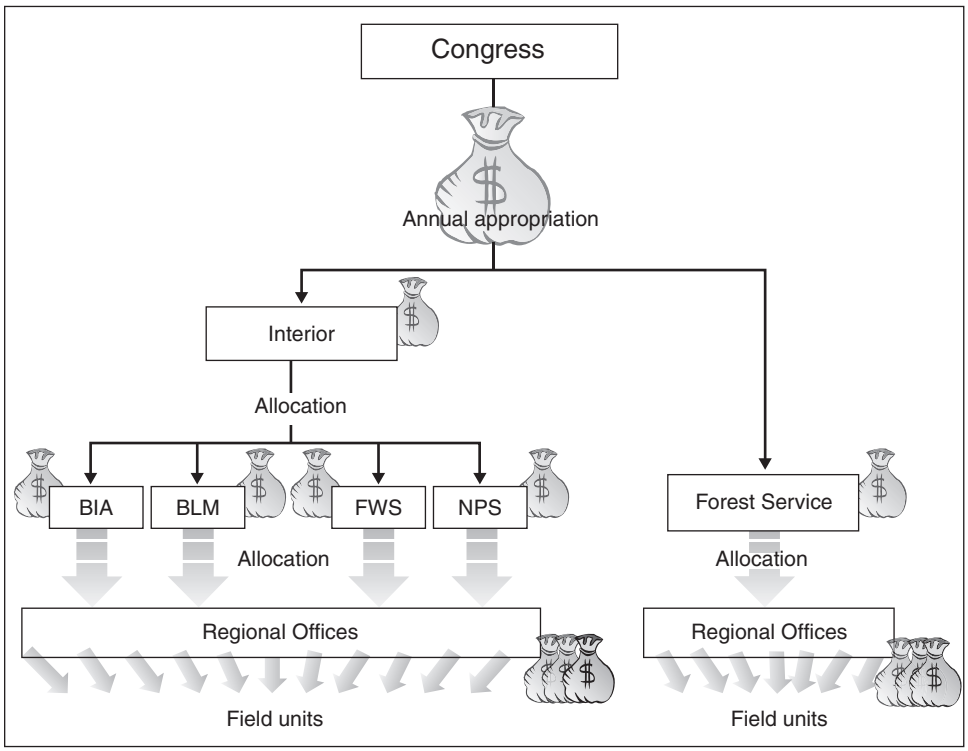
[3]HFRA defines "federal land" to include land administered by the Forest Service and BLM. Consequently, HFRA fuel reduction project authorities are available only to the Forest Service and BLM, and its fuel reduction project requirements apply only to these agencies as well. In some cases, BIA, FWS, and NPS have chosen to comply with some of the requirements.

national forests and parks, are typically responsible for selecting and implementing fuel reduction projects.

Since 2001, Congress has appropriated more than $3.2 billion in fuel reduction funds to the Forest Service and Interior. For 2007, the Forest Service received about $300 million, and Interior received about $200 million.[4] After receiving its annual appropriation, the Forest Service allocates funds to its nine regional offices which in turn allocate funds to individual national forests and grasslands. Interior, upon receiving its annual appropriation, allocates funds to BIA, BLM, FWS, and NPS. BLM generally receives about 50 percent of Interior's funding, BIA about 20 percent, and FWS and NPS about 15 percent each. These agencies then allocate funds to their regional or state offices, which, in turn, allocate funds to individual field units, such as national parks or wildlife refuges. (BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this report, we refer to all of these as regional offices when we discuss the Interior agencies collectively.) Figure 1 shows the annual appropriation and allocation process.

[4]Years cited in this report refer to fiscal years except where otherwise specified.

Figure 1: Annual Appropriation and Allocation Process for Fuel Reduction Funds



Source: GAO (data) and Art Explosion (clipart).

Recognizing that treating all of the land in need of fuel reduction may take decades, the agencies have acknowledged the importance of setting priorities for which lands are to receive treatment so that they can select those treatments that will be the most effective at reducing the risks from wildland fire. However, we have found a long-standing pattern of shortcomings in the processes the Forest Service and Interior agencies use to identify and set priorities for lands needing fuel reduction. Between 1999 and 2003, we reported that the Forest Service and Interior had made it a priority to treat lands at the highest risk from wildland fire, but they had not identified the amount or location of such lands and had not issued guidance specific enough for field staff to set priorities for individual projects. We concluded that the agencies needed a cohesive strategy

outlining long-term options and associated costs for reducing fuel.[5] In subsequent reports, we noted, among other things, the progress the agencies had made in improving their data, but reiterated that they needed to complete ongoing efforts to identify lands at risk from wildland fire—by collecting information on the hazards, the likelihood of fire occurring, and the values at risk—so funds could be targeted to such lands. We also reiterated the need to develop a cohesive strategy that included long-term options and associated costs so that Congress could make informed decisions about cost-effective approaches to fuel reduction.[6]

In this context, you asked us to report on the agencies' current processes for identifying and setting priorities for fuel reduction. Specifically, you asked us to (1) identify the processes the Forest Service, Interior, and the four Interior agencies use to allocate fuel reduction funds and select projects for implementation, including the factors that influence these processes, and (2) determine how, if at all, these processes could be improved to better ensure that they contribute to the agencies' goal of effectively reducing the risk of wildland fire to communities and the environment.

To address these objectives, we met with national, regional, state, and local officials of the Forest Service, Interior, and Interior agencies. At the national level, we met with agency officials at their Washington, D.C., headquarters, as well as at the National Interagency Fire Center in Boise, Idaho. At the regional and state levels, we used a structured interview guide to speak, in person or by telephone, with officials in all Forest Service regional and BLM state offices, as well as with officials in selected BIA, FWS, and NPS regional offices that collectively received a substantial portion of each agency's fuel reduction funds. At the local level, we visited

[5]GAO, *Western National Forests: A Cohesive Strategy Is Needed to Address Catastrophic Wildfire Threats*, GAO/RCED-99-65 (Washington, D.C.: Apr. 2, 1999); *Reducing Wildfire Threats: Funds Should Be Targeted to the Highest Risk Areas*, GAO/T-RCED-00-296 (Washington, D.C.: Sept. 13, 2000); GAO-02-259; *Wildland Fire Management: Additional Actions Required to Better Identify and Prioritize Lands Needing Fuels Reduction*, GAO-03-805 (Washington, D.C.: Aug. 15, 2003).

[6]GAO, *Wildland Fires: Forest Service and BLM Need Better Information and a Systematic Approach for Assessing the Risks of Environmental Effects*, GAO-04-705 (Washington, D.C.: June 24, 2004); *Wildland Fire Management: Important Progress Has Been Made, but Challenges Remain to Completing a Cohesive Strategy*, GAO-05-147 (Washington, D.C.: Jan. 14, 2005); *Wildland Fire Management: Update on Federal Agency Efforts to Develop a Cohesive Strategy to Address Wildland Fire Threats*, GAO-06-671R (Washington, D.C.: May 1, 2006).

20 local units, such as national forests and BLM field offices, in eight states to gain a better understanding of their processes for selecting fuel reduction projects for implementation. We selected local units that are diverse in geographic location, predominant vegetation type, and proximity to communities and development. We also obtained and reviewed applicable laws, regulations, and agencywide and regional policies; agency data on funding allocations; and electronic data on the extent of agency fuel treatment activities. We tested these data and found that they were sufficiently reliable for the purposes of this review. Finally, we interviewed several nonfederal parties, including representatives from environmental groups and the Western Governors' Association.[7] We conducted our work from August 2006 to September 2007 in accordance with generally accepted government auditing standards. See appendix I for a detailed description of our methodology.

Results in Brief

In allocating fuel reduction funds and selecting projects, the Forest Service—at the national, regional, and local levels—uses both quantitative processes (such as computer models or scoring systems) and professional judgment and, in doing so, considers multiple factors, such as risk assessments, treatment cost per acre, and collaboration with communities or other entities. Specifically, for 2007, we found the following:

- *At headquarters*, the Forest Service began using a computer model to influence funding allocations to regions. To set priorities for each region's fuel reduction funding, the model considers multiple factors, including some intended to assess risk, such as the potential for fires occurring in each region and their expected severity, as well as other factors, such as regional use of biomass removed in fuel treatments and treatment cost per acre. However, the Forest Service's funding allocations to its regions were not consistent in all cases with the priority scores resulting from the model, with some high-scoring regions receiving less funding than some lower-scoring regions. These disparities occurred for a number of reasons, such as the higher costs of fuel reduction in some areas. However, the model did not substantially influence the agency's 2007 allocations; instead, the Service relied largely on prior year funding levels and used results from the model only to make minor adjustments. Officials said they expect

[7]The Western Governors' Association is an independent, nonpartisan organization of governors representing 19 western states. The governors use the association to develop and advocate policies that reflect regional interests.

the model's results to have more influence on future allocation decisions, but curbed this influence initially because they were still refining the model and wanted to maintain relatively stable regional funding levels.

- *In the regions*, each region determined how to allocate funds to national forests and what factors to consider, as long as they were consistent with the factors used in the national allocation model. Four of the Service's nine regions relied primarily on quantitative data in their allocation processes, while five relied primarily on professional judgment. For example, the Rocky Mountain region used a computer model that evaluated data on multiple factors, such as vegetative conditions and areas of insect-killed trees, while the Southern region convened a group of officials who used professional judgment and considered historical funding levels, the capabilities of the forests, per-acre treatment cost, local priorities, and acreage targets when allocating funds. Beginning with the 2008 allocations, the Forest Service plans to require regions to use the headquarters model to inform allocation decisions.

- *Locally*, national forests had discretion in determining how to select projects. Some used quantitative, data-driven processes, while others relied primarily on professional judgment or collaborative processes involving other agencies and local communities. Forests considered a range of factors—similar to those used at the national and regional levels—when selecting projects.

Like the Forest Service, Interior and its agencies' national, regional, and local offices used both quantitative and judgmental processes for allocating fuel reduction funds and selecting projects and considered multiple factors that are similar to those the Forest Service uses. More specifically, for fiscal year 2007, we found the following:

- *Interior* allocated funds to its four agencies primarily on the basis of historical funding levels; however, Interior is developing a computer model similar to the Forest Service's, and it used the model to allocate 5 percent of its funds in 2007. Interior agencies, in turn, had the flexibility to determine how to allocate funds, within the parameters of departmental guidance.

- *BLM* headquarters allocated funds primarily on the basis of historical funding levels, but officials told us that, starting in 2008, they plan to use a quantitative process incorporating multiple factors, such as the potential for fires to occur, treatment cost, and local risk ratings.

- *BIA* headquarters allocated funds using quantitative processes, but these processes generally emphasized a single factor—BIA units' past performance (measured in acres treated) in carrying out fuel reduction activities.

- *FWS* headquarters allocated funds to regional offices using a quantitative process—a model that considers a range of factors, such as the history of fires, fuel conditions, and communities at risk.

- *NPS* headquarters allocated funds to regions largely on the basis of historical funding levels. These funding levels were originally determined using a model that assessed the risk from wildland fire, among other factors.

At the regional and local levels, regional offices and field units in all four agencies used a variety of processes to allocate funds and select projects for implementation. Some processes emphasized quantitative data, while others emphasized professional judgment. The regional and local offices also considered a range of factors, consistent with departmental direction.

Although the Forest Service and Interior have begun taking action to enhance their funding allocation processes, there are additional steps they could take to improve these processes to better ensure they advance the agencies' goal of effectively reducing the risk of wildland fire to communities and the environment. Specifically, the agencies could improve their processes by taking the following five steps:

- *Consistently using risk assessments.* The agencies did not consistently use risk assessments in their 2007 allocation processes at the national, regional, and local levels, in some cases because national or regional offices expected local units to do so. However, agency officials cannot be sure that projects identified as high risk locally would likewise be the highest risk from a regional or national perspective. Even when the agencies did conduct risk assessments, they found it difficult to meaningfully distinguish between higher- and lower-priority locations because one key value at risk—the wildland-urban interface—is broadly defined and many different areas are classified as interface. Although the agencies' guidance sets a priority on projects in the interface, it does not specify whether some of the areas classified as interface ought to be higher priority than others. As a result, projects as diverse as those protecting remote power lines, individual ranch houses, or large suburban subdivisions can all fall within the wildland-urban interface category and, thus, be designated

high priority—complicating agency officials' attempts to identify and direct their limited resources toward the highest-priority areas.

- *Developing information on treatment effectiveness.* The agencies did not consider treatment effectiveness—that is, how much risk reduction can be achieved, and for how long—when making allocation decisions because they currently have no measure for effectiveness, although they are working to develop such a measure. Without information on treatment effectiveness, the agencies could be funding treatments that have little effect on reducing risk.

- *Developing information on cost effectiveness.* The agencies often considered costs when allocating funds, but not cost effectiveness—primarily because they lack information on treatment effectiveness. Without such information, it is difficult to know whether a treatment's cost is warranted or to compare the cost effectiveness of different potential treatments to decide how to optimally allocate funds.

- *Clarifying the importance of factors unrelated to risk or effectiveness.* The agencies often considered factors other than risk, treatment effectiveness, and cost effectiveness when allocating funds and selecting projects. When these external factors—such as funding stability and the use of biomass resulting from fuel reduction treatments—have considerable influence, it is difficult for the agencies to ensure that they are allocating funds so that treatments will most effectively reduce risk.

- *Applying more systematic processes.* The agencies sometimes relied exclusively on professional judgment when allocating funds or selecting projects. Although judgmental processes might result in allocations that maximize risk reduction, the agencies cannot be assured that they routinely do because such processes are not necessarily systematic—that is, methodical, based on criteria, and applied consistently.

To improve the agencies' ability to ensure that fuel reduction funds are directed to most effectively reduce the risk from wildland fire, we are recommending that the Secretaries of Agriculture and of the Interior take actions to implement a more systematic allocation process; develop additional information on risk, treatment effectiveness, and cost-effectiveness to support the process; and clarify the relative importance of multiple criteria for setting priorities in allocation and project selection decisions. We provided a draft of this report to the Secretaries of Agriculture and of the Interior for review and comment. The Forest

Service and the Department of the Interior generally agreed with our report; their joint comment letter is presented in appendix IV.

Background

Wildland Fire Is a Natural Process

Although its effect on communities can be devastating, wildland fire is a natural and necessary process that provides many benefits to ecosystems, such as maintaining habitat diversity, recycling soil nutrients, limiting the spread of insects and disease, and promoting new growth by causing the seeds of fire-dependent species to germinate. Wildland fire also periodically removes brush, small trees, and other vegetation that can otherwise accumulate and increase the size, intensity, and duration of subsequent fires. However, human uses and land management practices—including decades of wildland fire suppression—have excluded fire from ecosystems, reducing the normal frequency of wildland fire and subsequently causing an accumulation of vegetation. Federal researchers have estimated that unnaturally dense fuel accumulations on 90 million to 200 million acres of federal lands in the contiguous United States place these lands at an elevated risk of severe wildland fire and that these conditions also hold true for many nonfederal lands.

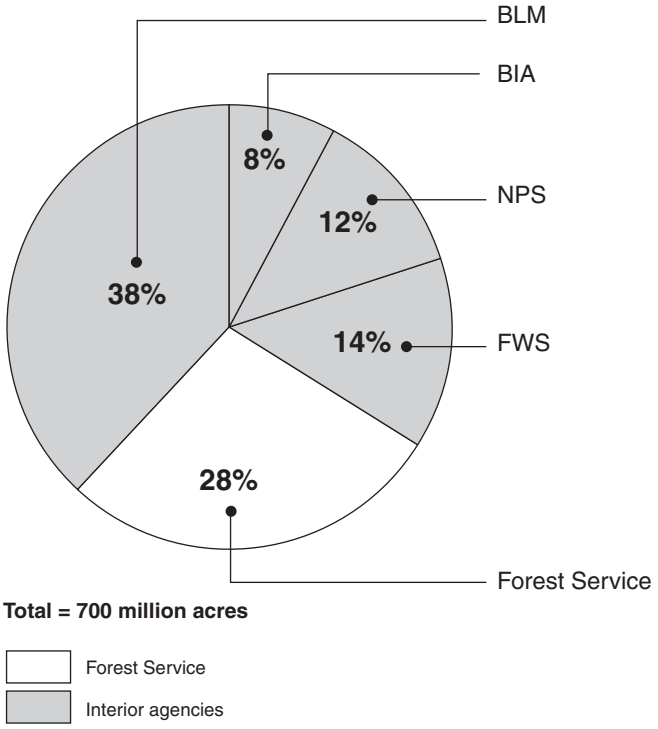
Most lands in the United States evolved with fire, and each ecosystem has a characteristic fire regime that describes the role fire plays in the ecosystem, including typical fire frequency, scale, intensity, and duration. These regimes are numbered I through V, with fire regime I characterized by low-severity fires that historically occurred every 35 years or less, fire regime II characterized by high-severity fires that historically occurred every 35 years or less, fire regime III characterized by mixed-severity fires that historically occurred every 35 to 100 or more years, fire regime IV characterized by high-severity fires that historically occurred every 35 to 100 or more years, and fire regime V characterized by high-severity fires that historically occurred every 200 or more years. Many ecosystems—particularly those in fire regimes I and II—have now missed numerous fire cycles as a result of past suppression policies and other land management practices. This departure from the natural fire regime is categorized by a measure called condition class, which the agencies have used as a generalized rating for the risk of uncharacteristic wildland fires that may cause undesirable ecological consequences. Ecosystems in condition class 1 are generally within their historical fire return interval, so fires in these areas pose little risk to natural processes—although fires in such ecosystems may still pose a high risk to communities. Areas in condition classes 2 and 3 have moderate to significant departures from historical fire

experiences. In such areas, fuel that would typically have burned periodically has instead accumulated, posing a higher risk that uncharacteristically large amounts of vegetation and other natural resources would be lost from wildland fire; fires in these areas may also pose a high risk to communities.

Five Agencies Are Responsible for Wildland Fire Management

The Forest Service, BIA, BLM, FWS, and NPS are responsible for wildland fire management, including fuel reduction. These five agencies manage about 700 million acres of land in the United States, including national forests, national grasslands, Indian reservations, national parks, and national wildlife refuges. The Forest Service and BLM manage the majority of these lands, with the Forest Service managing about 190 million acres and BLM managing about 260 million acres; BIA, FWS, and NPS each manage less than 100 million acres. Figure 2 shows the distribution of land among the five agencies. Each agency has between 7 and 12 regional offices that oversee field units.

Figure 2: Distribution of Total Land Managed by the Forest Service, BIA, BLM, FWS, and NPS



Source: GAO analysis of Forest Service and Interior data.

Each year, the Forest Service, Interior, and Interior agencies set performance targets for region- and state-level fuel reduction by establishing the number of acres the agencies expect to be treated—both within and outside of the wildland-urban interface—using the funds allocated. For example, for fiscal year 2007, BLM assigned a target of almost 90,000 acres to its Oregon/Washington state office and specified that two-thirds of the acres should be in the wildland-urban interface. Between 2001 and August 2007, land managers treated more than 18 million acres under the fuel reduction program, including about 8.5 million acres near communities.[8] These acres include federal, state, and private land, because, in addition to conducting fuel treatments on federal lands, the agencies work with and grant funds to local communities to conduct fuel reduction treatments on state and private lands. These acres also include those that have been treated more than once.

The agencies generally reduce fuel using either mechanical treatments, in which equipment—such as chainsaws, chippers, bulldozers, or mowers—is used to cut vegetation, or prescribed burning, in which fires are deliberately set by land managers to restore or maintain desired vegetation conditions.[9] Figure 3 depicts a mechanical thinning project, and figure 4 depicts a prescribed burn.

[8]The agencies treated an additional 1.8 million acres from 2004 to August 2007 through other land management activities.

[9]The agencies also conduct some treatments using other methods, such as applying herbicides and allowing animals to graze on the land.

Figure 3: A Mechanical Thinning Project for Fuel Reduction on BLM Land in California

Source: BLM.

Figure 4: Prescribed Fire for Fuel Reduction on Forest Service Land in South Carolina

Source: Forest Service.

Although prescribed burning can be risky, burning under specified fuel and weather conditions enables fire to be controlled at a relatively low intensity level within a confined area. Prescribed burning is very effective in removing smaller vegetation, such as grasses, leaves, pine needles, and twigs, but is not as effective in removing larger fuel, such as trees, or in thinning stands to desired densities. In contrast, mechanical treatment methods are effective in thinning stands and removing larger vegetation but may increase the amount of smaller fuel on the ground, including tree tops and limbs (referred to as slash) and other debris from thinning. As a result, some fuel reduction projects use multiple treatment methods and may span several years. For example, a field unit may first treat an area mechanically to thin accumulated vegetation and then follow with a prescribed burn to remove remaining slash and litter on the ground.

In addition to reducing the risk of fire to communities and the environment, one of the long-term goals of the fuel reduction program is to allow fire to resume its natural role. By conducting treatments, including creating fire breaks to help contain the spread of fire, the agencies increase the amount of land where naturally ignited fires can safely be allowed to burn. Under wildland fire use policies, land managers may allow wildland fires that are naturally ignited to continue to burn, as long as fuel and weather conditions are appropriate and the fire is located within an area designated for wildland fire use.[10] Managers are thus able to use natural fire to meet resource objectives, such as removing excess vegetation.

Although the five agencies all reduce fuel in order to reduce risk to communities and the environment, their fuel reduction programs reflect differences in their missions, predominant vegetation types, and allowable land uses. For example, FWS's mission is focused on the conservation of wildlife habitat, and the agency generally conducts more prescribed burns than mechanical treatments because such burns frequently improve habitat as well as reduce risk; the agency has been conducting prescribed burns since the 1930s. Similarly, prescribed burns, as well as wildland fire

[10]Interagency policy directs land managers to select firefighting strategies in accordance with local federal units' land and fire management plans. If a plan has not been developed and approved, the policy directs land managers to suppress the fire. Thus, under the policy, the areas where wildland fire use is allowed must be defined in a fire management plan, along with prescribed weather and other conditions. The fires are monitored, and if weather conditions change in a way that would potentially allow the fires to escape from the designated areas, the fires are suppressed.

use, are the preferred fuel treatment methods at NPS and have been used by the agency for decades. NPS prefers these treatment methods over mechanical treatments because its mission emphasizes preservation of natural and cultural resources, and fire is a natural process that better aligns with this mission. Regarding predominant vegetation types, BLM's lands are largely rangelands, while lands managed by other agencies, such as the Forest Service and FWS, include more forests. As a result of this difference, BLM not only conducts mechanical treatments and prescribed burns, as do the other agencies, but also uses herbicides to reduce fuel, especially where rangelands have been invaded by exotic plants such as cheat grass. Agency differences in allowable land use also affect their fuel reduction programs. For example, the Forest Service, BIA, and BLM have active commercial timber programs, and field units may therefore conduct fuel treatments that benefit both the timber and fuel reduction programs. BIA and NPS also manage lands with numerous archaeological sites, which must be considered when conducting treatments. In contrast, the majority of BLM's land is used for grazing, and, as a result, BLM coordinates fuel treatments with potentially affected ranchers.

Expansion into the Wildland-Urban Interface Has Increased, as Has the Federal Focus on Wildland Fire Management

Urban and suburban expansion into the wildland-urban interface has increased the number of communities and structures at risk of wildland fire near federal lands that the five agencies manage. Experts estimate that almost 60 percent of all new housing units built in the 1990s were located in the wildland-urban interface and that this growth trend continues. They also estimate that more than 30 percent of housing units overall are located in the wildland-urban interface and that the interface covers about 9 percent of the nation's land. In addition to housing units, other types of infrastructure are located in the wildland-urban interface, including power lines, campgrounds and other recreation facilities, oil and gas wells, communications towers, and roads.

After the National Fire Plan was developed, the agencies began receiving sharp increases in funding for fuel reduction and, since 2001, Congress has appropriated between about $400 million and $500 million annually for fuel reduction under the plan. (App. II shows agency fuel reduction funding appropriations and allocations for 2005 through 2007; app. III shows the agencies' fuel treatment accomplishments.) In 2002, the President announced the Healthy Forests Initiative (HFI), directing the departments of Agriculture and of the Interior and the Council on Environmental Quality to provide regulations to ensure more timely decisions, increase efficiency, and improve results in reducing the risk of catastrophic wildland fires.

In 2003, Congress passed HFRA to reduce wildland fire risk to communities, municipal water supplies, and other at-risk federal lands through a collaborative process of planning, setting priorities for, and implementing fuel reduction projects. In funding authorized fuel reduction projects on federal land, HFRA requires the agencies to use at least 50 percent of these funds in the wildland-urban interface.[11] The act also established separate environmental analysis and administrative review procedures for fuel reduction projects authorized under HFRA. In providing assistance for fuel reduction activities on nonfederal lands, HFRA requires the agencies, to the maximum extent practicable, to give priority to communities that have adopted a community wildfire protection plan (community plan) or have taken proactive measures to encourage willing property owners to reduce fire risk on private property. A community plan identifies and sets priorities for fuel reduction treatments and recommends the types and methods of treatment on federal and nonfederal land that will protect at-risk communities and essential infrastructure; community plans also recommend measures to reduce structural ignitability throughout the at-risk community. These plans are to be agreed upon by the applicable local government, local fire department, and state forest management agency, in consultation with other interested parties and the federal land management agencies. As of February 2007, there were at least 1,100 completed community plans covering almost 3,300 communities throughout the United States, and approximately 450 additional plans in progress, according to the National Association of State Foresters. A community plan may cover one or more communities, and some cover entire counties.

According to the 10-Year Strategy Implementation Plan, the goal of the fuel reduction program is to reduce the risk of wildland fire to communities and the environment. However, some fuel treatments provide other benefits in addition to this overall program goal; for example, agency staff sometimes conduct prescribed burns to both reduce fuel and enhance wildlife habitat, or conduct mechanical thinning projects before a commercial timber sale. Similarly, in addition to the approximately $400 to $500 million appropriated for fuel reduction each year, funds from other agency programs, such as wildlife management or timber, often are used to conduct vegetation treatment projects that reduce fuels as a secondary

[11]This requirement applies only to projects conducted using HFRA authorities. Agency officials told us they do not have reliable data on the portion of their fuel reduction projects that used HFRA authorities.

benefit. In addition, the agencies sometimes receive partnership funding from outside organizations, such as the Rocky Mountain Elk Foundation or The Nature Conservancy, to conduct collaborative treatments.[12]

GAO Has Reviewed Agencies' Fuel Treatment Programs

While the federal agencies acknowledge the importance of setting priorities for lands needing fuel treatments, we have identified a long-standing pattern of shortcomings in the processes the Forest Service and Interior use to identify and set priorities for these lands. Between 1999 and 2007, we conducted several reviews of the agencies' wildland fire management efforts, including the fuel reduction program. We found that, while the agencies aimed to target fuel reduction efforts to the highest risk areas, they could not ensure that they were doing so. For example, in 1999, we found that the Forest Service intended to give priority to treatments in the wildland-urban interface but was hampered in doing so because it had not fully defined and mapped such areas.[13] We concluded that the Forest Service needed a cohesive strategy outlining options and associated costs for reducing fuel. We reiterated the agencies' need for a cohesive strategy in several additional reports and testimonies issued between 2002 and 2007.[14] In 2000 and 2002, we reported that the Forest Service and Interior did not know how many communities were at high risk of severe wildland fire or their locations and the cost to treat them and, therefore, could not set treatment priorities.[15] We further reported in 2002 and 2003 that the agencies did not have quantifiable long-term and annual performance measures to assess progress in reducing the risks of wildland fire and that they measured the performance of the fuel reduction program by number of acres treated, which does not necessarily correlate to risk reduction.[16]

Similarly, in 2004, we reported that the agencies did not systematically assess the risks to environmental resources and ecosystems and,

[12]Our review was limited to fuel reduction work activities using federal funds appropriated specifically for this purpose. As a result, fuel reduction work funded by other agency programs or outside organizations is beyond the scope of this review.

[13]GAO/RCED-99-65.

[14]GAO, *Wildland Fire Management: Reducing the Threat of Wildland Fires Requires Sustained and Coordinated Effort*, GAO-02-843T (Washington, D.C.: June 13, 2002); GAO-05-147; GAO-06-671R; *Wildland Fire Management: Lack of a Cohesive Strategy Hinders Agencies' Cost-Containment Efforts*, GAO-07-427T (Washington, D.C.: Jan. 30, 2007).

[15]GAO/T-RCED-00-296; GAO-02-259.

[16]GAO-02-259; GAO-03-805.

therefore, could not target fuel reduction efforts to the resources and ecosystems at highest risk. To set priorities for fuel reduction activities, the agencies must first identify areas at risk from wildland fire by considering three elements: hazard, risk, and value.[17] A hazard is a potential event, such as a wildland fire, and the conditions that cause it; in the case of wildland fire, both the fuel conditions and the fire itself are the hazard. Risk is the probability that an event such as a wildland fire will occur. Values are the resources and property that could be lost or damaged because of a hazard; in the case of wildland fire, values might include social, economic, or environmental values.[18] Without considering all three elements, the agencies may not be appropriately setting priorities for areas needing fuel reduction. For example, an area with high vegetation hazard may not be in an area where fires are likely to occur, making it a lower priority for treatment; likewise, a high hazard area might not be near something of value that could be lost or damaged in a fire, also making it a lower priority for treatment.

We also found, through multiple reviews, that the agencies could benefit from coordinating their efforts to manage wildland fires because wildland fire is a shared problem that transcends administrative boundaries. For example, in 2001 we reported that federal policy for managing wildland fire required coordination, consistency, and agreement among the Forest Service, Interior, and Interior agencies, but we found that the agencies planned and managed wildland fire management activities largely on agency-by-agency and unit-by-unit bases, and could not ensure, among other things, that they were allocating funds to the highest-risk communities and ecosystems.[19] In a 2002 report, we noted that the Forest Service and Interior had either developed or were in the process of developing numerous strategies that had different goals and objectives and that were not linked, primarily because the agencies had been managing their lands on an agency-by-agency basis for decades.[20] In a subsequent

[17]This approach, outlined by the National Academy of Public Administration, uses risk as a specific term referring to the probability of an event, as well as an umbrella term that encompasses all three of these elements. See National Academy of Public Administration, *Managing Wildland Fire: Enhancing Capacity to Implement the Federal Interagency Policy* (Washington, D.C.: December 2001).

[18]For more information on the hazard-risk-value framework, see GAO-04-705.

[19]GAO, *The National Fire Plan: Federal Agencies Are Not Organized to Effectively and Efficiently Implement the Plan*, GAO-01-1022T (Washington, D. C.: July 31, 2001).

[20]GAO-02-259.

testimony, which emphasized the agencies' need for a cohesive strategy as well as clearly defined and effective leadership, we concluded that effectively addressing wildland fire would require a sustained and coordinated effort between departments.[21] (See Related GAO Products.)

The Forest Service Uses a Mix of Quantitative and Judgmental Processes and Considers a Range of Factors in Allocating Funds and Selecting Projects

The Forest Service uses both quantitative and judgmental processes in deciding how to allocate fuel reduction funds. At headquarters, the agency increasingly relies on a quantitative process—reflected in a computer model—to determine the relative need for fuel reduction funds in each region. At the regional level, some offices primarily use quantitative processes to allocate resources while others rely on professional judgment. Similarly, the national forests use a mix of quantitative and judgmental processes to select projects.

At the National Level, the Forest Service's Allocation Process Increasingly Relies on a Quantitative Approach

At the headquarters level, the Forest Service has developed a computer model that assesses regions on various factors and assigns a score to each region reflecting its relative priority for fuel reduction funds.[22] According to Forest Service officials, they developed the model to address shortcomings that were highlighted by Congress and that were previously identified by GAO, the Department of Agriculture's Office of Inspector General, and the Office of Management and Budget. These shortcomings included inadequate assessment of the risk of wildland fires to communities, failure to clearly identify fuel reduction priorities, and little

[21] GAO-02-843T.

[22] The Forest Service's system for setting priorities for reducing hazardous fuels and allocating resources excluded the Alaska region (and did not give it a priority score) because the Alaska region's program accounts for less than 1 percent of the agency's fuel reduction funds.

assurance that funding is targeted to these priorities.[23] In addition, agency officials said they developed the model to provide transparency, so that agency officials at all levels, as well as Congress and others, can understand the rationale behind allocation decisions.

In developing the model, the Forest Service brought together an interdisciplinary group of senior leaders to determine the final list of factors, which was based on an initial list developed by regional fuel program managers. To determine the factor weightings, the group followed a multistep process in which they determined the relative importance of each factor by comparing it separately to every other factor, and then synthesized the results to determine overall weightings.[24] The model includes 18 weighted factors, as shown in table 1.

[23]See GAO-03-805; U.S. Department of Agriculture, Office of Inspector General, *Audit Report: Implementation of the Healthy Forests Initiative*, 08601-6-AT (Washington, D.C.: September 2006); Office of Management and Budget, *Program Assessment Rating Tool: Review of U.S. Department of Agriculture's Wildland Fire Management Program* (Washington, D.C.: 2006); U.S. House of Representatives, Committee on Appropriations, *Department of the Interior, Environment, and Related Agencies Appropriations Bill of 2007*, *House Report 109-465*, 109th Cong., 2nd Sess. (Washington, D.C.: May 15, 2006); U.S. Senate, Committee on Appropriations, *Department of the Interior, Environment, and Related Agencies Appropriation Bill of 2007*, *Senate Report 109-275*, 109th Cong., 2nd Sess. (Washington, D.C.: June 29, 2006).

[24]The process the officials used to weight the factors is called the analytical hierarchy process, which is a systematic process often used in private industry to make complex decisions involving multiple criteria, such as investment decisions. We did not assess the appropriateness of the factors selected or the weights assigned, nor did we evaluate the model's accuracy in applying these factors to determine priority scores.

Table 1: Factors Considered in Forest Service Fuel Reduction Funding Allocation Model

Factors	Weight (percent)
Treatment effectiveness[a]	16.7
Wildfire potential	12.5
Wildland-urban interface	10.3
Treatment method availability	8.3
Wildlife habitat objectives	7.1
Municipal water supply	5.2
Ecosystem vulnerability[b]	5.2
Associated benefits[a,c]	4.2
Vegetative maintenance	4.2
Biomass opportunity	3.6
Insects and disease	3.6
Invasive species	3.6
Vegetation departure[b]	3.6
Watershed condition	3.6
Life cycle cost[a,d]	2.8
Commercial timber	2.6
Smoke emissions[e]	1.7
Use of legislative tools[f]	1.4
Total	**100**

Source: GAO analysis of Forest Service data.

Notes: Totals do not add to 100 percent due to rounding.

[a]No data were available for the 2007 allocation process.

[b]"Ecosystem vulnerability" and "vegetation departure" are measures of fire regime condition class.

[c]"Associated benefits" is a measure of acres treated with fuel reduction funds that achieve benefits for other programs, such as wildlife or watershed.

[d]"Life cycle cost" is intended to measure the cost of treatments per year.

[e]"Smoke emissions" is a measure of the acres of vegetation that produces high levels of smoke during a wildland fire.

[f]"Use of legislative tools" is a measure of acres treated in projects authorized in HFRA or HFI, identified in community wildfire protection plans, or implemented using stewardship contracts. Stewardship contracting involves the use of any of several contracting authorities that were first authorized for use by the Forest Service on a pilot basis in 1998, and were subsequently extended to BLM. In practice, stewardship contracts generally involve the exchange of goods, such as timber, for contract services, such as thinning of brush.

Several of the factors—such as fire potential, ecosystem vulnerability, and wildland-urban interface—are designed to assess the potential for severe

wildland fires in each region and the likelihood of damage resulting from such fires. For example, to determine the potential for severe fires, the model analyzes data such as the number and size of large wildland fires in each region. To determine the likelihood of damage resulting from wildland fires, the model includes data on values at risk, such as the locations of municipal water supplies and wildland-urban interface.

Other factors are intended to encourage efficiency and effectiveness within the fuel reduction program and across multiple Forest Service programs, such as the forest products or wildlife management program, to take advantage of opportunities to achieve objectives in other programs. Regarding effectiveness, the model included a factor intended to assess effectiveness in the regions—method availability. However, in practice, this factor used data on the total number of acres treated in each region—in effect rewarding regions for treating a large number of acres regardless of how well the treatments reduced risk or of the risk level of the areas treated. In addition, the model was designed to include a factor to assess how effective individual fuel reduction treatments are likely to be in reducing risk. However, the Forest Service does not currently have data to make such an assessment; consequently, for 2007, this factor did not influence allocations to the regions.

In 2007, officials used the model's results to inform their decisions about funding allocations to the regions, although they relied mainly on the prior year's funding levels along with their professional judgment. Officials used the model's results only to make minor adjustments to allocations because the model was still being refined and because they wanted to phase in funding changes gradually in order to minimize budget-related disruptions. Headquarters officials said they expect the model to have a stronger influence on future allocation decisions.

The model assigned a numerical score to each region that indicated the region's relative priority for fuel reduction funds, with higher scores indicating higher priority. However, as shown in table 2 and figure 5, the Forest Service's funding allocations to its regions are often at odds with the priority scores resulting from the model, with some high-scoring regions—such as the Northern and Eastern regions—receiving less funding than some lower scoring regions such as the Pacific Southwest and the Southwest regions.

Table 2: Forest Service Regions' Fiscal Year 2007 Fuel Reduction Priority Scores and Funding Allocations

Dollars in thousands

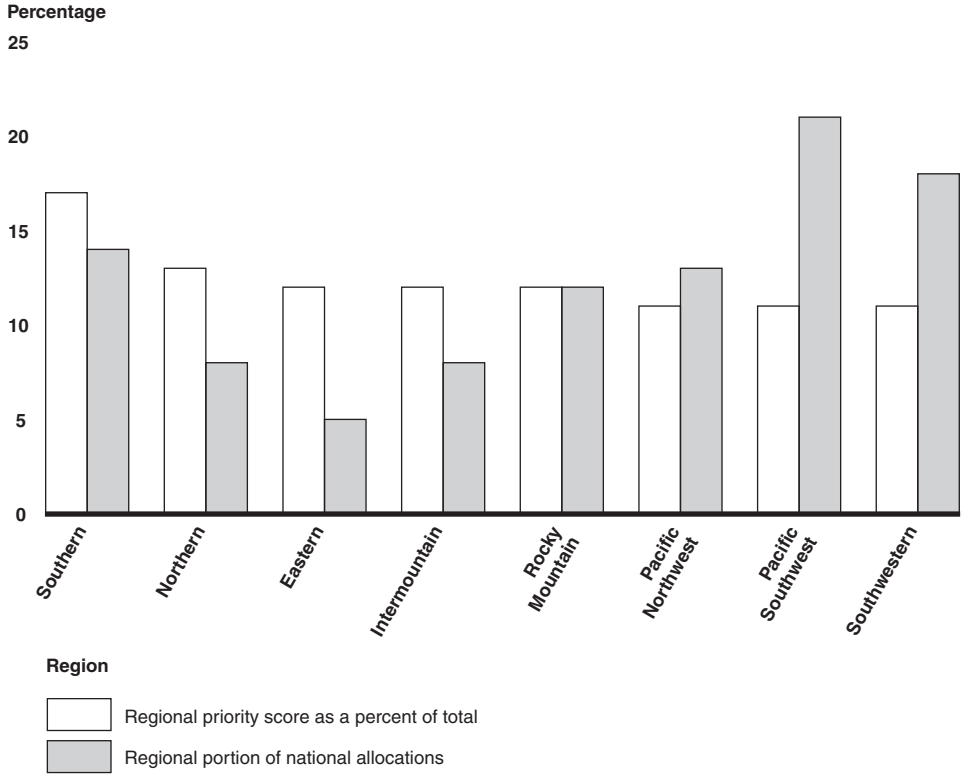
Forest Service region	Priority score	Funding allocation
Southern	574	$29,092
Northern	455	15,782
Eastern	416	9,718
Intermountain	408	16,165
Rocky Mountain	399	25,445
Pacific Northwest	389	25,794
Pacific Southwest	388	43,737
Southwestern	367	37,341
Alaska[a]	[a]	805
Total		**$203,879**

Source: Forest Service.

Notes: The Forest Service also allocated $2.265 million to its research stations and $ 95.109 million to its headquarters office and to cost pools, which are used for expenses that cannot reasonably be charged to a single program, including indirect, support, and common services charges.

[a]The Forest Service excluded the Alaska region from its model because the region has a small fuel reduction program relative to the other regions and receives less than 1 percent of the agency's fuel reduction funds.

Figure 5: Forest Service Regions' Fuel Reduction Priority Scores as a Percentage of Total, Compared to Regions' Funding Allocations as a Percentage of Total Allocations, Fiscal Year 2007



Source: GAO analysis of Forest Service data.

According to Forest Service officials, the allocation amounts were not more closely correlated with the priority scores for the following reasons:

- As noted, the officials wanted to temper changes to regions' budget allocations until they completed revisions to the model and developed more confidence in its output in order to minimize funding shifts that might prove inappropriate once the model is refined.[25] Agency officials told us that even when they become confident in the model's output,

[25]GAO has previously noted the importance of the integrity, credibility, and quality of data that underlie budget decisions and, thus, the value in implementing changes gradually when the quality of such data is in question. See, for example, GAO, *Performance Budgeting: Opportunities and Challenges*, GAO-02-1106T (Washington, D.C.: Sept. 19, 2002).

they will likely implement changes incrementally in order to minimize disruption to regions and national forests.

- Until the revisions have been completed, the model's results will be tentative. An important focus of the revisions will be those 3 of the model's 18 factors for which the Forest Service had no data sources in 2007. Because of the lack of data, these elements had no effect on the regions' 2007 priority scores,[26] but agency officials hope to have data to inform these elements for future allocations.

- The relatively high priority score assigned to the Eastern region was not consistent with agency officials' knowledge of the area—that is, they believed that, relative to the other regions, there were fewer destructive wildland fires in the Eastern region and, consequently, they expected the region's priority score to be lower than it was. When the officials consulted data on the number of structures burned in wildland fires, their belief was confirmed. Consequently, agency officials are reexamining the measures they used to assess risk and exploring options for refining them.

- Fuel reduction costs vary widely from region to region, and when making final allocations, the officials made adjustments to accommodate this variation. For example, the Pacific Southwest region received the largest allocation of any region, despite its relatively low priority score, in part because treatment costs in the region are very high (averaging about $535 per acre in 2006). Therefore, a relatively large allocation is needed to fund even a moderate amount of work. At the other end of the spectrum, treatment costs in the Southern region are low (averaging about $32 per acre in 2006), meaning that needed work can be accomplished with a smaller allocation. In addition, agency officials said that, although the Southern region's priority score might point toward a larger allocation for the region, nonmonetary constraints—such as the size of the workforce—limit the amount of work the region can accomplish and, therefore, the amount of funds that can prudently be invested there. Further, in order to maintain overall funding stability to the regions, officials coordinated regional fuel reduction funding allocations with those of other Forest Service resource programs, such as watershed management or forest products. This coordination sometimes resulted in officials adjusting fuel

[26]To ensure that the elements without data had no effect on priority scores, all of the regions were assigned the same score for each of these elements.

reduction funding allocations in order to compensate for adjustments in these other programs' funding levels.

- The Forest Service allocated a portion of its fuel reduction funds according to congressional direction. Specifically, congressional committee reports accompanying relevant appropriations acts directed the Forest Service to spend about $34 million (12 percent) of its 2006 fuel reduction funds in certain areas or on certain projects. The Forest Service accommodated this congressional direction, regardless of whether doing so was consistent with priority scores.

Some Forest Service Regions Use Quantitative Allocation Processes, While Others Rely More on Professional Judgment

For 2007, the Forest Service allowed each region to determine how to allocate funds to its national forests and what factors to consider in the process, as long as the factors were consistent with those considered in the national allocation process. Four of the Service's nine regions relied primarily on quantitative data in their allocation processes to national forests, while five relied primarily on professional judgment. In applying these processes, all nine regions considered a combination of factors, many of which were similar to those used at the national level. Beginning with the 2008 allocations, the Forest Service plans to require regions to use the headquarters model to inform allocation decisions.

Of the four regions that relied primarily on quantitative processes in 2007, one—the Rocky Mountain region—used a computer model that analyzed geospatial data on vegetative condition and areas of insect-killed trees to help assess relative wildland fire risk among the national forests in the region. Regional officials then used their judgment to consider other factors, such as lands in the wildland-urban interface and acreage targets, to refine allocation amounts. Through the risk assessment process, the region identified 6 emphasis forests out of the 11 forests in the region and allocated over 70 percent of the region's fuel reduction funds to these 6 forests. The Pacific Northwest region also used a model, but its model incorporated regional data on a number of factors, including the number of acres in fire regimes I, II, and III; the number of acres identified in community plans as being in the wildland-urban interface; and per-acre treatment costs. Using these data, regional officials identified five forests in the region where an extremely wet climate made the risk of damaging wildland fires so low that they decided not to allocate any fuel reduction funds to these forests and excluded them from the model. Another region that relied on a quantitative process—the Pacific Southwest region—used a scoring system that ranked forests primarily on the basis of a risk assessment; the assessment incorporated multiple factors, such as the

number of acres in condition classes 2 and 3 and in the wildland-urban interface. The region also used other factors, such as the forests' capacity to conduct fuel treatment work, to make smaller adjustments. The Intermountain region allocated about 80 percent of its fuel reduction funds in accordance with forests' historical funding levels. For the remaining funds, the region delegated priority decisions to collaborative interagency groups in each of the region's states. These groups scored and ranked proposed projects against a set of standard criteria and made funding recommendations to the regional office.

The remaining five Forest Service regions relied primarily on professional judgment and negotiation among agency officials when determining funding allocations to national forests. Although these regions did not use quantitative processes to assign priorities among forests, they incorporated some of the same information included in other regions' quantitative processes. For example, the Northern region conducted a risk assessment for the region, but instead of using the risk assessment to guide its allocations to the forests, the region directed forests to use it to identify potential treatments. The region then allocated funds to forests primarily on the basis of the forests' proposed annual workloads. In the Southern region, officials used their professional judgment to decide on allocations largely on the basis of forests' reported capabilities, per-acre treatment costs, and local priorities, and how they fit with expected regional targets and budgets.

Factors outside of the formal process influenced allocations, according to Forest Service officials, but they did not always formally incorporate these factors into the allocation process. For example, in several regions, fuel reduction officials said they coordinated with officials from other resource programs, such as the wildlife management and vegetation management programs, when deciding on final allocations. In doing so, they sometimes adjusted fuel reduction allocations to, for example, prevent multiple programs from reducing allocations to a given forest in the same year or to take advantage of efficiencies when different programs' priorities overlapped in a given forest. In addition, nearly every region reported considering acreage targets when making allocation decisions—even those that did not report it as an official part of their allocation processes. Regional officials noted that pressure to meet the acreage targets established by Forest Service headquarters sometimes trumped all other factors in allocation decisions, especially in 2007 when targets increased at a faster rate than funding levels. Another factor, according to agency officials in several locations, was direction contained in congressional committee reports accompanying relevant appropriations acts that a

certain amount of funding be allocated to specific forests or specific districts within forests. As with headquarters, regional offices allocated funds according to this direction, apart from any priority-setting process. For example, in 2006, the Pacific Southwest region allocated nearly $21 million (about 52 percent of the region's budget) on the basis of congressional committee report direction, in part to treat areas of insect-killed trees in southern California. Finally, regions reported shifting funds among forests, after initial allocation decisions had been made, to accommodate unexpected circumstances during the year, such as large wildland fires that prevented fuel reduction treatments from being implemented as planned.

National Forests Select Projects Using Quantitative and Judgmental Processes

Like regional offices, national forests are allowed to determine what processes to use and which factors to consider in selecting fuel reduction projects to fund and implement, within the parameters of national and regional direction. In practice, some forests rely more on quantitative, data-driven processes, while others rely more on professional judgment. Both consider a mix of factors, as the following examples, based on our site visits to national forests, illustrate:

- *Quantitatively based selection.* The Arapaho-Roosevelt National Forest in Colorado collaborated with another national forest, a national park, Forest Service research scientists, and the Colorado State Forest Service to develop a risk assessment that used quantitative data to map the highest priority locations for fuel reduction treatments in the area. Forest officials then used the risk assessment to prepare a 10-year strategy with proposed annual treatments. Each year, forest officials first consult the strategy and the risk assessment to identify a list of projects to fund, and then adjust the list to meet acreage targets within budget constraints. Similarly, officials of the Angeles National Forest in Southern California convened a diverse group of stakeholders and followed a step-by-step process to identify priorities for fuel reduction treatments. During the process, Forest Service officials provided information, such as the locations of historical wildland fires and developed areas, as well as places where fuel reduction was not feasible because, for example, the topography was too steep to operate needed equipment. They then used fire behavior models to show where fires could potentially burn and how various proposed fuel reduction treatments might affect such fires. The end result was a multiyear list of proposed projects that forest officials used to select projects each year.

- *Judgmental based selection.* At the Medicine Bow-Routt National Forest in Wyoming and the Chattahoochee-Oconee National Forest in Georgia, officials relied largely on their knowledge and experience about the area to select fuel reduction projects. Some of these officials had worked at the same forest for decades. At the Ocala National Forest in Florida, officials use their professional judgment to select projects, which are almost all prescribed burns. However, because the forest's fuel reduction program is so large and the vegetation grows so quickly, the project selection process is founded on a rotational schedule. Under this schedule, the forest aims to treat nearly all of its approximately 130,000 burnable acres over a 4-year period. Consequently, officials try to treat about a quarter of the acreage—or slightly over 30,000 acres—each year. Forest officials also said they consider other factors, such as wind direction, humidity, and human activity (for example, popular areas for weekend recreation), when determining the specific timing of a prescribed burn.

In addition to factors that national forests considered, unanticipated factors influenced project selection decisions at the local level, sometimes preventing planned projects from being implemented. In such cases, agency staff frequently carried out lower priority projects in place of the originally planned projects. For example, wildland fires sometimes burned in locations planned for fuel reduction treatments, making the treatments unnecessary; in other cases, litigation prevented planned treatments from being implemented as scheduled.

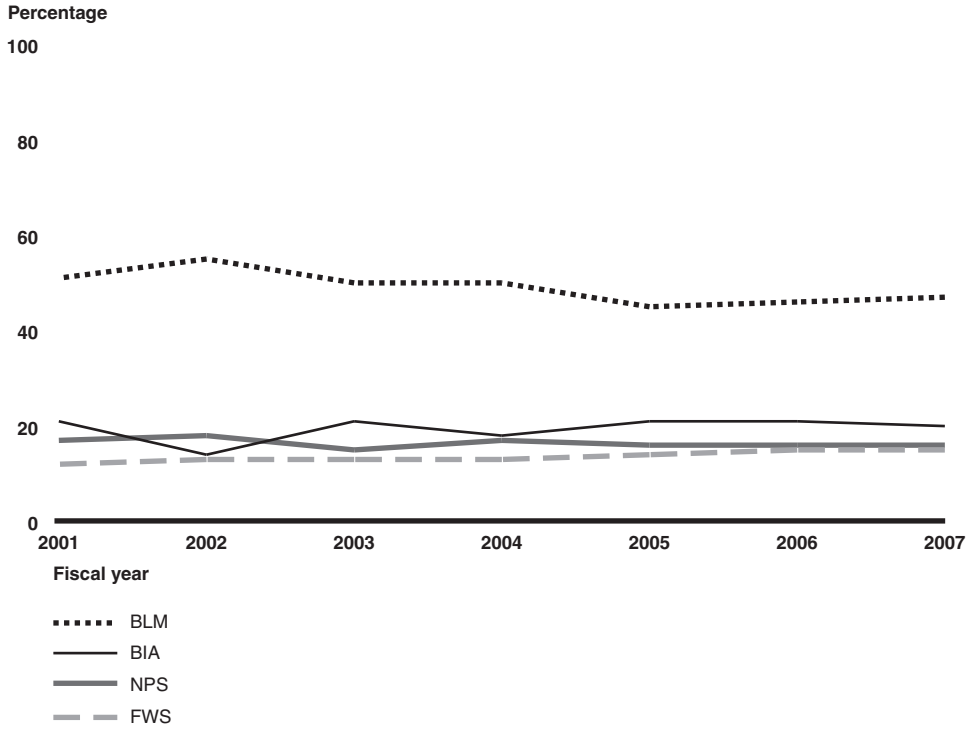
Interior and Its Agencies Use a Mix of Quantitative and Judgmental Processes and Consider a Range of Factors in Allocating Funds and Selecting Projects

Interior and its agencies—BLM, BIA, FWS, and NPS—use both quantitative and judgmental processes for allocating fuel reduction funds and selecting projects, and consider multiple factors, many of which are similar to those used by the Forest Service. In 2007, Interior allocated funds to its four agencies primarily on the basis of historical funding levels, but it is currently developing a computer model similar to the Forest Service's. Like Interior, the BLM national office allocated funds to its state offices primarily on the basis of historical funding levels in 2007 but is expecting to implement a new funding allocation model in 2008. The majority of BLM state and local offices allocated funds and selected projects using quantitative processes, many of which use scoring systems. The other three Interior agencies' national, state, and local offices used both quantitative and judgmental processes to allocate funds and select projects, considering a range of factors.

Interior Allocates Funds to Its Agencies Primarily on the Basis of Historical Funding Levels

Interior's allocations to BLM, BIA, FWS, and NPS have remained fairly constant from year to year, measured on a percentage basis, because the department primarily allocates fuel reduction funds on the basis of past funding levels—what one departmental official called "allocation by tradition." This funding pattern dates back to 2001, when the Interior agencies began receiving a sharply increased amount of fuel reduction funds as a result of the National Fire Plan. Since then, the percentage of Interior's fuel reduction funding that is allocated to each of the agencies has remained consistent, with BLM receiving about 50 percent of the funding, BIA receiving about 20 percent, and FWS and NPS each receiving about 15 percent. Figure 6 shows the percentage of Interior's total fuel reduction appropriation that was distributed to each agency from 2001 through 2007.

Figure 6: Percentage of Interior's Total Fuel Reduction Funds Allocated to the Interior Agencies, Fiscal Years 2001 through 2007



Source: GAO analysis of Interior data.

In 2001, Interior established initial funding allocations on the basis of estimates of each agency's infrastructure and capacity (i.e., the amount of work each could accomplish), which it determined by compiling field

requests from the four agencies. However, at the time, most of the agencies and their field units had little infrastructure related to the fuel reduction program—including limited staff—so many units did not have the resources to collect extensive information on fuel reduction needs, according to agency officials. As a result, agency officials had to make allocation decisions based on limited information. Some agency and departmental officials have stated that the allocations need to be revisited now that the fuel reduction program has been in place for several years.

Each year, the department tells the four agencies how much funding the department has requested for the fuel reduction program and what its acreage targets are for treatments within and outside of the wildland-urban interface. The agencies' fuel program leads—the headquarters officials in charge of each agency's fuel reduction program—then meet to determine how to divide the funds and set targets for each agency. However, the fuel program leads do not have the authority to significantly adjust the funding allocations from previous levels; rather, such changes would have to be determined at the department level, according to headquarters officials. The agencies' field units submit proposed project lists to the regions, which review these lists before forwarding them to headquarters; these lists provide the fuel program leads with an idea of each agency's needs and capabilities when determining funding allocations. After the fuel program leads decide upon initial allocations, they may shuffle funds within or between their agencies throughout the year to adapt to uncontrollable circumstances, such as weather conditions. The majority of fuel treatments that the Interior agencies conduct depend on the weather, and sometimes weather conditions prevent work from being completed. For example, if a drought in the Southeast makes vegetation too dry for safe prescribed burns, Interior may shift funds to units in the western United States. In practice, these considerations may result in Interior's shifting funds from FWS and NPS, which conduct a large number of fuel treatments in the Southeast, to BLM or BIA, which conduct most of their fuel treatments in the West.

In 2007, Interior allocated 5 percent of its funds to the agencies using a model similar to the Forest Service model, and it plans to use the model to

influence a greater portion of allocations in future years.[27] The department developed the model after Interior and the Forest Service received congressional committee direction in 2005 to develop a common method for setting project priorities. Interior's 2007 model included a range of factors, such as the amount of land each agency manages with certain fuel conditions and the degree to which each agency used biomass, but included fewer factors than the Forest Service's model because some data were not yet available. Because Interior does not currently have a good method for measuring efficiency or effectiveness, its 2007 model used the legislative tools factor, which measures the extent of use of HFI and HFRA planning authorities, to measure efficiency, and the number of acres treated to measure effectiveness. The following provides the complete list of factors used in Interior's 2007 model:[28]

- number of fire starts,
- number of large fires (defined as 500 acres or more),
- fuel conditions,
- biomass utilization,
- number of threatened and endangered species,
- fire regime condition class improvement,
- use of legislative tools (HFI/HFRA),
- number of acres treated, and
- wildland-urban interface.

[27]The funds Interior allocated using the model represented 5 percent of project funds—that is, funds expected to be spent on individual projects—rather than 5 percent of the total allocation, which would include program management expenses such as salaries, facility costs, and so forth. NPS did not receive any of the 5 percent of 2007 funds that were allocated using the new model because Interior allocated the funds late in the fiscal year and NPS had already met its 2007 acreage targets.

[28]Weights are not included in the list because Interior had not yet finalized them at the time of our review.

Results from the 2007 model were generally consistent with Interior's allocations to the agencies in previous years. However, Interior is still making changes to the model, including determining how to weight the factors, so this may not be the case in future years. According to departmental officials, Interior intends to be cautious in applying the new model and making significant changes to current allocations because Interior and the Forest Service are currently developing the Fire Program Analysis (FPA) system—an interagency fire management planning and budgeting model—and they expect information from that system to inform future allocation decisions.[29] By proceeding slowly, the department hopes to avoid potentially disruptive fluctuations in regional and field unit allocations.

Once they have received their allocations from the department, Interior agencies determine how to allocate fuel reduction funds to the regions within the parameters of departmental and congressional direction. Interior officials have stated that they would like the agencies to use more rigorous allocation processes in the future, though one departmental official noted that he does not want the agencies to invest substantial funding or time and effort to develop new allocation processes pending the expected completion of the FPA. Interior guidance lists the following priorities for selecting projects:

- All projects must result from a collaborative process.
- Funding will be targeted to the wildland-urban interface.
- Within the wildland-urban interface, focus should be on projects near wildland-urban interface communities at greatest risk of fire; communities that have completed a community plan or its equivalent; and communities where there is an active partnership with volunteer efforts, in-kind services, or partners who contribute funding.
- Outside of the wildland-urban interface, focus should be on areas in condition class 2 or 3 in fire regimes I, II, or III, or those in condition class 1 where landscape conditions could quickly deteriorate to condition 2 or 3.

[29]While agency officials told us the new model will be coordinated with FPA, they did not provide details on how this coordination will occur.

- Priority should also be given to projects using mechanical treatments, with special emphasis on projects yielding biomass that can be sold or traded to companies or the local community; and projects using contractors, particularly those projects conducted under contracts that support rural communities' stability.

- Prescribed burning is to be used when weather and resource conditions permit, where mechanical treatments are not appropriate, and as maintenance treatments following mechanical work.

- Managers must make maximum practical use of tools provided by HFRA and HFI.

BLM Increasingly Uses Quantitative Processes in Allocating Funds and Selecting Projects

In 2007, BLM headquarters allocated funds to its state offices primarily on the basis of historical funding levels; however, agency officials told us that, starting in 2008, BLM plans to use a quantitative process incorporating factors similar to those used in Interior's new model, with a greater emphasis on collaboration and local priorities. BLM headquarters provides flexibility to state offices and local units when allocating funds and selecting projects but directs these offices to consider Interior and agency guidance. The majority of BLM state offices and local units used quantitative processes to allocate funds and select projects in 2007, frequently scoring projects against a set of weighted factors.

BLM Allocates Funds to Its State Offices Primarily on the Basis of Historical Funding Levels but Plans to Use a More Quantitative Approach in 2008

In 2007, BLM headquarters allocated funds to its state offices largely on the basis of past funding levels—as in previous years—as a way to ensure that funding levels remain relatively stable, but it also considered proposed projects, national priorities, and the extent to which state offices met past acreage targets established by BLM. While the project lists do not largely influence allocations to state offices, state offices use these lists to allocate funds to field units, and field units use them to select projects for implementation. Table 3 shows the 2007 allocations to the BLM state offices. (App. II also shows 2005 and 2006 allocations.)

Table 3: BLM Allocations to State Offices, Fiscal Year 2007

State office	Allocation	Percent of BLM total state office allocation
Oregon/Washington	$24,878,000	27.1
Idaho	14,598,000	15.9
Utah	10,078,000	11.0
California	7,322,000	8.0
Colorado	6,843,000	7.5
Nevada	6,414,000	7.0
New Mexico	6,412,000	7.0
Montana	5,461,000	6.0
Arizona	4,355,000	4.7
Wyoming	3,684,000	4.0
Alaska	1,556,000	1.7
Eastern States	126,000	0.1
Total	**91,727,000**[a]	**100.0**

Source: GAO analysis of BLM data.

Notes: Total allocation includes the allocation for the current year plus carryover from the previous fiscal year.

[a]BLM allocated an additional $8,473,000 for BLM headquarters, science centers, training costs, and other support costs.

As shown in table 3, the Oregon/Washington, Idaho, and Utah state offices got substantially more funding than the other states—more than half of BLM's total funding. The Oregon/Washington state office alone received more than $24 million—27 percent of BLM's state office funding; one BLM field unit in Oregon, the Medford district office, received over $9 million in 2007—more than nine state offices each received in total funding. According to some agency officials, the relatively high level of fuel reduction funding directed toward the Oregon/Washington state and Medford district offices is, in part, the result of BLM's emphasis on providing stable levels of funding to states and field units. According to these officials, when BLM (along with other federal agencies) received a sharp increase in fuel reduction funding in 2001, agency officials sought to identify units that could implement fuel reduction projects quickly. Because the Oregon/Washington and Medford offices were identified as having the capacity to undertake a large number of fuel reduction projects, they received a substantial portion of the new funding. However, another agency official told us these large amounts are justified because there is substantial wildland fire risk in Oregon and, therefore, a great need for

fuel treatments because vegetation grows very quickly in the western part of the state, there is considerable wildland-urban interface, and wildland fire suppression costs are high.

Starting in 2008, BLM plans to use a model to influence funding allocations to state offices for fuel reduction. Use of the model is intended to ensure that the highest priority work is funded and that BLM's fuel reduction treatments are integrated with other vegetation treatments, such as range improvement projects, to effectively achieve fire and resource management goals and objectives. According to a headquarters official, the new model is intended to facilitate comparison of risk and needed work at the national and state levels in order to set priorities for funding among states and communities. Headquarters officials will use the model results to make allocation decisions but will shift no more than 20 percent of the previous year's allocations to each state in 2008 and 2009.

The model has three components: (1) treatment characteristics; (2) a measure of the degree of threat; and (3) an efficiency measure. For the first component—treatment characteristics—the model will score every proposed project on a set of weighted factors, such as local priority ratings, the availability of joint funding, and condition class; there are separate factors and weights for projects within and outside of the wildland-urban interface. The second component—the measure of the degree of threat—currently combines three elements: the number of fire starts, the number of large fires (i.e., fires greater than 300 acres), and local risk ratings. The third component—efficiency—is currently measured by past performance on acreage targets, past performance on estimating treatment costs, and treatment cost per acre. According to agency officials, they intend to eventually include a measure of effectiveness in the model, which would indicate how well a treatment reduces risk or achieves other objectives. However, because BLM does not currently have a good way to measure effectiveness, it is using measures of efficiency until it develops a better approach. Table 4 shows the complete list of factors used in the model and their weights.

Table 4: Factors and Factor Categories BLM Considers in BLM Fuel Reduction Funding Allocation Model

Funding allocation model components	Factors evaluated	Weights for wildland-urban interface treatments	Weights for treatments outside the wildland-urban interface	Overall weight
	Community plan or equivalent	0.14	0.01	
	High local priority[a]	0.14	0.11	
	Mechanical treatment	0.12	0.04	
	Joint funding available	0.10	0.08	
	HFRA/HFI NEPA type[b]	0.10	0.08	
	Stewardship project[c]	0.10	0.08	
	Multiple land ownership	0.08	0.03	
Treatment characteristics	Moderate local priority[a]	0.08	0.06	**0.45**
	Biomass utilized[d]	0.05	0.04	
	Large-scale treatment[e]	0.05	0.10	
	Low local priority[a]	0.02	0.02	
	Condition class 2 or 3	0.01	0.11	
	Impacted species	0.01	0.10	
	Fire regime I, II, or III	[f]	0.06	
	Fire or other treatment method[g]	[f]	0.08	
Degree of threat	Number of large fires (greater than 300 acres)[h]	0.50	0.50	**0.35**
	Number of fire starts[h]	0.25	0.25	
	Local risk rating[i]	0.25	0.25	
Efficiency	Past performance on acreage targets[j]	0.50	0.50	**0.20**
	Past performance on treatment cost estimates[k]	0.40	0.40	
	Cost per acre	0.10	0.10	

Source: GAO analysis of BLM data.

[a]The local priority rating is assessed at the local level and is a way for the field to communicate project priorities that may not be well-represented by other factors.

[b]The "HFRA/HFI NEPA-type" factor weights projects that use National Environmental Policy Act (NEPA) planning tools authorized by HFRA or HFI.

[c]Stewardship projects are accomplished through the use of stewardship contracting, which involves the use of any of several contracting authorities that were first authorized for use by the Forest Service on a pilot basis in 1998, and were subsequently extended to BLM. In practice, stewardship contracts generally involve the exchange of goods, such as timber, for contract services, such as thinning of brush.

[d]The "biomass utilized" factor weights projects that make use of biomass—small-diameter trees, branches, and other organic material—removed through fuel reduction.

[e]Large-scale treatments are treatments that are at least 150 percent larger than the average treatment.

[f]This factor was not used to determine the treatment scores for wildland-urban interface treatments.

[g]This factor weights projects treated with prescribed fire or other treatment methods, such as grazing or herbicides.

[h]The "number of large fires" and "number of fire starts" factors are determined at the field office or district level and applied to all treatments within that field office or district.

[i]The risk rating is assessed at the local level and is to be determined from community plans or risk assessment programs.

[j]The "past performance on acreage targets" factor is calculated at the state level and applied to all treatments within the state.

[k]The "past performance on treatment cost estimates" factor is calculated at the state level and applied to all treatments within the state.

The BLM national office also directs state offices and local units to consider Interior and BLM priorities when allocating funds and selecting projects. BLM-specific guidance directs state offices and local units to coordinate fuel treatments with other resource management activities, such as timber and wildlife habitat; target funds to wildland-urban interface areas identified through a collaborative process; target non-wildland-urban interface funds to ecosystems that have the highest risk-reduction potential; and use HFI and HFRA planning tools.

The Majority of BLM State Offices Incorporate Quantitative Approaches in Their Allocation Processes

The BLM national office allows state offices to choose the approach they use in allocating funding to field units, as long as they take into account departmental and BLM priorities, and state offices will continue to have this flexibility with the implementation of the new national allocation process, according to headquarters officials. In 2007, 6 of the 11 BLM state offices primarily used quantitative approaches to inform their allocation processes, and 5 primarily used a judgmental approach.[30] Nine of 11 state offices considered targets or past performance, and 10 considered at least one factor related to collaboration, such as community plans. Eight of 11 state offices considered at least one factor to estimate wildland fire risk, such as local- or state-level risk assessments or fire regime condition class.

The six state offices that allocated funds using quantitative processes in 2007 primarily used weighted scoring systems—similar to the state scoring component of BLM's new model—to set priorities for projects. While the

[30]While there are 12 BLM state offices—11 in the West and 1 in the East—the vast majority of BLM-managed land is in the West, and the Eastern States office receives only about 0.1 percent of BLM's total fuel reduction funding. Further, this funding is allocated to just one field unit. As a result, the Eastern States office is not included in our description of BLM state office allocation processes.

specific factors and their weights varied by state, many factors were commonly used and were similar to those used in BLM's headquarters system; each of the states had separate lists of factors for projects within and outside of the wildland-urban interface. For wildland-urban interface projects, five of the six state offices emphasized factors such as local risk ratings or community hazard assessments to estimate risk from wildland fire, and all six offices considered a variety of other factors, including community support and joint funding, to measure the extent of collaboration. For projects outside of the wildland-urban interface, all six offices gave priority to projects in condition classes 2 or 3, jointly funded or collaborative projects, and projects that improved threatened and endangered species habitat, as well as a variety of other factors. Once the state offices had the field offices' project lists, state and field offices generally negotiated to determine final funding allocations.

The remaining five state offices primarily used judgmental processes to allocate funding to field units. For example, in 2007, the Oregon/Washington state office allocated funding using professional judgment and negotiation, which included numerous discussions with field units' fuel program staff to assess the units' priorities and capabilities. The state office primarily considered capability and past performance of field offices and BLM's national priorities when making the final allocations. Starting in 2008, the office plans to use a model to allocate base funding for fuel reduction, which covers salaries and other fixed costs, but will continue to allocate project funding using the current approach, which relies primarily on professional judgment and negotiation.

BLM officials told us that factors outside of the formal process influenced allocations. For example, in several states, agency officials said they coordinated with officials from other resource programs, such as the range or weeds programs, at the state or local level when deciding on final allocations or selecting projects. As a result, they sometimes selected projects that used funding from multiple resource areas, or benefited these areas, over other projects in order to take advantage of efficiencies. Many state offices also reported that they considered acreage targets when making allocation decisions. According to one state official, acreage targets were the most influential factor in allocation decisions, and several agency officials said that lower priority projects were sometimes funded to meet acreage targets. Finally, state offices reported shuffling funds among or within field units after allocation decisions had been made to accommodate uncontrollable circumstances throughout the year, such as weather conditions that prevented prescribed burns from being implemented as planned.

BLM state offices also devote substantial effort and funding to assist in the development of community plans, and allocate a significant portion of fuel reduction funding to projects on private land. For example, the Montana state office funded the development of 49 out of 54 completed community plans throughout the state, according to an agency official. Also, when the Montana state office and its field units allocate funding to, and select projects in, the wildland-urban interface, proposed projects on private land—which are submitted to BLM by counties—are ranked using the same system as BLM projects. Consequently, BLM projects on federal land essentially compete for the same funding as projects on private land. In California, the BLM state office allocates more than half of its wildland-urban interface funding to a community assistance program, through which fuel treatments on private, state, or tribal lands adjacent to or in the vicinity of federal lands are funded through an interagency grant process.

The Majority of BLM Field Units Incorporate Quantitative Approaches into Their Project Selection Processes

As with the BLM state offices, in 2007, the majority of BLM field units used quantitative approaches that incorporated a range of factors—many of which were similar or identical to the ones used by state offices—to select and rank projects. For example, the Twin Falls district office in Idaho scored all projects using a weighted scoring system developed by the BLM Idaho state office. It then ranked the projects, considering factors such as project scores and areas identified in community plans. The Billings field office in Montana also used a weighted scoring system to rank projects. Field staff initially identified projects using community plans or the field office's risk assessment—which analyzed fuel type, fire regime condition class, and fire occurrence to identify high-risk fire areas—and then scored the projects using the Montana state office's weighted scoring system to identify high-, medium-, and low-priority projects.

Also, like national forests, BLM field units were sometimes influenced by unanticipated factors when selecting projects. For example, agency officials sometimes deferred planned projects because newly proposed projects suddenly became a high priority. They pointed to situations in which nonprofit organizations donated funds to pay for projects and agency officials gave those projects a higher priority. In Colorado, recent oil and gas development, as well as construction of new subdivisions in high-risk areas, have caused field units to shift priorities to conduct treatments near these developments, according to a BLM official.

BIA Allocates Funds Largely on the Basis of Units' Performance History, while FWS and NPS Use Quantitative and Judgmental Processes

In 2007, the three remaining Interior agencies—BIA, FWS, and NPS—allocated fuel reduction funds using quantitative and judgmental processes and considering a variety of factors. Like BLM, these agencies provide flexibility to regional offices and local units in determining how to allocate funds and select projects and direct them to consider departmental priorities. (See app. II for these agencies' 2005 through 2007 allocations to their regional offices.)

BIA and FWS Headquarters Allocate Funds Using Quantitative Processes, While NPS Headquarters Allocates Funds Primarily on the Basis of Historical Funding Levels

In 2007, BIA headquarters allocated fuel reduction funds to its regions using a formula that considered past performance and proposed work and that essentially rewarded regions for their accomplishments. The formula allocated to each region a percentage of the region's total budget request, based on the percentage of the prior 3 years' acreage targets that the region met. For example, if a region had met 95 percent of its total acreage target since 2004, the region would receive about 95 percent of its requested budget for 2007. BIA placed a cap on the amount of funding that regions could request, based on their previous year's accomplishments.[31] According to a headquarters official, BIA rewards those regions and units that achieve acreage targets because, in many instances, units do not meet targets.

FWS headquarters allocated 2007 funds to regional offices using a quantitative model that considers multiple factors, including historical fire occurrence, fuel conditions, community assessments of risk, and field unit past performance. The model has separate modules for projects within and outside of the wildland-urban interface, and produces a weighted score for each FWS field unit. In the wildland-urban interface module, the most influential factors are communities at risk, local hazard rankings, and fire conditions. For the non-wildland-urban interface module, the most influential factors are past performance and proposed work.

NPS headquarters allocated 2007 funding to regional offices primarily on the basis of historical funding levels. These levels were originally set by a model that determined funding allocations through a risk assessment, which considered vegetation types, fuel types, fire return intervals, and other data, and through an effectiveness measure that examined treatment success for different vegetation types. According to an NPS official, the

[31]Regions that accomplished 90 percent or more of the previous year's acreage target could request up to 120 percent of the prior year's funding amount, while regions that accomplished less than 90 percent could request only up to 105 percent of the previous year's amount.

agency maintained funding proportions at the model's 2005 level after Interior directed it to work on the FPA; NPS decided that it would have been too much work for field staff to maintain the model while also preparing data for the FPA. Furthermore, they believed that the model, initially developed more than 20 years ago, was outdated and did not merit additional financial investment while the FPA was being developed.

BIA, FWS, and NPS Regional Offices Allocate Funds to Field Units Using Quantitative and Judgmental Processes

BIA, FWS, and NPS allow their regions the flexibility to determine how to allocate funding to field units, provided the processes and factors are consistent with departmental and agency guidance. The BIA national office encourages regions to adopt allocation strategies similar to the one used at headquarters—which rewards past performance—and some of BIA's regional offices have done so, such as the Rocky Mountain and Northwest regions. The Rocky Mountain region, for example, used a quantitative process to allocate fuel reduction funds, using an allocation formula similar to the one used by BIA headquarters but using only the previous year's accomplishment rate, rather than the 3-year average headquarters used. Likewise, one FWS regional office that we visited used a quantitative process to allocate fuel reduction funds in 2007: FWS's Mountain-Prairie region allocated funds to local units using FWS's national model, but regional officials adjusted the model's allocations on the basis of their knowledge about local factors, such as community support for projects and field unit staffing levels.

Other BIA and FWS regional offices, and all of the NPS regional offices that we visited, allocated fuel reduction funds in 2007 using judgmental processes that incorporated a range of factors. For example, BIA's Southwest region allocated funds primarily on the basis of project rankings (as determined at the local level) and cost efficiency, according to a regional official. Likewise, FWS's Southeast region allocated 2007 funds according to a regional official's assessment of a variety of factors, such as field units' programs of work and wildland fire activity; this official has many years of experience managing the region's fuel reduction program. In NPS's Pacific West region, a group of local and regional fire and fuel program staff determined funding allocations on the basis of park priorities, past performance, and conformance with NPS policy, balanced against regional funding levels and acreage targets.

As in other agencies, officials told us that factors outside of the formal process also influenced allocations. Several BIA and NPS officials told us that staffing constraints at field units may affect allocations. For example, many park units have very small fuel treatment programs and no staff dedicated solely to the program; therefore, the fuel reduction programs at

such units may be eliminated if staff, who have numerous collateral duties, no longer have the time to plan or implement treatments. Furthermore, the location of some field units makes it difficult to recruit and retain qualified staff; the field units are located either in areas with high costs of living or in remote areas. Without dedicated staff to manage fuel reduction programs at such field units, their capacity to plan and implement projects and spend any funding allocation is limited, so capacity becomes the determining factor regardless of other factors considered in the allocation process, according to agency officials. Some BIA officials told us that self-determination limits BIA's influence over the tribes; self-determination provides tribes with the authority to manage federal programs when they choose to do so, as well as the authority to choose not to emphasize a given program. In some regions, acreage targets also affected allocation and project selection processes, and one agency official told us that projects were sometimes developed and implemented specifically to meet targets. However, other BIA, FWS, and NPS regional officials told us that they did not assign acreage targets to field units or that there was little pressure to meet targets. Finally, regions reported shifting funds among field units after allocation decisions had been made to adapt to uncontrollable circumstances, such as weather conditions that prevented planned projects from being implemented.

Local BIA, FWS, and NPS Units Select Projects Using Quantitative and Judgmental Processes

Some BIA, FWS, and NPS local units selected projects in 2007 using quantitative processes. For example, in NPS's Sequoia and Kings Canyon National Parks in California, agency officials identified projects using a model that determined high-risk areas on the basis of several factors, such as the risk of a fire starting and the location of the wildland-urban interface. Park officials used the model information, as well as additional factors, such as values at risk, sequencing of treatments, and project accessibility, to select projects. BIA's Zuni Agency in New Mexico also used a quantitative process to select projects. The fuels specialist analyzed geographic information—for example, on housing density and existing vegetation—to identify and rank projects.

Other BIA, FWS, and NPS units primarily used judgmental processes when selecting projects for 2007. For example, at FWS's Merritt Island National Wildlife Refuge in central Florida, field staff selected projects primarily on the basis of the rotational schedule for prescribed burns. Refuge officials also considered other factors, such as wildlife habitat, to select which projects to complete that year. According to agency officials, the refuge has habitat for the scrub jay, a threatened species, and while prescribed burns generally improve this habitat, too much prescribed burning can be disruptive. NPS's Cape Canaveral National Seashore, which neighbors

Merritt Island National Wildlife Refuge, also selected projects judgmentally, and in coordination with refuge staff. The process was primarily influenced by the location of the wildland-urban interface and threatened and endangered species habitat.

BIA, FWS, and NPS field units, like national forests and BLM field offices, also adapted to unanticipated events when selecting projects. In some cases, field units were forced to accommodate unique circumstances. For example, the Merritt Island National Wildlife Refuge is adjacent to a National Aeronautics and Space Administration facility, and, during the days immediately before and during scheduled rocket or shuttle launches, the refuge must put all prescribed burns on hold.

Several Improvements Could Help Better Ensure That Fuel Reduction Funds Are Allocated to Effectively Reduce Risk

Although the Forest Service and Interior are taking steps to enhance their funding allocation and project selection processes—for example, by developing models to assist in making allocation decisions—there are several improvements they could make to better ensure that they allocate fuel reduction funds to effectively reduce risk. Specifically, when allocating funds and selecting projects, the agencies could improve their processes by (1) consistently assessing all elements of wildland fire risk, including hazard, risk, and values; (2) developing and using measures of the effectiveness of fuel reduction treatments; (3) using this information on effectiveness, once developed, to assess the cost-effectiveness of potential treatments; (4) clarifying the relative importance of the numerous factors they use in allocating funds, including factors unrelated to risk or effectiveness; and (5) following a more systematic process in allocating funds. While the agencies have recognized the importance of these elements—particularly risk, treatment effectiveness, and cost effectiveness—in several strategy documents, they have not effectively incorporated them into their allocation processes.

The Agencies Do Not Consistently Assess All Elements of Risk When Allocating Funds

The agencies have repeatedly stressed the importance of identifying high-risk areas in setting priorities and allocating funds for fuel reduction; for example, in their 2006 document Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy (Cohesive Strategy),[32] the Forest Service and Interior declared that they "expect to ensure that fuel project investments are cost-effectively allocated to achieve risk reductions." Similarly, in its 2007 budget justification, the Forest Service declared that the fuel reduction program focuses on reducing the risk of wildland fire and long-term damage to resources and property; likewise, Interior's 2007 budget justification declared that the department intended to reduce fuels in order to "provide better risk reduction to communities and resources."

At the national level, the Forest Service and FWS headquarters incorporated nationwide risk assessments into their 2007 allocation processes; Interior did so for only 5 percent of the funds it allocated to the four Interior agencies; and BIA, BLM, and NPS did not include risk assessments in their national allocation processes at all, although BLM officials said they are taking steps to do so in the future. According to Forest Service and Interior agency officials, it has been difficult to develop national risk assessments because they require nationally consistent data, which have not always been available.[33] Furthermore, some of the available national data on vegetation type and condition were designed for forests and, consequently, are not as accurate for shrublands and grasslands.

At the regional and local levels, some agency offices used risk assessments when allocating funds and selecting projects, while others did not. One of the Forest Service's 9 regions and 2 of BLM's 11 state offices considered all three elements required for a risk assessment in their 2007 allocation processes, and several other Forest Service regions considered two of the three elements—hazard and values—but did not consider risk. Some, but

[32]U.S. Department of the Interior and USDA Forest Service, "Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy," February 2006. Note that, although the document is referred to as a cohesive strategy, previous GAO reports concluded that it does not contain all the elements GAO called for in its earlier recommendations for such a strategy. See, for example, GAO-06-671R.

[33]The agencies expect that nationally consistent data will be available through LANDFIRE, a geospatial data and modeling system currently being implemented. LANDFIRE data are complete for some of the country, with data for the remainder of the country expected to be completed by 2009.

not all, of the other Interior agencies' regional offices we visited considered elements of risk assessments in their allocation processes as well. Regional officials offered several reasons for not always systematically considering risk assessments when allocating funds, such as not having the necessary data for a regionwide risk assessment or only informally considering risk.

Several agency officials told us that they do not consider the lack of a formal national or regional risk assessment to be a significant problem because they rely on field units to assess risk when selecting projects. However, as with regions, not all local units used risk assessments when selecting projects; some local units used only partial assessments or did not use risk assessments at all. Even when field units do use risk assessments to help select projects in high-risk areas at the local level, agency officials cannot be confident that areas designated as high risk locally would still be designated as high risk at the regional or national level. For example, one BLM field office in Colorado oversees a rural area with only two communities, neither of which is at risk from wildland fire, according to BLM officials. For officials at this office, the most important values at risk are rural power lines and oil and gas infrastructure; therefore, they give the highest priority to projects that protect these features. From a regional or national perspective, however, other projects may be a higher priority for funding because the values at risk are more important, the area is at higher risk from fire, the level of hazard is greater because of fuel conditions, or some combination of these reasons. Without using national, regional, and local-level risk assessments that systematically assess hazards, risks, and values, it is difficult to ensure that allocation decisions are grounded in a clear understanding of which areas are at the highest risk.

Even when the agencies conduct risk assessments that include hazards, risks, and values, they may find it difficult to distinguish between high- and low-priority locations because one key value at risk—the wildland-urban interface—has multiple definitions that leave considerable room for interpretation on the part of agency officials. As a result, many different areas can be classified as wildland-urban interface, and the term's usefulness in helping agency officials identify, and direct funds toward, the highest-priority lands is diminished. In 2001, the agencies—in cooperation with tribes and states—defined the interface as including three categories: (1) dense populations (250 or more people per square mile) abutting wildlands; (2) scattered populations (28 to 250 people per square mile) intermixed with wildlands, and (3) development surrounding an island of wildland fuel, such as a park or open space. Agency officials told us that

they developed this definition very quickly, in response to legislative direction, but later came to believe that it overemphasized population density and was not flexible enough to accommodate differences in landscape features such as vegetation, terrain, and prevailing weather patterns, which can affect the size and shape of areas in the wildland-urban interface.

In 2003, HFRA defined the wildland-urban interface to include an area within or adjacent to an at-risk community, that is identified in project recommendations to a federal agency in a community wildfire protection plan. For areas not in community plans, HFRA specified that areas within one-half mile of an at-risk community were to be considered wildland-urban interface,[34] as were areas within 1-1/2-miles of an at-risk community under certain conditions, and areas adjacent to evacuation routes for at-risk communities. According to agency officials, this definition offered more flexibility by moving away from the focus on population density, but it applies only to projects conducted using HFRA authorities.

Most recently, the 2006 10-Year Strategy Implementation Plan developed by the agencies, western governors, and others, defined the wildland-urban interface as the "the zone where structures and other human development meet at-risk forest and rangelands." While this definition provided broad flexibility, agency officials told us it did not replace the 2001 definition (which focused on population densities), and both the 2001 and 2006 definitions apply to projects other than those conducted using HFRA authorities. The end result is multiple definitions that—individually and collectively—allow many different areas to be classified as wildland-urban interface without specifying whether some ought to be given higher priority than others.

[34]In 2001, a *Federal Register* notice was published with a list of wildland-urban interface communities identified by states as being "in the vicinity of federal lands" and "at high risk from wildfire." However, the states and tribes used inconsistent approaches to identify these communities at risk. To standardize these approaches, the National Association of State Foresters was tasked, in the 10-Year Implementation Plan, with developing a definition for community at risk, and a process for states and tribes to follow to identify and prioritize the communities. Accordingly, in 2003, the National Association of State Foresters finalized its guidance, defining community as "a group of people living in the same locality and under the same government," and specifying that a community was to be considered at risk from wildland fire if it was located within the wildland-urban interface as defined in the 2001 *Federal Register*, which stated that, "the urban-wildland interface community exists where humans and their development meet or intermix with wildland fuel."

In part because of this lack of clarity, agency officials we spoke with reported including several types of locations under the category of wildland-urban interface. Some units interpreted the interface to mean only the area surrounding houses, while others also included roads, power lines, oil and gas development, communications infrastructure, campgrounds and recreation areas, and other features. For example, the BLM Colorado state office defined industrial interface as a subcategory of the wildland-urban interface, including features such as power lines or oil and gas development, which are common features in or near some of BLM's rural field units. In contrast, officials for two national forests near urban areas (Atlanta and Los Angeles) determined that most or all of their forests were in the wildland-urban interface because, they estimated, a wildland fire could move into nearby urban and suburban areas within a single day. In yet another interpretation, a BIA agency in New Mexico tailored its definition of wildland-urban interface to accommodate cultural differences between tribes, as the differences were reflected in the arrangement of their homes: one tribe built its homes in clusters while another built its homes in a scattered pattern.

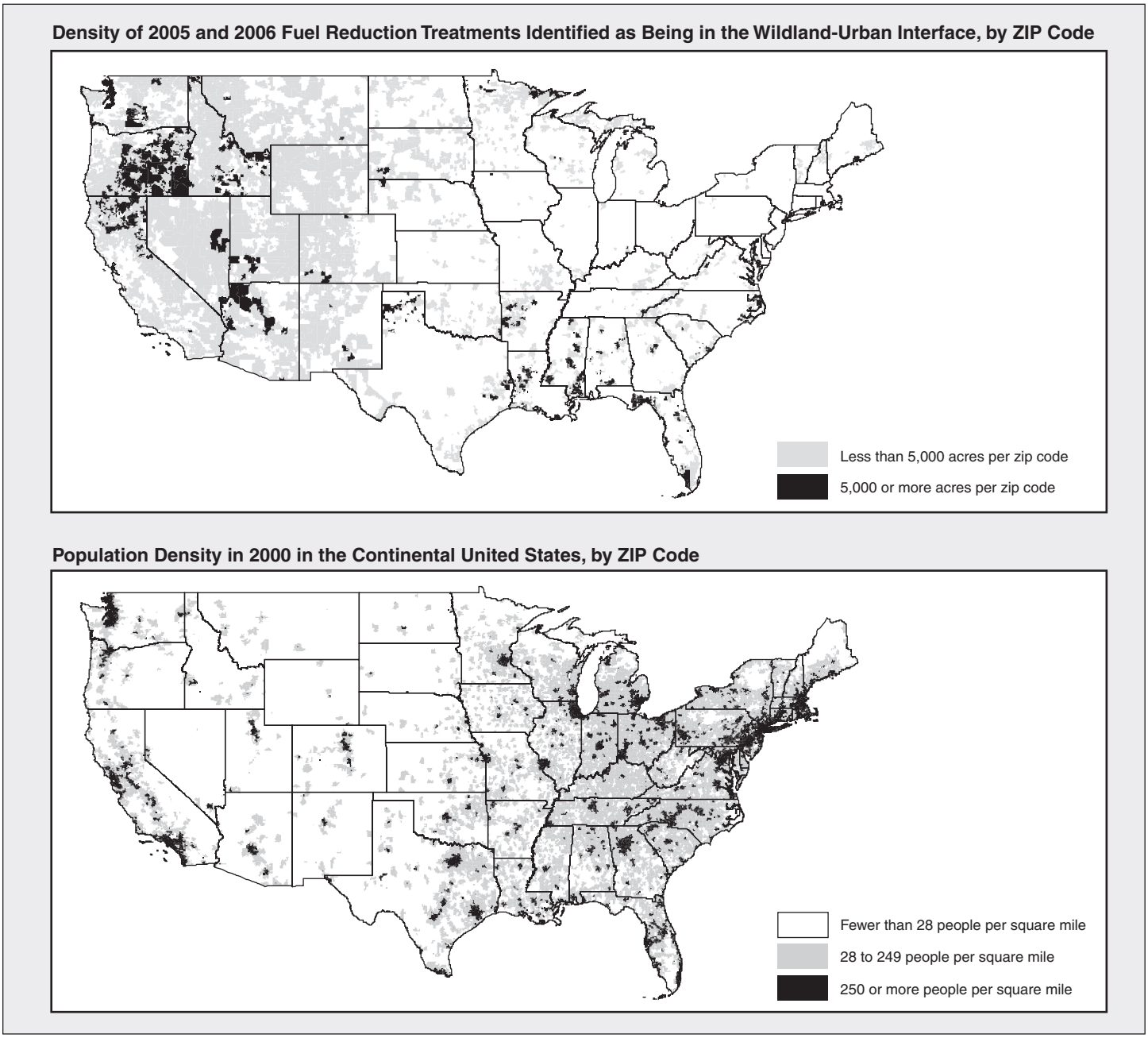
Although each of these interpretations of wildland-urban interface may have merit given the situations the field units face, the lack of clear definition effectively allows a wide range of areas to be defined as wildland-urban interface. The fluid nature of the wildland-urban interface definition is illustrated by guidance that one FWS region issued to its local units in 2006, when it notified them that it was expanding the relatively strict definition of wildland-urban interface the region had previously used to reflect interagency guidance. According to this region, "this expanded definition may enhance our ability to fund a project with [wildland-urban interface] … funding and will help us meet the [wildland-urban interface] treatment targets mandated by the Department."

Given the range of definitions available for wildland-urban interface, it is not surprising to find that in 2005 and 2006 many of the fuel reduction treatments the agencies identified as being in the wildland-urban interface were in ZIP code areas with fewer than 28 people per square mile, on average.[35] (See fig. 7.) Specifically, about 2.2 million acres, or 65 percent of all acres treated in areas identified as the wildland-urban interface during

[35]We conducted our analysis using census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be smaller pockets where the population density is higher or lower than the average used in our analysis.

that period, were in ZIP code areas with fewer than 28 people per square mile. While the agencies may have had legitimate reasons for some of these treatments—for example, to protect a critical evacuation route for a larger community—it is not clear why, as a whole, so many acres treated are far from more densely populated areas. Expressing its concern about this situation in 2006, the Office of Management and Budget noted, "As the agencies increase their emphasis on [wildland-urban interface] treatments over time, field staff and/or project proponents may simply be defining more projects as [wildland-urban interface] projects in order to increase the likelihood of having their projects funded."

Figure 7: Density of Wildland-Urban Interface Treatments and Population Density, by ZIP Code



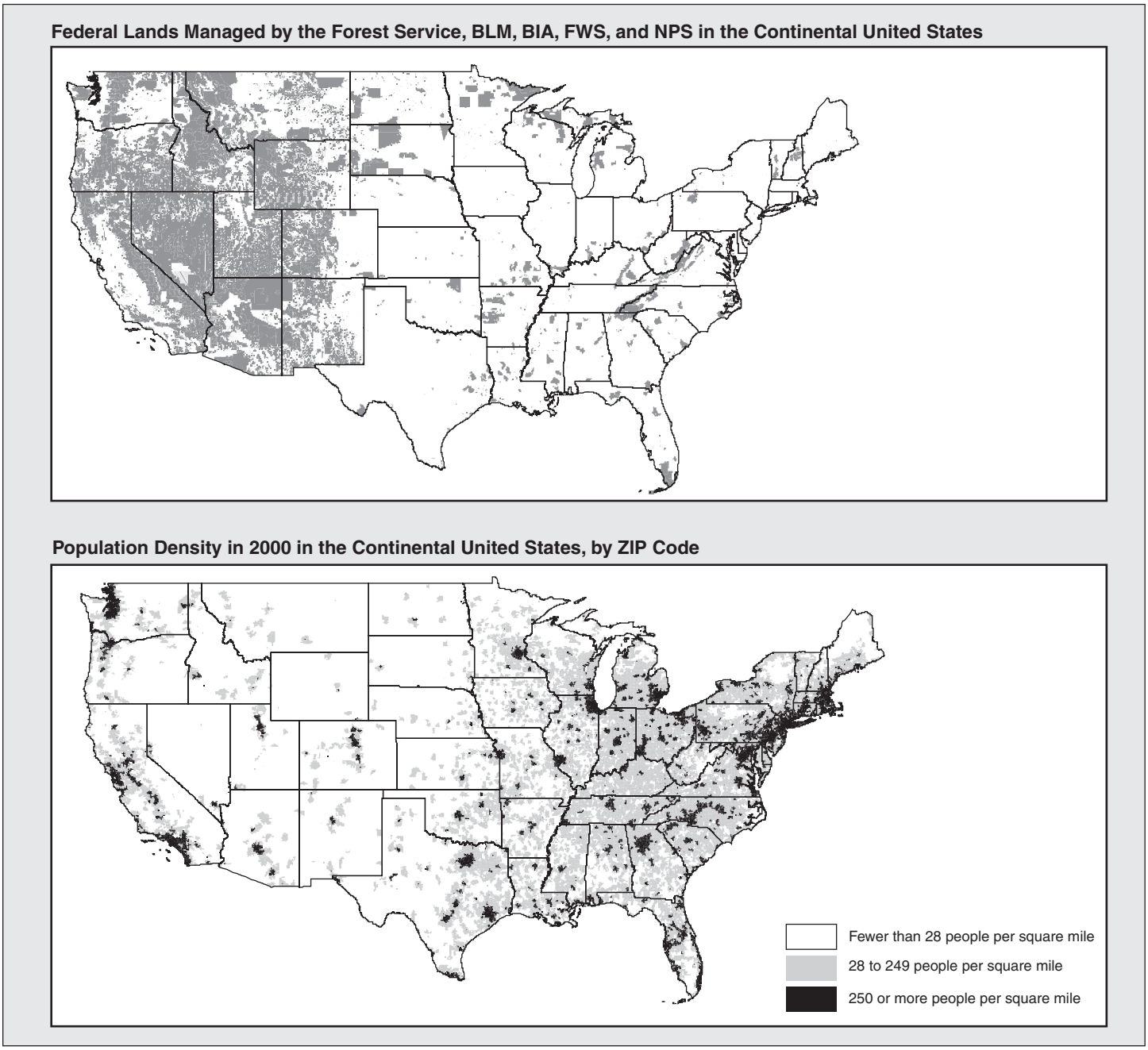
Source: GAO analysis of Forest Service, Interior, and U.S. Census data.

Note: We conducted our analysis using census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be smaller pockets where the population density is higher or lower than the average used in our analysis. When mapping the data, we included a 1.5-mile buffer around the ZIP code areas with 28 or more people per square mile to account for the 1.5-mile buffer specified in the HFRA definition for wildland-urban interface.

Conversely, population density alone may not be sufficient justification for selecting locations for fuel reduction. One Forest Service official cautioned against "prioritization by census," because more densely populated areas are not necessarily at greater risk than less populated areas. For example, although Chicago is a densely populated urban area, the Forest Service has not conducted more treatments in the nearby grassland because the risk of a fire threatening the urban area is very low, according to agency officials. In addition, highly populated urban areas are often not as close to federal lands as are communities with smaller populations, and the agencies conduct the majority of their fuel reduction work on federal lands. Figure 8 shows the location of federal lands relative to more densely populated areas in the continental United States. Even if a dense urban area is near federal lands, the entire area is not typically at risk from a fire originating on federal lands; only the portion of structures closest to federal lands is at risk, according to Forest Service officials.[36] Finally, vegetation and other conditions on some federal lands make it unlikely that a fire would burn or that a fire would threaten a nearby population.

[36]However, in a fire behavior assessment of the June 2007 Angora Fire in California, Forest Service officials stated that a large number of houses ignited because of embers from other burning houses, rather than from wildland fuel—suggesting that even homes that are not immediately adjacent to federal lands could be at risk from wildland fire.

Figure 8: Location of Federal Lands and Populated Areas in the Continental United States

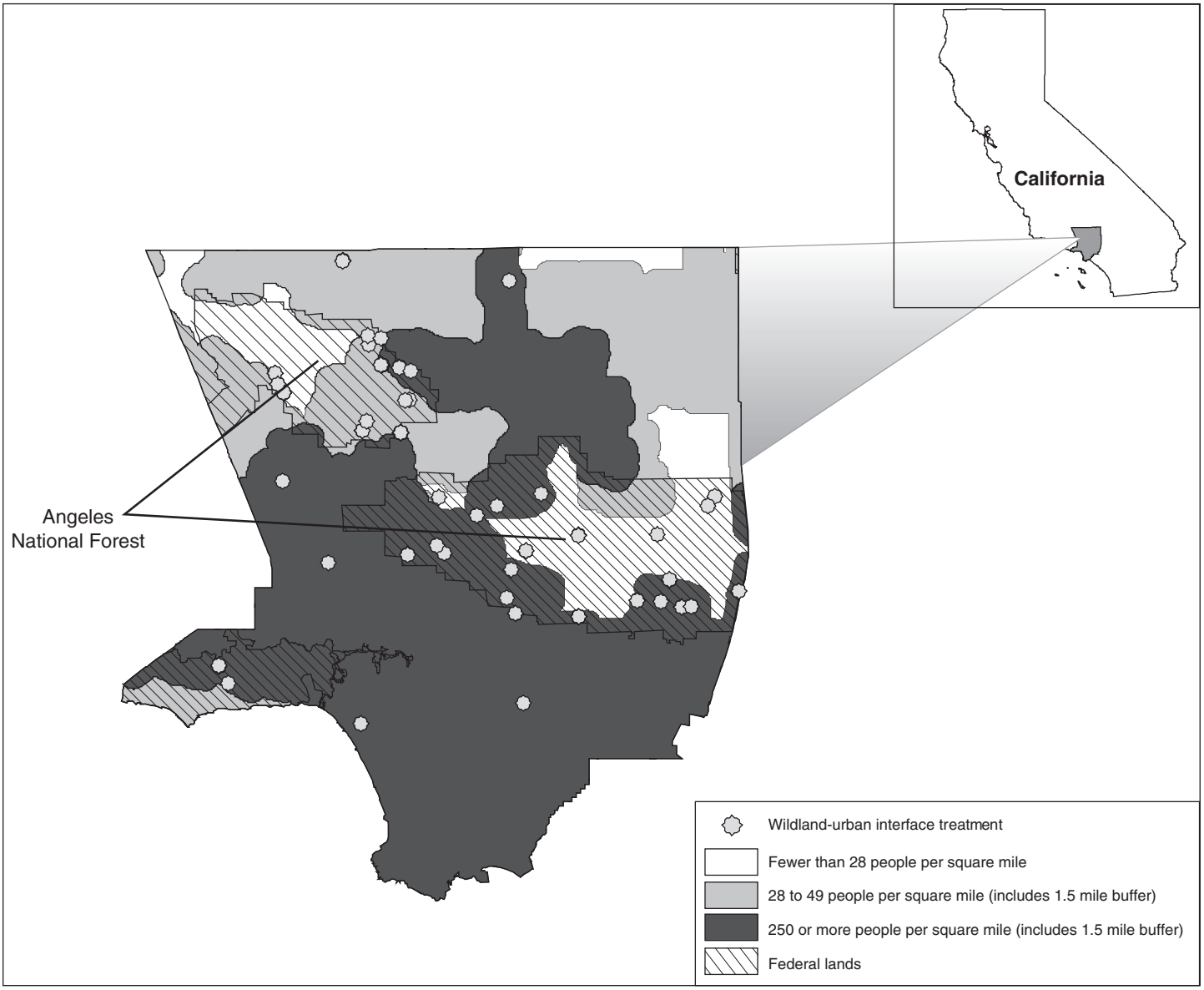


Source: GAO analysis of U.S. Census and U.S. Geological Survey's National Atlas Web site data.

Note: We conducted our analysis using census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be smaller pockets where the population density is higher or lower than the average used in our analysis. When mapping the data, we included a 1.5-mile buffer around the ZIP code areas with 28 or more people per square mile to account for the 1.5-mile buffer specified in the HFRA definition for wildland-urban interface.

While many important contextual details are not visible on a national map, some can be seen at the county level. For example, in Los Angeles County—the most populous U.S. county—many of the fuel reduction treatments completed in 2005 and 2006 were adjacent to densely populated areas, as shown in figure 9, but some were miles away and in ZIP code areas with relatively low population.

Figure 9: Map of Los Angeles County Wildland-Urban Interface Fuel Reduction Treatments Completed in 2005 and 2006, and Population Density



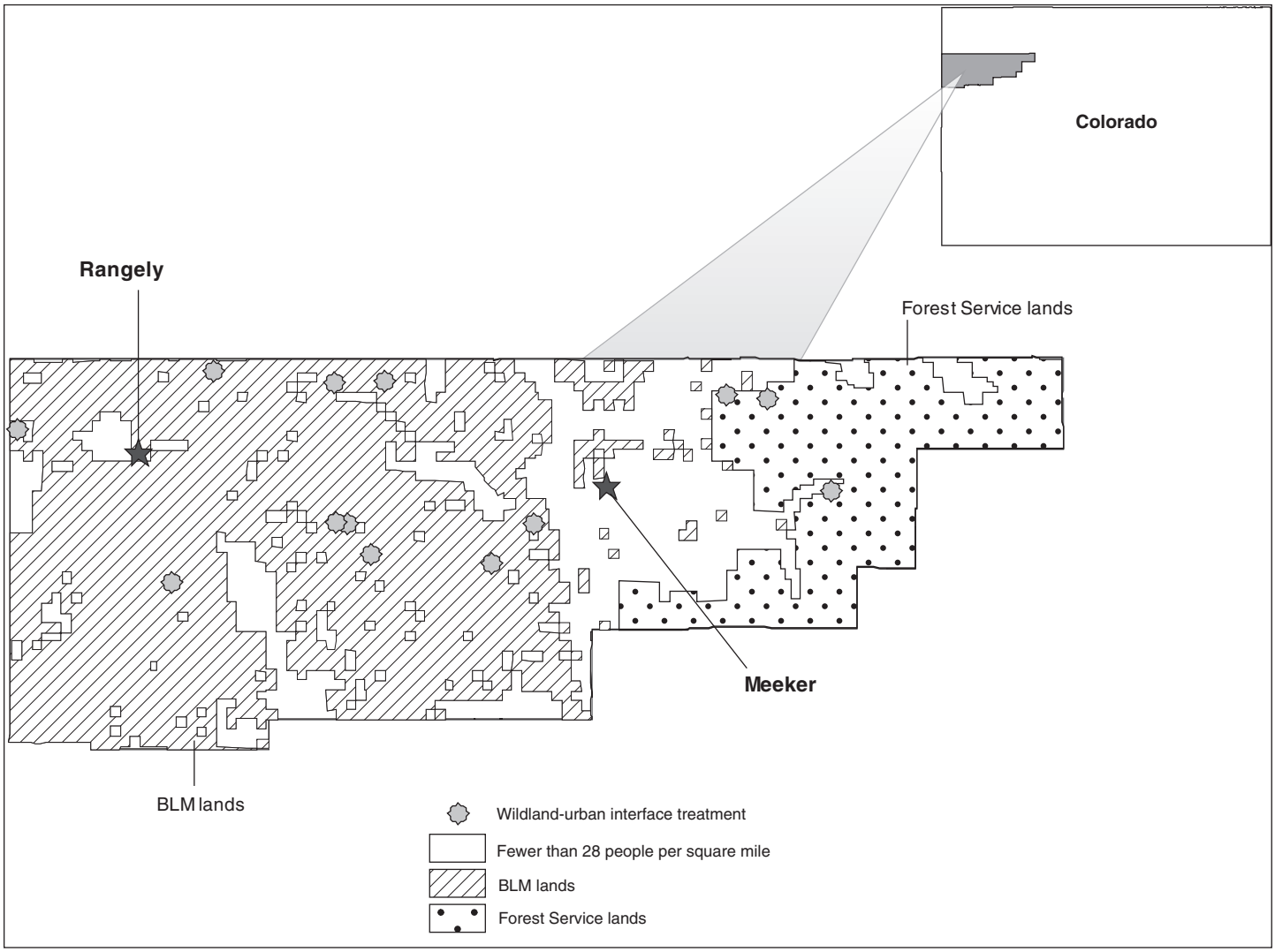
Source: GAO analysis of Forest Service, Interior, U.S. Census, and U.S. Geological Survey's National Atlas Web site data.

Note: We conducted our analysis using census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be smaller pockets where the population density is higher or lower than the average used in our analysis.

Treatments occurred in these low-density areas for several reasons. First, many of the treatments conducted in the county during that period, while not immediately adjacent to the city of Los Angeles, were on the federal land closest to the city, the Angeles National Forest, which of course is not highly populated. Also, while the average population density for the general area is low, individual communities with populations ranging from about 1,000 to 3,000 are located inside the boundaries of the forest, and the Forest Service conducted some treatments to protect them. Second, developed sites—such as campgrounds, roads, and recreation areas—where people temporarily congregate may not be reflected on a census map of population density. According to officials at the Angeles National Forest, human-caused wildland fires generally coincide with such areas, making it important to conduct fuel treatments around these sites. Finally, low-density areas within the forest were more feasible to treat than some areas closer to population centers because steep terrain across much of the forest—including along its southern boundary adjacent to heavily populated Los Angeles—makes it difficult and expensive to conduct fuel treatments, and, in some cases, would make treatments ineffective, according to agency officials.

In contrast to Los Angeles County, Rio Blanco County, Colorado, is a rural county with a total population of about 6,000 and an average population density throughout the county of less than 28 people per square mile. Nevertheless, BLM classified some of its fuel reduction treatments in this county as wildland-urban interface treatments. As figure 10 shows, these treatments in 2005 and 2006 were generally located far from the largest towns in the county—Meeker and Rangely—which each has a population of about 2,000.

Figure 10: Map of Rio Blanco County Wildland-Urban Interface Fuel Reduction Treatments Completed in 2005 and 2006, and Population Density



Source: GAO analysis of Forest Service, Interior, U.S. Census, and U.S. Geological Survey's National Atlas Web site data.

Note: We conducted our analysis using census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be smaller pockets where the population density is higher or lower than the average used in our analysis. In Rio Blanco County, there were no ZIP code areas with an average population of 28 or more people per square mile.

According to BLM officials, they did not conduct wildland-urban interface treatments closer to these towns because the towns are not at significant risk from wildland fire; they are surrounded in large part by rocky

outcroppings and irrigated agricultural fields, where fires would not likely start, and area roads serve as fire breaks. In addition, the county had prepared a community plan identifying its highest priorities, and the federal lands surrounding the towns were not among them. Instead, many of the fuel reduction treatments the agencies did implement—including the five located southwest of Meeker—were conducted to protect energy development facilities, such as a coal mine and oil and gas wells, or power lines that service such facilities, according to BLM officials. According to the officials, they selected these projects because they were higher priority than other potential projects in the county, and because the county's community plan had identified the protection of energy development and power lines as its priorities, defining the wildland-urban interface to include the areas around such infrastructure. While these decisions may be reasonable given local priorities, it is not clear from a national perspective whether the values at risk in this case are of higher priority than the values at risk in other locations—in part because the definitions of the wildland-urban interface do not distinguish the relative importance of different values at risk, such as homes, power lines, or oil and gas wells, among others.

The Agencies Do Not Consider Treatment Effectiveness in Their Allocation Processes Because They Have No Measure for Effectiveness

Although the agencies recognize the importance of measuring the effectiveness of fuel reduction treatments—that is, how much risk reduction is achieved through a given treatment and for how long—none of the agencies considered effectiveness when allocating funds in 2007 because they have not yet developed a method for measuring it. Without understanding the potential effectiveness of fuel reduction treatments, the agencies cannot ensure that funds are allocated appropriately, because not all areas that rank high in a risk assessment can be treated with the same degree of success. For example, parts of southern California are dominated by chaparral ecosystems, which feature plants with fire-resistant roots, enabling the plants to re-sprout quickly. Some of the plants also encourage fire because their leaves are coated with a flammable resin. Although these areas of chaparral ecosystems would score high on a risk assessment—because there is a high vegetation hazard near populated areas with considerable values at risk—agency officials told us that fuel reduction treatments in chaparral may be effective for only a short time because the vegetation often grows back quickly. In addition, many of the damaging fires in southern California chaparral have been fanned by the warm, dry, and extremely powerful Santa Ana winds, making it difficult for fuel treatments to affect fire severity, according to some Forest Service officials. As a result, some of these areas, though at high risk from fire, might not be designated as high priority for fuel treatments. In general,

understanding the expected effectiveness of fuel reduction treatments under different conditions can help the agencies target their funds toward treatments that will achieve the most risk reduction for a given cost. The agencies have, on multiple occasions, recognized the significance of treatment effectiveness; for example, in the 2006 10-Year Strategy Implementation Plan, the agencies identified the need to "explore the feasibility of developing measures that determine the degree and longevity of fire hazard reduction achieved by hazardous fuels treatments."

Although the agencies have not yet developed a measure of effectiveness, they have designed their allocation models to accommodate data on effectiveness in the expectation that such data will eventually become available. The Forest Service's model includes two elements intended to assess effectiveness, but, because the agency does not have data on effectiveness, one of the elements serves as a placeholder—by assigning each region an identical score—and thus does not influence priority scores, while the other uses data on the total number of acres treated in each region instead. Forest Service officials acknowledged that the number of acres treated does not reveal how effective the treatments are in reducing risk, but told us they used this information because they wanted a measure that would reflect the variation in accomplishment levels from one region to the next. Interior and BLM also plan to include a measure of effectiveness in their allocation models, but Interior—like the Forest Service—currently uses total acres treated, and BLM uses data on efficiency, including total acres treated and average cost per acre, because these are the only data available. According to agency officials, it is difficult to develop a single measure of effectiveness for different geographic locations and vegetation types, because, for example, a treatment in grass might be effective for 1 year, while a treatment in some forests might be effective for 30 years. Nevertheless, as long as the agencies continue to allocate funds without knowing how effective treatments are likely to be, they cannot be sure that funds are being spent on projects that substantially reduce overall risk.

According to Forest Service research scientists, developing a measure of treatment effectiveness would require that the agencies first determine how to estimate the level of risk in a given location so they could track any changes in risk resulting from fuel treatments. For example, they could use data on fire intensity, severity, or occurrence, or some combination of these and other factors, to evaluate risk. Once agency officials determined how to estimate risk, they could use the information to measure treatment effectiveness. However, there is no consensus on how best to do so and any method would likely require considerable effort. For example, under

one approach described by the researchers, available scientific studies about fuel reduction treatments in various vegetation types would be analyzed to ascertain where fuel treatments are more or less effective, and effectiveness ratings would be calculated for each vegetation type on the basis of this information. After establishing the ratings, they would collect field data to verify their initial conclusions and ratings—a costly and time-consuming exercise, according to some researchers. Such an approach would have drawbacks, however; the researchers told us that it would be difficult to establish a single rating that would apply to vegetation types under all circumstances because fuel conditions within a given vegetation type vary widely, depending, for example, on geographic location and previous fuel reduction activity. In addition, factors other than vegetation—such as terrain, weather, and soil—also influence treatment effectiveness. Consequently, some researchers have proposed alternative approaches, such as one that would consider many factors, in addition to vegetation type, to assign effectiveness ratings to individual treatment areas rather than general vegetation types. However, developing an effectiveness rating scheme using this approach—or others that incorporate numerous factors—would require significant research and analysis over a long time period, according to one researcher.

A less expensive, quicker approach outlined by another Forest Service researcher would rely on expert opinion rather than field data. Under this simplified approach, a panel of experts with knowledge about and experience in fuel reduction treatments and their effectiveness would use their professional judgment to collectively estimate the extent to which fuel treatments would be effective in each of several vegetation or fire regime condition class categories. The experts' estimates could then be used to inform decisions on allocating funds.

The Agencies Often Consider Costs, but Not Cost-Effectiveness, When Allocating Funds

The agencies also do not consider the cost-effectiveness of treatments when allocating funds, primarily because they do not have data on treatment effectiveness. Treatment costs can vary widely in different areas, from as little as $10 per acre to well over $1,000 per acre, even ranging as high as $30,000 per acre under unusual circumstances, and allocating funds wisely involves not simply targeting those acres that can be treated most cheaply, but those acres where treatments yield the most cost-effective result. While considering costs is an important step in making allocation decisions, it is equally important to consider effectiveness in conjunction with costs to avoid funding ineffective projects simply because they are cheap. However, until the agencies have data on treatment effectiveness, they will find it difficult to do so. In

support of these considerations, the 2006 Cohesive Strategy emphasized the importance of reducing fuel in the most cost effective manner possible, because federal funds can support only a finite number of fuels treatments each year covering a fraction of the acres at high risk from unusually severe fires.

In practice, the agencies frequently consider costs when allocating funds and selecting projects. They sometimes give priority to projects with low per-acre costs in order to leave more funds available for other projects or to treat more acres within their budgets—an important factor for agencies trying to meet increasing acreage targets. Also, agencies sometimes give priority to low-cost treatments in areas that have previously been treated and are consequently of relatively low risk, in order to prevent them from becoming higher risk. According to agency officials, these treatments are a priority because they are a cost-effective way to maintain low-risk conditions once achieved; it is generally much cheaper to reduce fuel in areas that have recently been treated than to do so in areas that have never been treated or have not been treated for a long time. However, without knowing the effectiveness of treatments in reducing risk, agency officials may not be able to compare the relative benefits of potential projects when deciding where to invest fuel reduction funds—and, thus, may not know which projects are likely to be the most cost-effective.

In some cases, the agencies also give lower priority to treatments with very high per-acre costs—even in high-risk areas—because the expected benefit does not justify the expense. For example, the Desert National Wildlife Refuge in southern Nevada identified a mechanical thinning treatment to remove palm trees as its highest-priority fuel reduction project in 2006. The proposed project was in the wildland-urban interface and would also improve the habitat of an endangered fish, according to agency officials. However, it would have cost hundreds of thousands of dollars—nearly the entire budget for the region—and, therefore, FWS regional officials did not fund the project.

The Agencies Have Not Established Clear Guidance on the Relative Importance of Factors Used in Setting Priorities

In addition to more consistently using information on risk and developing measures of treatment- and cost-effectiveness, the agencies could improve their allocation process by clarifying the relative importance of the different factors they use in setting priorities. Without such clarification, it is not clear how agency officials are to resolve conflicts that arise between competing factors. In addition, when factors other than risk, treatment effectiveness, and cost effectiveness have considerable influence on

allocation decisions, it is difficult for the agencies to ensure that funds are allocated to areas where they will most effectively reduce risk.

The agencies consider such factors in part because they are directed to do so; many of the factors they consider are tied to federal laws or congressional direction. For example, fuel reduction projects authorized under HFRA include, among others, projects on federal land in the wildland-urban interface and certain projects in areas where ecological restoration is needed because vegetation has departed significantly from its historical regime. The act requires the agencies to develop annual programs of work for federal land that give priority to authorized hazardous fuel reduction projects that provide for the protection of at-risk communities or watersheds or that implement community wildfire protection plans. Congressional committee direction has also called for the agencies to put a priority on fuel reduction work completed through mechanical treatments and projects that use biomass.

Some of the factors the agencies consider are also intended to encourage efficiency in the fuel reduction program, as well as more broadly in their land management missions. Specifically, the agencies give priority to projects that achieve benefits not only for the fuel reduction program but also for other programs such as wildlife management and watershed improvement—an approach referred to as integration among programs. Agency officials said implementing such projects is a way to leverage funds and coordinate resources. The Forest Service also emphasizes these projects because its interpretation of the President's HFI calls for a focus on integrated management, according to agency officials.

In the face of multiple directives and competing agency priorities, agency officials must balance numerous factors when allocating funds and selecting projects, as the following examples illustrate:

- *Priorities in community plans may not always align with agency-identified priorities, forcing agencies to choose between them.* According to Montana BLM officials, one community proposed a fuel reduction project in an area the officials believed was relatively low risk because it had vegetation that does not burn easily. However, the officials agreed to implement the project because they are directed to give priority to locally identified projects and because they did not want to damage their relationship with the community. Several agency officials told us that community plans did not always include federal lands or propose projects in locations where the agencies could feasibly implement a treatment. In such cases, agency officials

sometimes worked with the communities to identify project locations agreeable to all, while other times they implemented agency-identified projects instead of those identified in the plans.

- *Direction to give priority to high-risk areas may also conflict with the agencies' commitment to meet acreage targets.* Several agency officials told us that they sometimes implemented lower-priority projects with low unit costs because they felt pressure to meet acreage targets. In some cases, these projects, although low priority for fuel reduction purposes, were a high priority for other resource programs or achieved other management objectives.

- *Direction to give priority to areas in the wildland-urban interface may conflict with other agency priorities.* For example, NPS officials told us that giving priority to fuel reduction treatments at the interface conflicted with the agency's mission to preserve natural ecosystems and processes, which would call for giving priority to treatments in undeveloped areas.

- *Desire for stable funding and staff levels may make officials reluctant to shift funds on the basis of risk assessments.* When allocating funds, the agencies frequently emphasized the importance of maintaining stable funding levels and minimizing disruptions to staff, which can conflict with the direction to emphasize high-risk areas. According to agency officials, stable allocations to regions and field units are needed to ensure predictability and enable regional and field staff to plan ahead. In addition, a minimum level of funding is needed to maintain the workforce and infrastructure required to support viable fuel reduction programs in regions and field units. Several agency officials told us they were reluctant to shift funding on the basis of risk assessments because doing so could require staff to relocate—potentially multiple times—and the officials wanted to avoid uprooting staff.

Agency guidance offers little in the way of clarification for staff confronted with numerous, conflicting priorities, as the multiplicity of priorities in the Forest Service and Interior's 2006 Cohesive Strategy illustrates. In this strategy, the Forest Service and Interior outline a set of national fuel treatment priorities but do not establish a hierarchy of their relative importance. Among the treatment priorities are areas in the wildland-urban interface as well as some areas outside the interface in condition classes 2 or 3. In addition, some areas in condition class 1—the only remaining condition class—are to be given equal priority, according to the strategy. Similarly, the strategy calls for priority to be given to mechanical

treatments where appropriate, but also to prescribed burns where appropriate. After providing a list of priority criteria, the strategy declares that the more criteria a fuel reduction project meets, the higher its priority should be for funding. However, it also acknowledges that, in exercising management discretion, the agencies may need to make exceptions to the process described for ranking and selecting projects.

Agencies' Allocation Processes Are Not Always Systematic

Although the agencies are working to develop and implement models that will allow them to allocate funds more systematically, such systematic approaches are not used by all agencies or at all levels within the agencies. By allocating funds using a systematic process—one that is methodical, based on established criteria, and applied consistently—the agencies can better ensure that they uniformly consider all relevant criteria and appropriately apply these criteria in all decisions.

In particular, when agency officials rely primarily on professional judgment and negotiation to allocate funds, they do not always follow a step-by-step approach or consistently apply a predetermined set of criteria. We recognize that agency decision makers—particularly those who have served in the same location for many years—often have detailed knowledge about on-the-ground conditions and a thorough understanding of fuel reduction needs. Nevertheless, without using a systematic approach, even knowledgeable and well-meaning decision makers may be more susceptible to influences that are not intended to be part of the decisions, as illustrated by the following examples:

- According to several agency officials, they face considerable pressure to meet acreage targets. Under these circumstances, and with no predetermined set of criteria in an allocation process, targets could have more influence than intended. That is, agency officials might fund lower priority projects in order to treat more acres.

- In NPS's Southeast region, agency officials told us that the location of full-time fuel reduction staff has considerable influence on allocations, even though it is not officially a factor in the allocation process. Few parks in this region have full-time staff devoted to fuel reduction, and parks without such staff request and receive much less fuel reduction funding than do the parks with dedicated staff—potentially because there are fewer staff to perform the work necessary to identify fuel reduction needs and request funds. Consequently, according to agency officials, it is difficult to ensure that all of the highest-priority areas for fuel reduction across the region are identified and targeted for funding

because some high-priority areas may not be identified if they are located in parks with fewer staff. NPS officials in another region expressed a similar concern, stating that the agency needs to shift fuel reduction funds within the region to direct them to high-priority locations and acknowledging that it cannot do so without also shifting personnel to high-priority locations.

Moving toward more systematic allocation processes also enhances transparency and accountability. In many of the locations we visited, the agency offices that relied primarily on professional judgment to allocate fuel reduction funds and select projects did not document the rationale for their decisions. As a result, the processes were not transparent, and neither agency officials nor others—including Congress and the public—could understand the rationale behind the decisions or have confidence that the resulting allocations were directed to the highest-priority areas for reducing risk to communities and the environment. For example, officials in BLM's Oregon/Washington state office used their professional judgment to determine allocations to its 10 district offices. Under this process in 2007, BLM's Medford district office received an allocation of about $9 million—over 7 times the average allocation received by the other nine district offices that year. While this disparity may be appropriate, without a transparent process it is difficult to determine the extent to which the allocation reflects agency priorities for reducing risk to communities and the environment, rather than other factors. The agencies themselves have emphasized the importance of transparency and accountability; for example, the 10-Year Strategy Implementation Plan states that the agencies should "strive for maximum transparency in the decision-making process."

Conclusions

Our nation's wildland fire problem has been decades in the making and will not be solved quickly. Nevertheless, with careful choices about where to spend their limited fuel reduction dollars, federal agencies can meaningfully, if incrementally, reduce the risks faced by communities and the environment. Doing so will require the agencies to continue moving away from allocation by tradition to allocation by priority. Toward this end, the agencies could improve their current approaches in three key areas.

First, the agencies would benefit from routinely using an allocation process that is systematic, and that is common to all the agencies. A systematic process can help ensure that the agencies apply their allocation and project selection criteria consistently, and can help interested parties

outside of the process—Congress, local communities, and other entities—understand the rationale for the funding and project selection decisions that are made. While the models that some of the agencies are developing represent substantial steps forward in this regard and will affect larger portions of funding allocations over time, not all of the agencies have models, and none consistently uses models at the national, regional, and local levels. Further, the models, even where used, often exert only a small influence on allocation decisions, partly because the agencies do not yet have full confidence in the models' data. As a result, the agencies often base decisions mainly on historical funding patterns and professional judgment. We recognize that professional judgment will always have a role in the allocation process to account for difficult-to-quantify factors, such as local priorities or political considerations. However, the agencies and the public are best served if a systematic process, such as a model, serves as the foundation for allocation decisions, and professional judgment plays a supporting, rather than a lead, role. Also, given that wildland fire is a nationwide problem that does not respect administrative boundaries, the agencies would do well to develop and use a common process for allocating fuel reduction funds—as Congress has called for—that can be customized to accommodate differences in scale, type of ecosystem, agency mission, and other criteria.

Second, the agencies could improve the information they use to make allocation decisions. Because the agencies do not always use risk assessments and currently lack data on treatment effectiveness, they often make allocation decisions without knowing, on a broad scale, where the acres at highest risk are located, which treatments are most effective at reducing risk, and which areas respond best to treatment. To improve their allocation decisions, they should continue, over the long term, to develop and use information on risk and treatment effectiveness. The agencies can then use this information, in concert with cost information, to effectively assess tradeoffs among potential treatments and identify the most cost-effective investments.

Finally, the agencies could strengthen their allocation processes by sorting through the numerous prioritization factors that have accumulated over the years and establishing a hierarchy for considering them. Without such a hierarchy, the exercise of setting priorities can be frustrating—or even meaningless—because virtually any project can qualify as high priority. While we recognize that, in some cases, the agencies are bound by law or congressional direction to give priority to certain factors, we believe there may remain enough room within those constraints not only to establish a hierarchy of factors, but also to clarify the relative importance of

categories within some factors—in particular, various categories of wildland-urban interface. We do not advocate prioritization by census—simply directing fuel reduction funds to areas with the highest populations—but neither do we believe that the agencies or the public are well-served by the broad definitions of the interface currently used. However, if the agencies determine, through further analysis, that laws or congressional direction create conflicts prohibiting them from implementing a consistent, systematic approach that distinguishes the relative importance of various priorities, they should so inform Congress and seek additional clarification.

It will not be easy to carry out these tasks. As they work to improve their processes, the agencies will need to devote considerable effort to developing measures and collecting data on risk and effectiveness and considerable thought to balancing this information against the many goals of the fuel reduction program—all in a way that yields transparent results. And once these steps are carried out, the agencies face perhaps an even more difficult decision: how best to redirect fuel reduction funds in a way that improves the agencies' effective use of their limited funds despite the potentially disruptive consequences for individual field units or nearby communities. Our findings suggest that the agencies are increasingly mindful of the merits of such an approach and that their recent actions have begun to lay the necessary groundwork. Nevertheless, many challenges remain, and a difficult road lies ahead.

Recommendations for Executive Action

We are recommending that the Secretaries of Agriculture and of the Interior take the following five actions to improve their ability to allocate fuel reduction funds so that these funds contribute most effectively to risk reduction.

First, we recommend that the Secretaries of Agriculture and of the Interior direct the agencies to develop a common, systematic funding allocation process in order to enhance the transparency and accountability of their allocation decisions and to ensure a common federal approach to allocating funds. Such a systematic process should serve as the foundation of each agency's allocation process and should be applied at all levels within the agencies. Existing models or those under development may serve as useful prototypes; for example, while we have not assessed its accuracy or technical soundness, the Forest Service's model for allocating funds shows promise as the foundation of a systematic process.

In addition, we recommend that the Secretaries of Agriculture and of the Interior direct their agencies to develop information to support this systematic process. Development of the information should include the following actions:

- Develop and implement a common approach to risk assessment, to provide for a broad, national assessment of hazard, risk, and values, as in the Forest Service's allocation model, as well as more refined regional and local assessments.

- Devote resources to developing a measure of, and subsequently collecting data on, fuel reduction effectiveness, so that the agencies can usefully estimate the extent and duration of risk reduction from potential fuel treatments. Because developing the measure and collecting data are likely to be difficult and time-consuming endeavors, the agencies might find it useful to proceed with convening a panel of experts to devise a rudimentary framework for estimating treatment effectiveness.

- Use information on risk and fuel treatment effectiveness, once available, in concert with information on the cost of treatments, to assess the cost-effectiveness of various potential fuel reduction treatments.

Finally, the Secretaries of Agriculture and of the Interior should provide guidance that clearly distinguishes the relative importance of the various factors used in allocating funds and selecting projects, including the importance of risk, effectiveness, and cost in comparison with other factors. This guidance should also distinguish the relative priority of different values at risk, especially different elements within the wildland-urban interface, such as homes, power lines, and municipal watersheds.

Agency Comments and Our Evaluation

We provided the Secretaries of Agriculture and of the Interior with a draft of this report for review and comment. The Forest Service and the Department of the Interior generally agreed with the findings and recommendations in the report, noting their ongoing efforts to develop and implement a risk-informed allocation process, and reiterating the importance of including state, tribal, and local concerns in the prioritization process. Their joint comment letter is reproduced in appendix IV.

We are sending copies of this report to interested congressional committees, the Secretaries of Agriculture and the Interior, the Chief of the Forest Service, and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staffs have any questions about this report, please contact me at (202) 512-3841 or nazzaror@gao.gov. Contact points for our Offices of Public Affairs and Congressional Relations may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.

Robin M. Nazzaro

Robin M. Nazzaro
Director, Natural Resources
and Environment

Appendix I: Objectives, Scope, and Methodology

We were asked to (1) identify the processes the Forest Service, the Department of the Interior (Interior), and Interior's agencies—the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS)—use to allocate fuel reduction funds and select projects for implementation, including the factors that influence these processes; and (2) determine how, if at all, the agencies could improve these processes to better ensure they contribute to their goal of effectively reducing the risk of wildland fire to communities and the environment. We focused our review primarily on the Forest Service and BLM because these two agencies accounted for about 80 percent of the fuel reduction funds appropriated by Congress for 2005, 2006, and 2007, although we collected information on the other three agencies as well.[1] We focused our review on fuel reduction work funded through congressional fuel reduction appropriations; therefore, fuel reduction work funded by other agency programs or outside organizations is outside the scope of this review. To gain an understanding of outside perspectives on the agencies' fuel reduction efforts, we met with several nonfederal parties, including representatives from the National Association of State Foresters, The Nature Conservancy, the Western Governors' Association, and the Wilderness Society.

Fuel Reduction Funding Allocation and Project Selection Processes

To learn how the agencies allocate fuel reduction funds and select projects, and to identify the factors that influence these processes, we first obtained and reviewed documents on policies and procedures governing the fuel reduction program. These included applicable laws, administrative initiatives, congressional committee reports, and interagency agreements, as well as guidance for fuel reduction from the departments, agency headquarters, and regional offices.[2] We also obtained and analyzed agency data on funding allocations.

To learn about the processes used to allocate fuel reduction funds at the national level, we met with agency officials from the Forest Service and Interior at their Washington, D.C., headquarters, and with officials from all five agencies at the National Interagency Fire Center in Boise, Idaho. We also met with agency researchers and modeling experts to better

[1]Years cited in this appendix refer to fiscal years except where otherwise specified.

[2]BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this appendix, we refer to all of these as regional offices when we discuss the Interior agencies collectively.

understand the data used in the national models currently under development by the Forest Service, Interior, and BLM. We did not, however, assess the accuracy or technical soundness of these models.

At the regional and state levels, we used a structured interview guide to speak, in person or by telephone, with officials in all Forest Service regional and BLM state offices, as well as with officials in selected BIA, FWS, and NPS regional offices. The structured interview guide included questions about the processes used to allocate fuel reduction funds, the factors that influence those processes, the extent and nature of regional guidance provided to field units, and the amount of oversight on the part of the regional offices. Because developing and administering a structured interview guide may introduce errors—caused by the way a particular question is interpreted, for example—we included steps in the development and administration of the interview guide to minimize such errors. We pretested the guide at several locations and modified it to reflect questions and comments we received. We also visited a number of the agencies' regional offices to obtain a greater understanding of the funding allocation processes in those regions. We selected regional offices that collectively received a substantial portion of their agency's fuel reduction funds and represented diversity with respect to fuel reduction funding levels, fuel reduction acreage accomplishments, predominant vegetation type, and geographic location. These selection criteria are shown in table 5.

Table 5: Regional Offices GAO Visited

Agency	Region/ state office	Fuel reduction funding level[a]		Acres treated[b]		Predominant vegetation type			Geographic location		
		Greater than average	Less than average	Greater than average	Less than average	Forest	Grass	Shrub	West	Central	East
Forest Service	Northern		x		x	x				x	
	Pacific Northwest	x			x	x			x		
	Pacific Southwest	x			x	x			x		
	Rocky Mountain	x			x	x				x	
	Southern	x		x		x					x
BIA	Northwest	x		x		x	x		x		
	Pacific (by phone)		x		x			x	x		
	Rocky Mountain		x		x	x	x			x	
	Southwest	x		x			x			x	
BLM	California		x		x		x	x	x		
	Colorado		x		x			x		x	
	Idaho	x		x			x		x		
	Montana		x		x		x			x	
	Oregon/Washington	x		x		x	x		x		
FWS	California-Nevada[c]		x		x			x	x		
	Mountain-Prairie	x			x		x			x	
	Southeast	x		x		x					x
NPS	Intermountain	x		x		[d]	[d]	[d]		x	
	Pacific West	x		x		[d]	[d]	[d]	x		
	Southeast	x		x		x					x

Source: GAO analysis of Forest Service and Interior data.

[a]"Greater than average" refers to regions that received more than the average funding amount received by that agency's regions in 2007, and "less than average" refers to regions that received less than the average amount in 2007.

[b]"Greater than average" refers to regions that treated more than the average acres treated by that agency's regions in 2006, and "less than average" refers to regions that treated less than the average acres treated in 2006.

[c]FWS's California-Nevada Operations office is officially part of the Pacific region, but manages its own fuel reduction program.

[d]These regions each cover several states and have a large variety of vegetation; therefore, no one vegetation type is predominant, according to agency officials.

To learn about the project selection processes used by local units, we selected a nonprobability sample of 20 local units in eight states to interview.[3] The sample included 8 national forests, 5 BLM district or field offices, 2 BIA agencies, 2 national wildlife refuges, and 3 national parks. Table 6 lists the units we visited. The local units selected for interviews represented diversity with respect to geographic location and predominant vegetation type. In addition, we selected units that represented diversity with respect to their proximity to communities and development, including units that were located in counties that were predominantly rural or urban.

[3]Results from nonprobability samples cannot be used to make inferences about a population, because in a nonprobability sample, some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

Table 6: Field Units GAO Visited

Agency and unit	State	Predominant vegetation type		
		Forest	Grass	Shrub
Forest Service				
Angeles National Forest	California			x
Arapaho-Roosevelt National Forests and Pawnee National Grassland	Colorado	x		
Bitterroot National Forest[a]	Montana and Idaho	x		
Boise National Forest	Idaho	x		
Chattahoochee-Oconee National Forests	Georgia	x		
Medicine Bow-Routt National Forests and Thunder Basin National Grassland	Wyoming and Colorado	x		
National Forests in Florida (Ocala National Forest)	Florida	x		
San Bernardino National Forest	California	x		x
BIA				
Crow Agency	Montana		x	
Zuni Agency	New Mexico	x		
BLM				
Albuquerque District Office	New Mexico	x		
Billings Field Office	Montana		x	
Little Snake Field Office	Colorado		x	x
Twin Falls District Office	Idaho		x	
White River Field Office	Colorado	x		x
FWS				
Merritt Island National Wildlife Refuge	Florida			x
Rocky Mountain Arsenal National Wildlife Refuge	Colorado		x	
NPS				
Cape Canaveral National Seashore	Florida	x		
Rocky Mountain National Park	Colorado	x		
Sequoia and Kings Canyon National Parks[a]	California	x		

Source: GAO analysis of Forest Service and Interior data.

[a]We met with officials from these field units at off-site locations, in order to facilitate cost-effective travel logistics.

During all of these visits, we collected documents and interviewed staff; during some of these visits, we also observed fuel reduction treatments. Because we conducted in-depth analyses of only a few selected units, we cannot generalize our findings beyond the local units and officials we contacted.

Potential Improvements to Agency Processes to Better Ensure They Contribute to Reducing Risk

To identify potential improvements to the agencies' processes for allocating fuel reduction funds and selecting treatments, we analyzed the information we collected through our site visits, structured interviews, agency documentation, and discussions with other agency officials. To identify the overall goals of the fuel reduction program, and the extent to which earlier assessments of the program identified shortcomings in the agencies' ability to meet these goals, we also evaluated (1) agency policy documents, including strategy documents, program guidance, and related documents discussing the program's objectives; (2) legislative direction associated with the fuel reduction program, including laws, congressional committee report language, and other direction; and (3) previous reviews of the fuel reduction program by GAO, the Inspectors General, and others.

In our interviews with agency officials, we asked about the factors they considered when allocating funds and selecting projects—including the influence of specific factors, such as acreage targets and risk assessments—as well as factors that prevented high-priority work from being accomplished. We also asked about regional and local definitions of the wildland-urban interface. We assigned the allocation processes used by the agencies' headquarters, regional offices, and local units to one of two categories: quantitative or judgmental. We also verified the factors used in allocation processes with agency officials.

To determine the extent to which the locations of wildland-urban interface treatments, population centers, and federal lands coincided, we analyzed fuel reduction data from a Forest Service and Interior database—the National Fire Plan Operations and Reporting System (NFPORS)—as well as population data from the U.S. Census Bureau, and federal lands data from the U.S. Geological Survey's National Atlas Web site (NationalAtlas.gov). Using the agency data on fuel reduction treatments, we used geographic information system (GIS) tools to map the location and size of wildland-urban interface treatments completed in 2005 and 2006. We also applied GIS tools to Census data to map population density in three categories: (1) fewer than 28 people per square mile, on average; (2) 28 to 249 people per square mile, on average; and (3) 250 or more people per square mile, on average.[4] We used these categories because they reflect the definition of wildland-urban interface published in the

[4]We conducted our analysis using U.S. Census data on the average population per square mile across areas defined by ZIP codes. However, especially in larger ZIP codes, there may be small pockets where the population density is higher or lower than the average used in our analysis.

January 4, 2001 Federal Register and used by the agencies.[5] We also mapped the location of federal lands using the data from the U.S. Geological Survey. In addition, we created maps of two counties—one urban and one rural—showing the locations of wildland-urban interface treatments completed in 2005 and 2006, population density, and federal lands. We also contacted officials in those two counties to discuss the location of specific wildland-urban interface projects and their rationale for selecting those projects.

To determine the reliability of the agencies' fuel reduction data, we reviewed related documentation, such as the NFPORS database users' manual; interviewed knowledgeable agency officials, including database administrators; discussed data input and verification procedures with regional and field staff; and conducted electronic data testing. We found that these fuel reduction data were sufficiently reliable for the purposes of this review. We obtained the federal lands data prepared by NationalAtlas.gov and reviewed the documentation provided on the limitations of the file. From this review, we determined that the federal lands data were sufficiently reliable for our purposes. To measure population density, we used Census ZIP Code Tabulation Area data from the 2000 U.S. Census and the geographic boundary for those areas. We reviewed documentation provided on the limitations of these files and compared their consistency with other Census sources. From this review,

[5]In the 2001 *Federal Register*, the agencies provide three categories of wildland-urban interface communities. The first is "interface community," which exists where structures directly abut wildland fuel; an alternative definition of the interface community specifies a population density of 250 or more people per square mile. The second is "intermix community," which exists where structures are scattered throughout a wildland area; an alternative definition of intermix community specifies a population density of between 28-250 people per square mile. The third is "occluded community," where structures, often within a city, abut an island of wildland fuel (e.g., park or open space).

we determined that the population density data were sufficiently reliable for our purposes.

We conducted our work from August 2006 to September 2007 in accordance with generally accepted government auditing standards.

Appendix II: Forest Service and Interior Fuel Reduction Funding Allocations, Fiscal Years 2005, 2006, and 2007

This appendix provides information on fuel reduction funding appropriations and allocations to the Forest Service, the Department of the Interior (Interior) and its agencies, and their regions for 2005, 2006, and 2007.[1] Interior allocates separate fuel reduction funds to its four agencies for treatments within and outside of the wildland-urban interface (WUI), while the Forest Service allocates one single source of fuel funding to its regions. Therefore, information on allocation amounts to WUI and non-WUI areas are included for Interior but not for the Forest Service. Table 7 provides total appropriations and allocations to the Forest Service and Interior agencies—Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), National Park Service (NPS), and Fish and Wildlife Service (FWS)—for 2005, 2006, and 2007. As shown in table 7 and figure 11, of the approximately $500 million appropriated to the Forest Service and Interior for fuel reduction in 2007, the Forest Service received about 61 percent of the total; BLM received about 19 percent of the total; and the remaining 20 percent was allocated to BIA, NPS, and FWS.

[1]Years cited in this appendix refer to fiscal years except where otherwise specified. BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this appendix, we refer to all of these as regional offices when we discuss the Interior agencies collectively.

Table 7: Total Appropriations to Forest Service, and Allocations to Interior Agencies, Fiscal Years 2005, 2006, and 2007

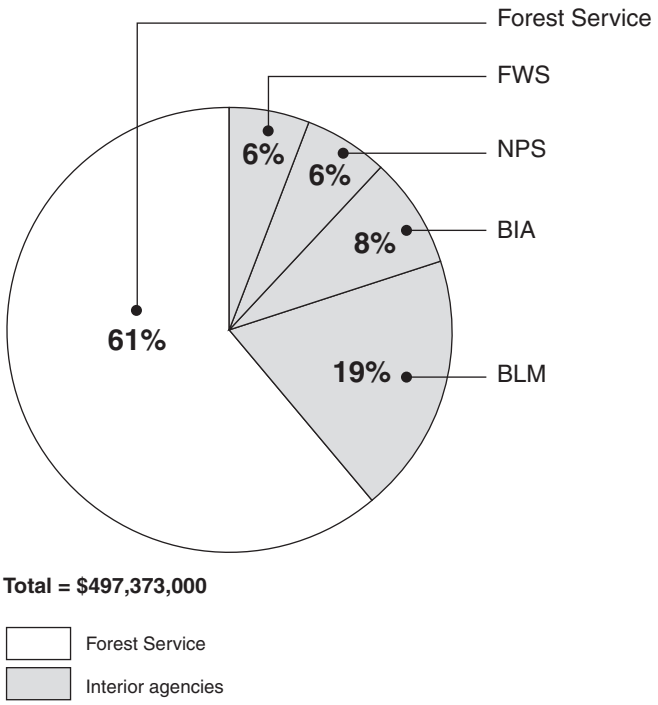
Agency	Total allocation	Percentage of total allocation
BLM		
2005	$91,386,000	18.8
2006	96,299,000	19.9
2007	93,389,000	18.8
BIA		
2005	42,488,000	8.7
2006	43,237,000	8.9
2007	40,664,000	8.2
NPS		
2005	33,040,000	6.8
2006	33,299,000	6.9
2007	31,396,000	6.3
FWS		
2005	27,527,000	5.7
2006	32,162,000	6.6
2007	30,666,000	6.2
Subtotal—Interior agencies		
2005	**194,441,000**	**39.9**
2006	**204,997,000**	**42.3**
2007	**196,115,000**	**39.4**
Forest Service[a]		
2005	292,389,000	60.1
2006	280,119,000	57.7
2007	301,258,000	60.6
Total		
2005	**486,830,000**	**100**
2006	**485,116,000**	**100**
2007	**497,373,000**	**100**

Source: GAO analysis of Forest Service and Interior data.

Notes: Interior allocated additional amounts of $6,968,000 in 2005; $5,115,000 in 2006; and $3,672,000 in 2007 to the Office of Wildland Fire Coordination, which is responsible for the coordination, integration, and oversight of wildland fire management programs within Interior.
Total allocations do not include carryover from the previous fiscal year.
Numbers may not total due to rounding.

[a]Forest Service figures represent appropriations.

Figure 11: Agency Funding Levels as a Percentage of Total Fuel Reduction Funding, Fiscal Year 2007



Source: GAO analysis of Forest Service and Interior data.

Notes: Interior allocated an additional $3,672,000 to the Office of Wildland Fire Coordination. Total allocations do not include carryover from the previous fiscal year.

Table 8 shows the Forest Service's total allocations to its nine regions and its headquarters for 2005, 2006, and 2007. In 2007, of the total funding allocated to the Forest Service for fuel reduction, about 68 percent was allocated to the regions. Approximately 32 percent was allocated to the Forest Service's headquarters, research stations, and general cost pools that are used for expenses not charged to a single program, including indirect, support, and common services charges. The Pacific Southwest region received the most funding for 2005, 2006, and 2007; the Southwestern region received the second-most funding during that time period.

Table 8: Forest Service Allocations to Regions and Headquarters, Fiscal Years 2005, 2006, and 2007

Region	Total allocation	Percentage of Forest Service's total allocation
Pacific Southwest		
2005	$66,656,000	22.8
2006	41,944,000	15.0
2007	43,737,000	14.5
Southwestern		
2005	30,638,000	10.5
2006	36,891,000	13.2
2007	37,341,000	12.4
Southern		
2005	25,478,000	8.7
2006	26,368,000	9.4
2007	29,092,000	9.7
Pacific Northwest		
2005	24,622,000	8.4
2006	23,179,000	8.3
2007	25,794,000	8.6
Rocky Mountain		
2005	21,032,000	7.2
2006	23,706,000	8.5
2007	25,445,000	8.4
Intermountain		
2005	13,673,000	4.7
2006	15,881,000	5.7
2007	16,165,000	5.4
Northern		
2005	11,875,000	4.1
2006	12,006,000	4.3
2007	15,782,000	5.2
Eastern		
2005	8,633,000	3.0
2006	8,631,000	3.1
2007	9,718,000	3.2

Region	Total allocation	Percentage of Forest Service's total allocation
Alaska		
2005	1,834,000	0.6
2006	853,000	0.3
2007	805,000	0.3
Subtotal, regions		
2005	**204,441,000**	**69.9**
2006	**189,459,000**	**67.6**
2007	**203,879,000**	**67.7**
Headquarters, Research stations, and cost pools		
2005	87,948,000	30.1
2006	90,659,000	32.4
2007	97,379,000	32.3
Total		
2005	**292,389,000**	**100**
2006	**280,119,000**	**100**
2007	**301,258,000**	**100**

Source: GAO analysis of Forest Service data.

Notes: Total allocations do not include carryover from the previous fiscal year.
Numbers may not total due to rounding.

Table 9 shows Interior's allocations to BLM, BIA, NPS, and FWS—including WUI and non-WUI allocations—for 2005, 2006, and 2007. In 2007, about 65 percent of Interior's total allocation was to WUI areas and 35 percent was to non-WUI areas. In 2007, BLM received the largest percentage of Interior's fuel reduction funding allocation—almost 48 percent.

Table 9: Interior Allocations to BLM, BIA, FWS, and NPS, Including WUI and Non-WUI Allocations, Fiscal Years 2005, 2006, and 2007

Agency	Total allocation	Percentage of Interior's total allocation to the agencies	Total WUI allocation	Total non-WUI allocation
BLM				
2005	$91,386,000	47.0	$64,437,000	$26,949,000
2006	96,299,000	47.0	66,245,000	30,054,000
2007	93,389,000	47.6	66,590,000	26,799,000
BIA				
2005	42,488,000	21.9	27,299,000	15,189,000
2006	43,237,000	21.1	27,494,000	15,743,000
2007	40,664,000	20.7	26,681,000	13,983,000
NPS				
2005	33,040,000	17.0	15,320,000	17,720,000
2006	33,299,000	16.2	14,948,000	18,351,000
2007	31,396,000	16.0	14,583,000	16,813,000
FWS				
2005	27,527,000	14.2	15,583,000	11,944,000
2006	32,162,000	15.7	19,772,000	12,390,000
2007	30,666,000	15.6	18,922,000	11,744,000
Total—Interior agencies				
2005	**$194,441,000**	**100**	**$122,639,000**	**$71,802,000**
2006	**$204,997,000**	**100**	**$128,459,000**	**$76,538,000**
2007	**$196,115,000**	**100**	**$126,776,000**	**$69,339,000**

Source: GAO analysis of Interior data.

Notes: Interior allocated an additional $6,968,000 in 2005, $5,115,000 in 2006, and $3,672,000 in 2007 to the Office of Wildland Fire Coordination.

Total allocations do not include carryover from the previous fiscal year.

Table 10 shows BLM's allocations to its 12 state offices and headquarters for 2005, 2006, and 2007. In 2007, about 71 percent of BLM's total fuel reduction funding was allocated to WUI areas, while about 29 percent was allocated to non-WUI areas. In 2005, 2006, and 2007, the Oregon/Washington state office received the most funding, followed by the Idaho and Utah state offices. These three offices accounted for about 50 percent of BLM's total annual fuel reduction allocation.

Table 10: BLM Allocations to State Offices and Headquarters, Fiscal Years 2005, 2006, and 2007

State office	Total allocation	Percentage of BLM's total allocation	Total WUI allocation	Total non-WUI allocation
Oregon/Washington				
2005	$26,177,000	27.6	$19,027,000	$7,150,000
2006	24,596,000	24.1	17,966,000	6,630,000
2007	24,878,000	24.8	18,542,000	6,336,000
Idaho				
2005	14,536,000	15.3	10,130,000	4,406,000
2006	14,787,000	14.5	10,033,000	4,754,000
2007	14,598,000	14.6	10,338,000	4,260,000
Utah				
2005	8,557,000	9.0	5,479,000	3,078,000
2006	7,968,000	7.8	5,225,000	2,743,000
2007	10,078,000	10.1	6,164,000	3,914,000
California				
2005	7,257,000	7.6	6,096,000	1,161,000
2006	6,364,000	6.2	5,382,000	982,000
2007	7,322,000	7.3	6,294,000	1,028,000
Nevada				
2005	6,663,000	7.0	4,572,000	2,091,000
2006	5,794,000	5.7	3,881,000	1,913,000
2007	6,414,000	6.4	4,317,000	2,097,000
Colorado				
2005	6,480,000	6.8	4,891,000	1,589,000
2006	6,068,000	5.9	4,589,000	1,479,000
2007	6,843,000	6.8	5,285,000	1,558,000
New Mexico				
2005	5,676,000	6.0	2,930,000	2,746,000
2006	6,167,000	6.0	3,347,000	2,820,000
2007	6,412,000	6.4	3,630,000	2,782,000
Montana				
2005	5,338,000	5.6	4,248,000	1,090,000
2006	4,871,000	4.8	4,000,000	871,000
2007	5,461,000	5.5	4,366,000	1,095,000

State office	Total allocation	Percentage of BLM's total allocation	Total WUI allocation	Total non-WUI allocation
Arizona				
2005	4,219,000	4.4	2,509,000	1,710,000
2006	3,787,000	3.7	2,396,000	1,391,000
2007	4,355,000	4.3	2,608,000	1,747,000
Wyoming				
2005	3,143,000	3.3	1,830,000	1,313,000
2006	2,898,000	2.8	1,786,000	1,112,000
2007	3,684,000	3.7	2,185,000	1,499,000
Alaska				
2005	785,000	0.8	365,000	420,000
2006	1,044,000	1.0	502,000	542,000
2007	1,556,000	1.6	786,000	770,000
Eastern states				
2005	98,000	0.1	78,000	20,000
2006	83,000	0.1	58,000	25,000
2007	126,000	0.1	90,000	36,000
Subtotal, state offices				
2005	**88,929,000**	**93.7**	**62,155,000**	**26,774,000**
2006	**84,427,000**	**82.6**	**59,165,000**	**25,262,000**
2007	**91,727,000**	**91.5**	**64,605,000**	**27,122,000**
Headquarters				
2005	5,979,000	6.3	4,527,000	1,452,000
2006	17,822,000	17.4	12,029,000	5,793,000
2007	8,473,000	8.5	6,315,000	2,158,000
Total				
2005	**94,908,000**	**100**	**66,682,000**	**28,226,000**
2006	**102,249,000**	**100**	**71,194,000**	**31,055,000**
2007	**100,200,000**	**100**	**70,920,000**	**29,280,000**

Source: GAO analysis of BLM data.

Notes: Total allocations include the allocation for the current year plus carryover from the previous fiscal year.

Numbers may not total due to rounding.

Table 11 shows BIA's allocations for 2005, 2006, and 2007 to its 12 regions and the National Interagency Fire Center. In 2007, about 67 percent of BIA's total fuel reduction funding was allocated to WUI areas, while about 33 percent was allocated to non-WUI areas. In 2005, 2006, and 2007, the

Northwest region received the most funding of the BIA regions, followed by the Southwest region. These two regions accounted for about 50 percent of BIA's total fuel reduction allocation in 2007.

Table 11: BIA Allocations to Regions and the National Interagency Fire Center, Fiscal Years 2005, 2006, and 2007

Region	Total allocation	Percentage of BIA's total allocation	Total WUI allocation	Total non-WUI allocation
Northwest				
2005	$12,204,855	28.1	$7,823,617	$4,381,238
2006	11,387,925	26.4	8,012,751	3,375,174
2007	11,835,643	29.6	8,465,745	3,369,898
Southwest				
2005	7,651,861	17.6	3,518,105	4,133,756
2006	9,175,694	21.3	4,115,843	5,059,851
2007	8,366,522	21.0	5,128,157	3,238,365
Western				
2005	4,497,336	10.4	2,912,773	1,584,563
2006	4,020,742	9.3	2,218,682	1,802,060
2007	3,366,120	8.4	2,287,498	1,078,622
Pacific				
2005	3,846,125	8.9	2,863,206	982,919
2006	3,096,619	7.2	2,546,681	549,938
2007	2,401,976	6.0	1,453,604	948,372
Great Plains				
2005	2,464,878	5.7	1,461,855	1,003,023
2006	3,196,997	7.4	1,742,168	1,454,829
2007	2,281,299	5.7	1,061,894	1,219,405
Alaska				
2005	2,417,117	5.6	2,247,117	170,000
2006	2,256,079	5.2	2,163,458	92,621
2007	1,780,638	4.5	1,538,479	242,159
Midwest				
2005	1,876,013	4.3	1,280,813	595,200
2006	2,736,830	6.3	1,988,630	748,200
2007	2,913,975	7.3	2,497,657	416,318
Rocky Mountain				
2005	1,699,576	3.9	1,004,728	694,848
2006	1,769,815	4.1	1,015,550	754,265

Region	Total allocation	Percentage of BIA's total allocation	Total WUI allocation	Total non-WUI allocation
2007	1,795,609	4.5	1,066,157	729,452
Navajo				
2005	1,258,919	2.9	342,421	916,498
2006	1,335,559	3.1	443,588	891,971
2007	933,183	2.3	357,126	576,057
Southern Plains				
2005	572,247	1.3	27,552	544,695
2006	568,471	1.3	30,174	538,297
2007	489,663	1.2	21,867	467,796
Eastern				
2005	503,175	1.2	425,375	77,800
2006	215,825	0.5	115,732	100,093
2007	433,609	1.1	272,952	160,657
Eastern Oklahoma				
2005	284,557	0.7	216,900	67,657
2006	224,465	0.5	189,709	34,756
2007	240,074	0.6	164,172	75,902
Subtotal, regions				
2005	**39,276,659**	**90.4**	**24,124,462**	**15,152,197**
2006	**39,985,021**	**92.7**	**24,582,966**	**15,402,055**
2007	**36,838,311**	**92.3**	**24,315,308**	**12,523,003**
National Interagency Fire Center				
2005	4,172,185	9.6	3,621,793	550,392
2006	3,156,566	7.3	2,720,552	436,014
2007	3,092,337	7.7	2,608,684	483,653
Total				
2005	**43,448,844**	**100**	**27,746,255**	**15,702,589**
2006	**43,141,587**	**100**	**27,303,518**	**15,838,069**
2007	**39,930,648**	**100**	**26,923,992**	**13,006,656**

Source: GAO analysis of BIA data.

Notes: Total allocations include the allocation for the current year plus carryover from the previous fiscal year.

Numbers may not total due to rounding.

Table 12 shows NPS's allocations to its seven regions and the Washington Office for 2005, 2006, and 2007. In 2007, about 46 percent of NPS's total fuel reduction funding was allocated to WUI areas, while about 54 percent

was allocated to non-WUI areas. NPS was the only Interior agency that allocated more funds to non-WUI areas than to WUI areas. In 2005, 2006, and 2007, the Pacific West region received the most funding; followed by the Intermountain region. These two regions accounted for about 60 percent of NPS's total annual fuel reduction allocation in 2007.

Table 12: NPS Allocations to Regions and the Washington Office, Fiscal Years 2005, 2006, and 2007

Region	Total allocation	Percentage of NPS's total allocation	Total WUI allocation	Total non-WUI allocation
Pacific West				
2005	$12,550,296	35.5	$7,317,240	$5,233,056
2006	10,478,930	32.4	6,231,822	4,247,108
2007	10,693,592	31.6	6,401,068	4,292,524
Intermountain				
2005	10,070,518	28.5	4,268,238	5,802,280
2006	8,578,937	26.5	3,138,962	5,439,975
2007	9,398,600	27.8	4,006,559	5,392,041
Southeast				
2005	4,279,340	12.1	1,973,600	2,305,740
2006	4,047,002	12.5	1,648,782	2,398,220
2007	4,604,308	13.6	1,843,531	2,760,777
Midwest				
2005	3,104,724	8.8	627,690	2,477,034
2006	3,341,288	10.3	634,129	2,707,159
2007	3,469,731	10.3	644,967	2,824,764
Northeast				
2005	898,084	2.5	521,020	377,064
2006	879,070	2.7	406,936	472,134
2007	1,201,497	3.6	757,338	444,159
Alaska				
2005	560,582	1.6	0	560,582
2006	813,140	2.5	0	813,140
2007	739,037	2.2	0	739,037
National Capital				
2005	142,043	0.4	122,320	19,723
2006	99,851	0.3	99,851	0
2007	103,631	0.3	103,631	0

Region	Total allocation	Percentage of NPS's total allocation	Total WUI allocation	Total non-WUI allocation
Subtotal, regions				
2005	**31,605,587**	**89.5**	**14,830,108**	**16,775,479**
2006	**28,238,218**	**87.4**	**12,160,482**	**16,077,736**
2007	**30,210,396**	**89.3**	**13,757,094**	**16,453,302**
Washington Office				
2005	3,705,107	10.5	1,572,455	2,132,652
2006	4,080,417	12.6	1,904,137	2,176,280
2007	3,605,604	10.7	1,804,906	1,800,698
Total				
2005	**35,310,694**	**100**	**$16,402,563**	**18,908,131**
2006	**32,318,635**	**100**	**14,064,619**	**18,254,016**
2007	**33,816,000**	**100**	**15,562,000**	**18,254,000**

Source: GAO analysis of NPS data.

Notes: Total allocations include the allocation for the current year plus carryover from the previous fiscal year.

Numbers may not total due to rounding.

Table 13 shows FWS's allocations in 2005, 2006, and 2007 to its seven regions, the California-Nevada Operations office, and headquarters.[2] In 2007, about 61 percent of FWS's total fuel reduction funding was allocated to WUI areas, while about 39 percent was allocated to non-WUI areas. In 2005, 2006, and 2007, the Southeast region received the most funding, followed by the Great Lakes-Big Rivers region.

[2]While FWS has seven regions, it has an eighth office—the California-Nevada Operations Office—that, although officially part of the Pacific region, manages its own fuel reduction program.

Table 13: FWS Allocations to Regions and Headquarters, Fiscal Years 2005, 2006, and 2007

Region	Total allocation	Percentage of FWS's total allocation	Total WUI allocation	Total non-WUI allocation
Southeast				
2005	$7,005,484	24.7	$3,715,115	$3,290,369
2006	7,966,857	23.8	4,780,616	3,186,241
2007	7,543,624	24.2	4,481,330	3,062,294
Great Lakes-Big Rivers				
2005	4,867,717	17.1	2,111,460	2,756,257
2006	5,438,168	16.2	2,658,862	2,779,306
2007	5,336,376	17.1	2,604,636	2,731,740
Mountain-Prairie				
2005	3,376,546	11.9	1,281,699	2,094,847
2006	3,776,901	11.3	1,658,254	2,118,647
2007	3,690,940	11.8	1,566,284	2,124,656
Southwest				
2005	3,363,824	11.9	2,139,589	1,224,235
2006	3,903,921	11.7	2,499,122	1,404,799
2007	3,721,205	11.9	2,434,533	1,286,672
Pacific				
2005	2,556,707	9.0	1,504,681	1,052,026
2006	2,853,522	8.5	1,864,739	988,783
2007	2,566,156	8.2	1,736,153	830,003
Northeast				
2005	2,201,297	7.8	1,751,683	449,614
2006	2,597,811	7.8	2,106,088	491,723
2007	2,416,798	7.7	1,977,669	439,129
California-Nevada[a]				
2005	1,712,138	6.0	986,919	725,219
2006	2,542,027	7.6	1,960,241	581,786
2007	2,254,492	7.2	1,460,866	793,626
Alaska				
2005	1,000,439	3.5	815,607	184,832
2006	1,271,882	3.8	1,050,646	221,236
2007	1,224,552	3.9	1,074,688	149,864

Region	Total allocation	Percentage of FWS's total allocation	Total WUI allocation	Total non-WUI allocation
Subtotal, regions				
2005	**26,084,152**	**91.9**	**14,306,753**	**11,777,399**
2006	**30,351,089**	**90.6**	**18,578,568**	**11,772,521**
2007	**28,754,143**	**92.1**	**17,336,159**	**11,417,984**
Washington Office				
2005	2,302,509	8.1	1,571,629	730,880
2006	3,153,074	9.4	2,037,897	1,115,177
2007	2,450,015	7.9	1,723,281	726,734
Total				
2005	**28,386,661**	**100**	**15,878,382**	**12,508,279**
2006	**33,504,163**	**100**	**20,616,465**	**12,887,698**
2007	**31,204,158**	**100**	**19,059,440**	**12,144,718**

Source: GAO analysis of FWS data.

Notes: Total allocations include the allocation for the current year plus carryover from the previous fiscal year.

Numbers may not total due to rounding.

[a]While FWS has seven regions, it has an eighth office—the California-Nevada Operations office—that, although officially part of the Pacific region, manages its own fuel reduction program.

Appendix III: Summary of Fuel Treatment Accomplishments for the Forest Service and Interior, Fiscal Years 2005 and 2006

The tables in this appendix summarize the fuel reduction accomplishments of the Forest Service and the four Interior agencies we reviewed—Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), National Park Service (NPS), and Fish and Wildlife Service (FWS)—for 2005 and 2006,[1] the most recent years for which complete data were available. National and regional office data are presented for each agency.[2]

Table 14 provides nationwide information for each of the five agencies, including total acres treated; acres treated in the wildland-urban interface (WUI) and in non-WUI areas; and acres treated with prescribed fire, mechanical methods, and other treatment methods such as herbicides and grazing. The Forest Service treated more acres than the four Interior agencies combined—almost 1.7 million acres in 2005 and more than 1.5 million acres in 2006. Within Interior, BLM and FWS treated the most acres, with BLM treating more than 500,000 acres in 2005 and almost 430,000 acres in 2006, and FWS treating almost 420,000 acres in 2005 and more than 370,000 acres in 2006. In each year, about 60 percent of the total acres treated by the five agencies were in the WUI, and about 40 percent of total acres treated were outside of the WUI. The majority of acres were treated with prescribed fire—almost 75 percent in 2005 and almost 65 percent in 2006.

[1]Years cited in this appendix refer to fiscal years except where otherwise specified.

[2]BIA, FWS, and NPS have regional offices, while BLM has state offices. For the purposes of this appendix, we refer to all of these as regional offices when we discuss the Interior agencies collectively.

Table 14: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for Interior and Forest Service

Agency	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
BLM						
2005	506,168	253,001	253,167	194,553	211,852	99,763
2006	427,912	230,932	196,980	107,443	206,123	114,346
BIA						
2005	193,617	71,983	121,634	96,881	94,168	2,568
2006	187,653	89,961	97,692	78,304	106,204	3,145
NPS						
2005	153,972	58,873	95,099	139,455	13,036	1,481
2006	116,635	38,558	78,077	102,765	11,532	2,338
FWS						
2005	415,646	158,711	256,935	389,686	21,734	4,226
2006	373,933	173,113	200,820	333,038	32,118	8,777
Interior subtotal						
2005	**1,269,403**	**542,568**	**726,835**	**820,575**	**340,790**	**108,038**
2006	**1,106,133**	**532,564**	**573,569**	**621,550**	**355,977**	**128,606**
Forest Service						
2005	1,672,909	1,198,663	474,246	1,366,988	303,002	2,919
2006	1,503,475	1,090,721	412,754	1,061,277	433,077	9,121
Total Forest Service and Interior						
2005	**2,942,312**	**1,741,231**	**1,201,081**	**2,187,563**	**643,792**	**110,957**
2006	**2,609,608**	**1,623,285**	**986,323**	**1,682,827**	**789,054**	**137,727**

Source: GAO analysis of Interior and Forest Service data.

[a]"Other" category includes treatments such as herbicides and grazing.

Table 15 summarizes 2005 and 2006 fuel treatment information for the Forest Service regions. In both years, the Southern region treated substantially more acres than the other regions, treating more than half of the Forest Service's total treated acres. The Forest Service treated more than twice as many acres in the WUI as in non-WUI areas, and treated most acres with prescribed fire.

Table 15: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for Forest Service Regions

Region	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Pacific Southwest						
2005	100,540	59,194	41,346	41,565	58,785	190
2006	95,729	62,229	33,500	36,779	50,423	8,527
Southwestern						
2005	164,506	69,929	94,577	118,326	46,180	0
2006	180,616	84,973	95,643	134,289	46,327	0
Southern						
2005	976,176	803,654	172,522	969,528	6,616	32
2006	776,145	674,189	101,956	625,605	150,540	0
Pacific Northwest						
2005	139,470	79,975	59,495	65,955	73,515	0
2006	133,528	60,904	72,624	73,068	60,432	28
Rocky Mountain						
2005	93,969	65,862	28,107	51,353	39,919	2,697
2006	102,953	77,650	25,303	49,313	53,394	246
Intermountain						
2005	74,676	34,163	40,513	47,077	27,599	0
2006	87,957	33,995	53,962	58,075	29,562	320
Northern						
2005	70,594	43,824	26,770	39,726	30,868	0
2006	68,639	46,892	21,747	43,480	25,159	0
Eastern						
2005	51,472	40,556	10,916	33,089	18,383	0
2006	57,221	49,202	8,019	40,242	16,979	0
Alaska						
2005	1,506	1,506	0	369	1,137	0
2006	687	687	0	426	261	0
Total						
2005	1,672,909	1,198,663	474,246	1,366,988	303,002	2,919
2006	1,503,475	1,090,721	412,754	1,061,277	433,077	9,121

Source: GAO analysis of Forest Service data.

[a]"Other" category includes treatments such as herbicides and grazing.

Table 16 summarizes 2005 and 2006 fuel treatment information for the BLM state offices. In both years, the Oregon/Washington and Idaho state offices treated the most acres, followed by the New Mexico state office. BLM treated about the same number of acres in the WUI and in non-WUI areas in 2005, and treated about 34,000 more acres in the WUI than in non-WUI areas in 2006. Unlike the Forest Service, BLM treated more acres mechanically than with prescribed fire, and also treated a substantial number of acres using other treatment methods, such as herbicides or grazing.

Table 16: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for BLM State Offices

State office	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Oregon/ Washington						
2005	108,909	71,218	37,691	47,273	61,636	0
2006	92,918	69,521	23,397	30,138	62,762	18
Idaho						
2005	112,254	54,460	57,794	13,321	46,231	52,702
2006	113,778	69,648	44,130	12,307	47,614	53,857
Utah						
2005	40,706	26,616	14,090	6,140	33,966	600
2006	40,535	28,906	11,629	3,900	36,601	34
California						
2005	24,191	21,439	2,752	2,342	19,349	2,500
2006	19,389	16,231	3,158	4,187	11,422	3,780
Nevada						
2005	28,427	15,190	13,237	10,391	16,272	1,764
2006	35,465	9,655	25,810	15,242	15,014	5,209
Colorado						
2005	20,417	13,616	6,801	6,950	13,012	455
2006	17,870	10,132	7,738	4,906	12,774	190
New Mexico						
2005	48,107	3,397	44,710	21,297	7,704	19,106
2006	53,329	4,390	48,939	11,682	5,643	36,004
Montana						
2005	10,867	6,124	4,743	4,577	5,340	950
2006	12,446	7,530	4,916	5,910	6,426	110

State office	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Arizona						
2005	35,424	17,078	18,346	17,297	4,391	13,736
2006	19,557	7,424	12,133	5,845	3,625	10,087
Wyoming						
2005	30,839	1,976	28,863	19,885	3,004	7,950
2006	18,662	4,507	14,155	9,816	3,789	5,057
Alaska						
2005	45,707	21,847	23,860	45,080	627	0
2006	3,963	2,988	975	3,510	453	0
Eastern states						
2005	320	40	280	0	320	0
2006	0	0	0	0	0	0
Total						
2005	**506,168**	**253,001**	**253,167**	**194,553**	**211,852**	**99,763**
2006	**427,912**	**230,932**	**196,980**	**107,443**	**206,123**	**114,346**

Source: GAO analysis of Interior data.

[a]"Other" category includes treatments such as herbicides and grazing.

Table 17 summarizes 2005 and 2006 fuel treatment information for the BIA regions. The Northwest and Western regions treated the most acres in 2005, with each region treating more than 38,000 acres. In 2006, the Northwest and Southwest regions treated the most acres, with each region treating more than 45,000 acres. The agency treated more acres in non-WUI areas than in WUI areas in 2005 and 2006.

Table 17: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for BIA Regions

Region	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Northwest						
2005	38,284	17,297	20,987	15,589	21,488	1,207
2006	48,733	25,354	23,379	14,687	32,590	1,456
Southwest						
2005	28,212	11,839	16,373	2,678	24,433	1,101
2006	45,132	20,558	24,574	8,096	36,049	987
Western						
2005	38,753	16,210	22,543	13,813	24,880	60
2006	22,167	10,360	11,807	7,892	14,275	0
Pacific						
2005	2,584	1,817	767	180	2,404	0
2006	4,431	3,179	1,252	331	4,100	0
Great Plains						
2005	14,386	6,986	7,400	7,595	6,591	200
2006	13,234	4,828	8,406	6,217	6,508	509
Alaska						
2005	1,253	1,253	0	167	1,086	0
2006	2,222	1,497	725	563	1,659	0
Midwest						
2005	21,356	6,478	14,878	17,792	3,564	0
2006	18,559	16,401	2,158	15,585	2,974	0
Rocky Mountain						
2005	11,347	2,856	8,491	6,616	4,731	0
2006	7,400	3,634	3,766	4,177	3,223	0
Navajo						
2005	14,274	956	13,318	13,318	956	0
2006	11,065	470	10,595	10,595	470	0
Southern Plains						
2005	12,322	434	11,888	8,401	3,921	0
2006	8,796	672	8,124	4,770	3,833	193
Eastern						
2005	7,788	5,616	2,172	7,718	70	0
2006	4,607	2,547	2,060	4,099	508	0

Region	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Eastern Oklahoma						
2005	3,058	241	2,817	3,014	44	0
2006	1,307	461	846	1,292	15	0
Total						
2005	**193,617**	**71,983**	**121,634**	**96,881**	**94,168**	**2,568**
2006	**187,653**	**89,961**	**97,692**	**78,304**	**106,204**	**3,145**

Source: GAO analysis of Interior data.

[a]"Other" category includes treatments such as herbicides and grazing.

Table 18 summarizes 2005 and 2006 fuel treatment information for the NPS regions. In 2005 and 2006, the Southeast region treated the most acres, followed by the Intermountain region. NPS treated more acres in non-WUI areas than the WUI, and treated the vast majority of acres (more than 90 percent in 2005 and about 88 percent in 2006) using prescribed fire.

Table 18: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for NPS Regions

Region	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Pacific West						
2005	25,949	9,432	16,517	18,922	5,681	1,346
2006	22,433	9,042	13,391	16,220	4,101	2,112
Intermountain						
2005	43,823	28,585	15,238	38,874	4,844	105
2006	25,350	14,447	10,903	19,397	5,727	226
Southeast						
2005	63,602	17,963	45,639	62,491	1,081	30
2006	45,471	9,413	36,058	44,641	830	0
Midwest						
2005	20,082	2,433	17,649	18,971	1,111	0
2006	22,872	5,432	17,440	22,150	722	0
Northeast						
2005	453	417	36	188	265	0
2006	486	224	262	348	138	0
Alaska						
2005	29	9	20	0	29	0
2006	23	0	23	9	14	0
National Capital						
2005	34	34	0	9	25	0
2006	0	0	0	0	0	0
Total						
2005	**153,972**	**58,873**	**95,099**	**139,455**	**13,036**	**1,481**
2006	**116,635**	**38,558**	**78,077**	**102,765**	**11,532**	**2,338**

Source: GAO analysis of Interior data.

[a]"Other" category includes treatments such as herbicides and grazing.

Table 19 summarizes 2005 and 2006 fuel treatment information for the FWS regions. In both years, the Southeast region treated substantially more acres than the other regions—about 35 percent of total acres treated in 2005 and about 30 percent in 2006—followed by the Southwest and Great Lakes-Big Rivers regions. Like NPS, FWS treated most acres outside of the WUI, and treated the vast majority of acres (about 94 percent in 2005 and about 89 percent in 2006) using prescribed fire.

Table 19: Summary of Fiscal Years 2005 and 2006 Fuel Reduction Accomplishments for FWS Regions

Region	Treated acres	WUI acres	Non-WUI acres	Acres treated using prescribed fire	Acres treated using mechanical means	Acres treated using other means[a]
Southeast						
2005	144,902	83,218	61,684	141,616	3,202	84
2006	114,212	75,024	39,188	106,864	7,348	0
Great Lakes-Big Rivers						
2005	73,550	27,719	45,831	70,880	2,204	466
2006	70,756	27,499	43,257	68,854	1,548	354
Mountain-Prairie						
2005	42,252	7,994	34,258	42,032	220	0
2006	39,095	10,100	28,995	38,862	233	0
Southwest						
2005	76,495	21,786	54,709	71,820	4,424	251
2006	56,607	17,036	39,571	54,792	1,800	15
Pacific						
2005	13,865	6,039	7,826	7,703	6,063	99
2006	23,996	15,704	8,292	11,225	11,683	1,088
Northeast						
2005	18,596	6,609	11,987	13,166	2,104	3,326
2006	16,515	8,791	7,724	13,007	1,794	1,714
California-Nevada[b]						
2005	45,216	4,595	40,621	42,176	3,040	0
2006	43,023	18,864	24,159	29,771	7,646	5,606
Alaska						
2005	770	751	19	293	477	0
2006	9,729	95	9,634	9,663	66	0
Total						
2005	**415,646**	**158,711**	**256,935**	**389,686**	**21,734**	**4,226**
2006	**373,933**	**173,113**	**200,820**	**333,038**	**32,118**	**8,777**

Source: GAO analysis of Interior data.

[a]"Other" category includes treatments such as herbicides and grazing.

[b]While FWS has only seven regions, it has an eighth office—the California-Nevada Operations office—that, although technically part of the Pacific region, manages its own fuel reduction program.

Appendix IV: Comments from the Department of the Interior and the Forest Service

WASHINGTON

THE DEPARTMENT OF AGRICULTURE

THE DEPARTMENT OF THE INTERIOR

September 21, 2007

Robin M. Nazzaro, Director
Natural Resources and Environment
U.S. Government Accountability Office
441 G. Street N.W.
Washington, DC 20548

Dear Ms. Nazzaro:

We appreciate the opportunity to review and comment on the draft Government Accountability Office (GAO) report, GAO-07-1168, "Wildland Fire Management: Better Information and a Systematic Process Could Improve Agencies' Approach to Allocating Fuel Reduction Funds and Selecting Projects." The Forest Service and the Department of the Interior generally agree with the findings of this report and believe that it provides an accurate, balanced assessment of the complex set of issues involved in setting priorities and allocating funds at all levels of our organizations.

We also agree with the GAO's findings related to the agencies' efforts to improve hazardous fuels project selection and fund allocation. The agencies are working together to develop and implement risk informed hazardous fuels fund allocation processes that address consistent criteria, but recognize the different legislated missions of each agency. The Forest Service allocates a portion of its fuel reduction funds according to congressional direction, which has an inevitable effect on regional allocations, regardless of consistency with criteria. As GAO has suggested, these processes are based not only on output from a systematic model, but other relevant information necessary to fully inform decision makers.

The Forest Service and the Department of the Interior recognize the importance of collaboration and would like the GAO report to prominently recognize the importance of including state, tribal, and local concerns in the prioritization process. We have been and continue to work on recommendations in the report.

We look forward to working with GAO on future reviews. If you have any additional questions or concerns, please contact Sandy T. Coleman, Forest Service Assistant Director for GAO/OIG Audit Liaison Staff, at 703-605-4699, or Deborah Williams, DOI/GAO Liaison at 202-208-3963.

Mark Rey
Under Secretary
Natural Resources and the Environment
U.S. Department of Agriculture

James E. Cason
Associate Deputy Secretary
U.S. Department of the Interior

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Robin Nazzaro, (202) 512-3841 or nazzaror@gao.gov

Staff Acknowledgments

In addition to the individual named above, Steve Gaty, Assistant Director; Christy Feehan; Rich Johnson; Ches Joy; Amanda Miller; John Mingus; Lesley Rinner; and Carol Shulman made key contributions to this report. Elizabeth Curda, Mehrzad Nadji, Jackie Nowicki, and Jena Sinkfield also made important contributions to the report.

Related GAO Products

Wildland Fire Management: A Cohesive Strategy and Clear Cost-Containment Goals Are Needed for Federal Agencies to Manage Wildland Fire Activities Effectively. GAO-07-1017T. Washington, D.C.: June 19, 2007.

Wildland Fire Management: Lack of a Cohesive Strategy Hinders Agencies' Cost-Containment Efforts. GAO-07-427T. Washington, D.C.: January 30, 2007.

Wildland Fire Management: Update on Federal Agency Efforts to Develop a Cohesive Strategy to Address Wildland Fire Threats. GAO-06-671R. Washington, D.C.: May 1, 2006.

Wildland Fire Management: Timely Identification of Long-Term Options and Funding Needs Is Critical. GAO-05-923T. Washington, D.C.: July 14, 2005.

Wildland Fire Management: Forest Service and Interior Need to Specify Steps and a Schedule for Identifying Long-Term Options and Their Costs. GAO-05-353T. Washington, D.C.: February 17, 2005.

Wildland Fire Management: Important Progress Has Been Made, but Challenges Remain to Completing a Cohesive Strategy. GAO-05-147. Washington, D.C.: January 14, 2005.

Wildland Fires: Forest Service and BLM Need Better Information and a Systematic Approach for Assessing the Risks of Environmental Effects. GAO-04-705. Washington, D.C.: June 24, 2004.

Wildland Fire Management: Additional Actions Required to Better Identify and Prioritize Lands Needing Fuels Reduction. GAO-03-805. Washington, D.C.: August 15, 2003.

Wildland Fire Management: Reducing the Threat of Wildland Fires Requires Sustained and Coordinated Effort. GAO-02-843T. Washington, D.C.: June 13, 2002.

Severe Wildland Fires: Leadership and Accountability Needed to Reduce Risks to Communities and Resources. GAO-02-259. Washington, D.C.: January 31, 2002.

The National Fire Plan: Federal Agencies Are Not Organized to Effectively and Efficiently Implement the Plan. GAO-01-1022T. Washington, D.C.: July 31, 2001.

Reducing Wildfire Threats: Funds Should Be Targeted to the Highest Risk Areas. GAO/T-RCED-00-296. Washington, D.C.: September 13, 2000.

Western National Forests: A Cohesive Strategy Is Needed to Address Catastrophic Wildfire Threats. GAO/RCED-99-65. Washington, D.C.: April 2, 1999.

Western National Forests: Catastrophic Wildfires Threaten Resources and Communities. GAO/T-RCED-98-273. Washington, D.C.: September 28, 1998.

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