

GAO

Report to the Chairman, Committee on
Energy and Natural Resources,
U.S. Senate

November 2008

WILDLAND FIRE MANAGEMENT

Interagency Budget Tool Needs Further Development to Fully Meet Key Objectives



GAO

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Highlights of [GAO-09-68](#), a report to the Chairman, Committee on Energy and Natural Resources, U.S. Senate

Why GAO Did This Study

Wildland fires have become increasingly damaging and costly. To deal with fire's threats, the five federal wildland fire agencies—the Forest Service in the Department of Agriculture and four agencies in the Department of the Interior (Interior)—rely on thousands of firefighters, fire engines, and other assets. To ensure acquisition of the best mix of these assets, the agencies in 2002 began developing a new interagency budget tool known as fire program analysis (FPA). FPA underwent major changes in 2006, raising questions about its ability to meet its original objectives. GAO was asked to examine (1) FPA's development to date, including the 2006 changes, and (2) the extent to which FPA will meet its objectives. To do so, GAO reviewed agency policies and FPA documentation and interviewed agency officials.

What GAO Recommends

GAO is recommending, among other things, that the agencies develop a strategic plan for the continued development of FPA and provide Congress with annual updates on (1) their progress in completing the steps outlined in that plan and (2) how they used FPA in developing their budgets. Interior disagreed with the need to develop a strategic plan. In response to Forest Service and Interior comments on GAO findings on FPA's cost-effectiveness approach, GAO's recommendation to develop a strategic plan was revised to provide more flexibility. The agencies generally concurred with the other recommendations.

To view the full product, including the scope and methodology, click on [GAO-09-68](#). For more information, contact Robin Nazzaro at (202) 512-3841 or nazzaror@gao.gov.

WILDLAND FIRE MANAGEMENT

Interagency Budget Tool Needs Further Development to Fully Meet Key Objectives

What GAO Found

FPA is both a computer model and a broader management system for developing the five agencies' wildland fire budget requests and allocating funds. FPA is intended to allow the agencies to analyze potential combinations of firefighting assets and potential strategies for reducing vegetation and fighting fires to determine the most cost-effective mix of assets and strategies. The agencies began developing FPA in 2002 and completed the first part of the model in October 2004. As the agencies began using FPA, however, agency officials raised concerns about its underlying science and the extent to which it met agency management and policy objectives. As a result, in 2006 the agencies conducted a review of FPA, which questioned FPA's basic modeling approach. The agencies made substantial changes to FPA after the review, some of which followed from the review's recommendations. For example, as recommended, the agencies established a new oversight body comprising senior agency leaders. The agencies also made fundamental changes to FPA's modeling approach for analyzing the firefighting assets needed to respond to fires, but these changes went beyond the review's recommendations and, despite FPA's importance and cost, the reasons for these changes were not fully documented. The agencies expected to complete the FPA model in November 2008—about a year later than initially estimated—and to begin using FPA's results in spring 2009 to develop their fiscal year 2011 budget requests, a delay of about 3 years from their initial goal of using FPA's preliminary results in 2006. FPA is expected to cost about \$54 million to develop.

Although it is not yet complete and GAO conducted only a limited review of its available components, FPA shows promise in achieving some of the key objectives originally established for it; nevertheless, the approach the agencies have taken hampers FPA from meeting other key objectives. Among the most important objectives, FPA will (1) provide a common framework for the five federal agencies to analyze firefighting assets and develop budget requests across agency jurisdictions, (2) analyze the most important fire management activities, and (3) recognize the presence of certain nonfederal firefighting assets that may be available to respond to fires on federal land. FPA falls short, however, with respect to other key objectives. First, FPA has limited ability to project the effects of different levels of vegetation reduction treatments and firefighting strategies over time, meaning that agency officials lack information that could help them analyze the long-term impact of changes in their approach to wildland fire management. Second, the modeling approach the agencies are taking cannot identify the most cost-effective mix and location of federal firefighting assets for a given budget but, rather, analyzes a limited number of combinations of assets and strategies to identify the most cost-effective among them. More broadly, the current FPA approach involves considerable discretion on the part of agency officials, increasing the importance of making decisions in a transparent manner so that Congress, the public, and officials throughout the agencies understand FPA's role in budget development and allocation.

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Abbreviations

Agriculture	Department of Agriculture
FPA	fire program analysis
Interior	Department of the Interior
OMB	Office of Management and Budget

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United States Government Accountability Office
Washington, DC 20548

November 24, 2008

The Honorable Jeff Bingaman
Chairman
Committee on Energy and Natural Resources
United States Senate

Dear Mr. Chairman:

Wildland fires increasingly threaten communities and natural resources, and the cost of responding to those fires has risen dramatically. To deal with fire's threats, the five federal agencies responsible for managing wildland fires—the Forest Service in the Department of Agriculture (Agriculture) and the Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and National Park Service in the Department of the Interior (Interior)—call upon thousands of firefighters and station fire engines, aircraft, and other equipment on or near federal land across the country. The agencies also conduct treatments to reduce vegetation, in an effort to lessen the potential for severe wildland fires, decrease the damage caused by fires, and restore and maintain healthy ecosystems. Despite these efforts, the average number of acres burned annually in recent years has grown by about 70 percent, and federal appropriations to prepare for and respond to wildland fires have nearly tripled since the mid-1990s, to more than \$3 billion annually. Several factors have contributed to the increased risk and cost, including (1) uncharacteristic accumulations of vegetation, in part due to past land management activities and fire suppression policies; (2) increasing human development in or near wildlands, an area commonly known as the wildland-urban interface; and (3) severe drought and other stresses, in part due to climate change. Combined, these factors have contributed to wildland fires' burning more intensely and spreading more quickly at the same time that development has continued in fire-prone areas. Long-standing concerns about the mounting risk from and cost of wildland fires, along with growing recognition of the long-term fiscal challenges facing the nation, have led Congress, the agencies, and others to focus on ensuring that federal wildland fire activities are appropriate and carried out in a cost-effective and efficient manner.

A key initial step in this effort was the development of the 1995 federal wildland fire management policy.¹ The policy recognized that new approaches to managing wildland fire were needed if the agencies were to respond effectively to changing conditions. The policy also found that differences in budgeting processes among the five agencies hindered their response to wildland fires. Subsequently, congressional committees directed the agencies to develop a common budget process. In 2001, the agencies commissioned a report that established a vision for an interagency budget process, a report the agencies adopted as the basis for a new budget-planning system known as fire program analysis, or FPA.²

As envisioned in the 2001 agency report, as well as in congressional committee and Office of Management and Budget (OMB) reports, FPA was intended to help the agencies develop their wildland fire budget requests and allocate funds. FPA's objectives include

- providing a common budget framework to analyze firefighting assets without regard for agency jurisdictions;
- examining the full scope of fire management activities, including preparing for fires by acquiring and positioning firefighting assets for the fire season, mobilizing assets to suppress fires, and reducing potentially hazardous fuels;
- considering the availability of nonfederal firefighting assets, such as state or county firefighters, that typically help respond to fires on federal lands;
- considering the communities and resources to be protected and agency land management objectives;
- modeling the effects over time of differing strategies for responding to wildland fires and treating lands to reduce hazardous fuels; and

¹Departments of Agriculture and the Interior, *Federal Wildland Fire Management Policy and Program Review* (Washington, D.C., December 1995). This policy was subsequently reaffirmed and updated in 2001: Departments of the Interior, Agriculture, Energy, Defense, and Commerce; Environmental Protection Agency; Federal Emergency Management Agency; and National Association of State Foresters, *Review and Update of the 1995 Federal Wildland Fire Management Policy* (Washington, D.C., January 2001).

²Forest Service and Department of the Interior, *Developing an Interagency, Landscape-scale Fire Planning Analysis and Budget Tool* (Washington, D.C., November 2001).

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- using this information to identify the most cost-effective mix and location of federal wildland fire management assets.

In addition, FPA was expected to be externally peer reviewed, which could improve Congress's and the agencies' understanding of its strengths and weaknesses.

To realize this vision, the agencies in 2002 began to develop FPA, designing it as a computer model that analyzed numerous potential combinations and locations of firefighting assets and, for any given budget level, identified the optimal mix of these assets—that is, the mix and locations of firefighting assets that would best protect resources at risk. Data on potential combinations and locations of assets were to be entered by fire officials at agency field units, and the model's analysis of these combinations would then be evaluated by agency budget officials at the national level. The agencies estimated that FPA would cost more than \$40 million to develop and would take about 5 years to complete. In 2006, after 4 years of work, the agencies conducted an internal review of FPA, in part because of concerns about how well the computer model reflected the realities of the agencies' fire management activities.³ Subsequently, the agencies made substantial changes in how FPA analyzes needed firefighting assets and determines where best to locate them. These changes raised questions about the extent to which FPA would meet its original objectives. In this context, you asked us to review FPA. This report examines (1) how the agencies have developed FPA to date, including the process followed as part of the internal review, and FPA's current status; and (2) the extent to which FPA will meet its original objectives.

To address our objectives, we reviewed agency documents on FPA development, including the interagency report and project charter that provide FPA's foundation, the reports resulting from the internal review, and numerous technical papers and other documentation describing particular aspects of FPA. To further our understanding of FPA's development, including changes made to FPA after the internal review, we interviewed Forest Service and Interior officials in Washington, D.C.; FPA project staff in Boise, Idaho; and agency officials in the field who were familiar with FPA. We also interviewed agency and other scientists who

³Departments of Agriculture and the Interior, *Fire Program Analysis: Scientific Review Team Report* (Washington, D.C., January 2006); and *Management Review Team Report of the Fire Program Analysis (FPA) Preparedness Module* (Washington, D.C., March 2006).

have helped develop FPA. At the time of our review, however, substantial portions of the model remained incomplete, and the agencies had not documented the model sufficiently to allow a comprehensive evaluation. We therefore limited our review to a broad examination of FPA's various components and how they interact, as well as a comparison of FPA's current approach and capabilities with its original objectives. We did not compare the capabilities of the current approach to those of the approach taken before the internal review. Appendix I describes our scope and methodology in more detail. We conducted this performance audit from September 2007 through November 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Results in Brief

The Forest Service's and Interior agencies' initial development and implementation of FPA gave rise to concerns about its performance, leading to an internal review and subsequent changes to the model. These changes, however, went beyond the review's recommendations and were not always clearly explained or fully documented. The agencies began developing FPA in 2002 and completed the first part of the model in October 2004. But as field units began to use the first part, senior agency officials and some field staff raised fundamental concerns—including concerns about the underlying science and the extent to which FPA met agency management and policy objectives. As a result, in 2006 the agencies conducted an internal review of FPA, which questioned its modeling approach and concluded, among other things, that agency leadership needed to become more involved if FPA were to succeed. The agencies made substantial changes to FPA after the review, some of which followed from the review's recommendations. For example, the agencies established a new oversight body comprising senior agency leaders and an interagency science team. The agencies, with the approval of the oversight body, also made fundamental changes to FPA's modeling approach for analyzing the firefighting assets needed to respond to fires, but these changes went beyond the review's recommendations. The review, for example, did not conclude that a different modeling approach was needed, instead recommending that the agencies continue testing the initial model and refine it as necessary. Rather than follow this recommendation, however, the agencies adopted an entirely new modeling approach. Yet despite FPA's importance and cost, the reasons for these changes were not

fully documented, and a formal, documented comparison of the original and revised approaches was never conducted. The agencies expected to complete the FPA model in November 2008—about a year later than initially estimated—and to begin using FPA’s results in spring 2009 to develop their fiscal year 2011 budget requests, a delay of about 3 years from their initial goal of using FPA’s preliminary results in 2006. Ultimately, FPA is expected to cost about \$54 million to develop.

Although it is not yet complete and we conducted only a limited review of its available components, FPA shows promise in achieving some of the key objectives that congressional committees, OMB, and the agencies themselves established for it. Nevertheless, the approach the agencies have taken hampers FPA from meeting other key objectives. Once FPA is more fully developed and documented, a detailed, external peer review may reveal more about the extent to which it will help the agencies develop their wildland fire budget requests and allocate funds. Among the most important objectives it is likely to achieve, FPA is to provide a common framework for the five federal agencies to develop their wildland fire budget requests and analyze needed firefighting assets across agency jurisdictions—a significant step forward—and is to analyze the three most important fire management activities (preparedness, fire suppression, and fuel reduction). The agencies also have developed FPA to be capable of recognizing the presence of nonfederal firefighting assets that may be available to respond to fires on federal land—another key objective—although the extent to which these assets is to be included in the analysis is not yet clear. And finally, FPA is also to consider specific land management objectives and resources at risk, as suggested by the 1995 federal wildland fire management policy, rather than simply assume that all fires should be suppressed as quickly as possible (although if implemented as currently developed, FPA will likely not allow the agencies to consistently identify the locations that are most important to protect from a national perspective). FPA falls short, however, with respect to other key objectives in two critical areas. First, FPA’s ability to project the effects of different levels of fuel reduction treatments and firefighting strategies over time appears limited. Agency officials are therefore likely to lack information that would help them analyze the extent to which increasing or decreasing funding for fuel reduction treatments and responding more or less aggressively to fires in the short term could affect the expected cost of responding to wildland fires over the long term. Second, regardless of the extent to which other key objectives are met, the modeling approach the agencies have taken is unlikely to identify the most cost-effective mix and location of federal firefighting assets for a given budget but only whether a particular mix of

assets is more or less cost-effective than another. Since the different mixes of assets analyzed are limited to the number of alternatives developed by agency units in the field, these alternatives, even taken together, are unlikely to include the single most cost-effective mix of assets nationwide. In addition, other aspects of FPA may complicate its further development and implementation, including the lack of an external peer review of the model to date. Agency officials recognize many of these shortcomings and have said that they are considering taking actions—such as further adjusting the model (to better identify the most highly valued resources to protect, for example) and submitting the model for peer review—that have the potential to move FPA closer to meeting its key objectives. Regardless of the specific objectives FPA achieves, the modeling approach the agencies selected for FPA involves considerable discretion on the part of agency decision makers, increasing the importance of making decisions in a manner transparent enough that Congress, the public, and officials throughout the agencies understand how the decisions were made and FPA’s role in them.

To improve the agencies’ ability to use FPA in developing their wildland fire management budget requests and allocating funds in a cost-effective manner and to promote transparency in decision making—and recognizing that FPA is still under development and that completing it will be an iterative process requiring the agencies’ continued effort to improve—we are recommending that the Secretaries of Agriculture and the Interior (1) direct the agencies to develop a strategic plan for the continued development of FPA, (2) report annually to Congress on their progress in completing the steps outlined in this plan and on FPA’s ability to meet each of its key original objectives, (3) report to Congress each year on how the agencies used FPA to develop their budget requests and allocate funds, and (4) submit the model for external peer review.

In written comments on a draft of this report, the Forest Service and Interior disagreed with our finding that FPA is unlikely to allow the agencies to identify the most cost-effective mix of firefighting assets, stating they believed that FPA will allow them to meet the goal of cost-effectiveness. They also commented that the revised approach they are taking in developing FPA is more realistic and appropriate than their original approach. We continue to believe, however, that, regardless of the comparative strengths and weaknesses of the original and revised approaches, FPA as it is being developed is unlikely to allow the agencies to identify the most cost-effective location and mix of assets and strategies—one of the agencies’ original objectives for FPA. To account for the agencies’ views that the revised approach is more realistic, we are

modifying our recommendation that the agencies develop a strategic plan for the continued development of FPA, adding that the agencies should clearly state whether they believe any of FPA's key original objectives are no longer appropriate. The Forest Service commented that it fundamentally agreed with our recommendations but believes there are better alternative approaches to carrying some of them out. The agency described the steps it intended to take in addressing two of them, but we do not believe that the steps outlined in the letter are specific and transparent enough to meet the intent of our recommendations. Interior concurred with three of our recommendations but disagreed with our recommendation that the agencies develop a strategic plan for the continued development of FPA, stating that developing such a plan would delay deployment and increase the cost of FPA. We do not agree that creating a strategic plan would necessarily delay the agencies' implementation of FPA; further, because our review raised questions about FPA's ability to meet certain key objectives, we continue to believe it is important for the agencies to create a strategic plan that directly and transparently evaluates FPA's ability to meet its original objectives and identifies ways to improve FPA to better meet those objectives. Comments from the Forest Service and Interior, along with our responses to those comments, are reprinted in appendixes II and III, respectively.

Background

The agencies' wildland fire management program has three major components: preparedness, suppression, and fuel reduction.⁴ To prepare for a wildland fire season, the agencies acquire firefighting assets—including firefighters, engines, aircraft, and other equipment—and station them either at individual land management units (such as national forests or national parks) or at centralized dispatch locations. The primary purpose of these assets is to respond to fires before they become large—a response referred to as initial attack—thus forestalling threats to communities and natural and cultural resources. The speed with which the agencies are able to respond to a fire can be critical to their ability to suppress it while it is small; increasing the number of firefighting assets available to respond, and the number of locations they can respond from, can therefore improve the agencies' initial attack success, although the marginal utility of adding more firefighting assets decreases as the number

⁴Together, preparedness, suppression, and fuel reduction make up approximately 80 percent of the agencies' wildland fire management budgets. Other federal wildland fire program components include financial assistance to state foresters for fire management activities, research and development, and rehabilitating burned federal lands.

of assets goes up. The assets the agencies use for initial attack are funded primarily from the agencies' preparedness budget accounts.

In the relatively rare instances in which fires escape initial attack and grow large, the agencies respond using an interagency system, in which additional firefighting assets from federal, state, and local agencies, as well as private contractors, are mobilized, regardless of which agency or agencies have jurisdiction over the burning lands.⁵ Federal agencies typically fund the costs of these activities from their suppression budget accounts. 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, the agencies also reduce potentially hazardous vegetation that can fuel fires. They remove or modify fuels using prescribed fire, mechanical thinning, herbicides, certain grazing methods, or combinations of these or other approaches.

The federal government's cost of preparing for and responding to wildland fires has increased substantially over the past decade—an increase that has led federal agencies to fundamentally reexamine their approach to wildland fire management. For decades, federal agencies aggressively suppressed wildland fires and generally succeeded in reducing the number of acres burned. In some parts of the country, however, rather than eliminating severe wildland fires, decades of suppression contributed to the disruption of ecological cycles and began to change the structure and composition of forests and rangelands, thereby making lands more susceptible to fire. Increasingly, the agencies have recognized the role that fire plays in many ecosystems and the role that it could play in the agencies' management of forests and watersheds. As a result, the agencies have increased their efforts to reduce fuels and their emphasis on using less aggressive firefighting strategies, which typically cost less and can reduce fuels across a broader area than if fires are aggressively suppressed. Such strategies are to be used only in appropriate situations, such as in responding to fires that are not expected to threaten communities or damage important natural or cultural resources.

This approach to managing wildland fires requires close integration of planning and budgeting systems so that the agencies are able to

⁵Federal and nonfederal agencies have established a framework to share the costs of responding to fires that threaten both federal and nonfederal resources. See GAO, *Wildland Fire Suppression: Lack of Clear Guidance Raises Concerns about Cost Sharing between Federal and Nonfederal Entities*, [GAO-06-570](#) (Washington, D.C.: May 30, 2006).

holistically analyze the full wildland fire management program. The agencies historically have used different planning and budgeting systems to help develop their budget requests and allocate the funds Congress appropriates. The agencies have identified shortcomings with this approach and have recognized that the existing systems were not capable of analyzing the trade-offs among initial attack, the full range of suppression strategies, and fuel reduction. Aggressively suppressing a fire, for example, may cost less in the short term but contribute to continued accumulation of vegetation, which can increase both the risk from and cost of responding to fires in the future; conversely, increasing investment in reducing fuels may cost more in the short term but can provide future benefits. The agencies, following congressional committee direction, committed to developing a new system, which came to be known as FPA. FPA is a strategic tool that agency budget officials expect to use to develop their wildland fire budget requests and allocate their fire management funds to the field, and that agency fire officials expect to use to model the effect that differing mixes and locations of firefighting assets, and differing levels of investment in reducing fuels, will have on their ability to protect communities and resources. Because it is a strategic tool rather than a tactical one, agency fire managers would not use FPA to help the agencies respond to actual fires.

In developing and using FPA, the agencies must consider the process and time frames of the annual federal budget cycle, which begins about 2 years before the fiscal year for which funds are being requested. Agencies develop their budget requests in late spring and summer and submit them to OMB in September. OMB prepares budget materials to submit to the President in January. The President approves a budget proposal and sends it to Congress by the first Monday in February. To develop their fiscal year 2011 budgets, for example, the agencies, in conjunction with their respective departments, expect to begin developing their budget requests in spring 2009 and to submit them to OMB in September 2009; subsequently, the President would submit his budget request to Congress in February 2010 for Congress's consideration.

Concerns about FPA's Early Performance Led to Significant Changes, Not All of Which Were Transparent

Concerns about FPA's early performance and about the policy and scientific approaches the agencies used in FPA's early development led the agencies to conduct an internal review of FPA in 2006. Subsequently, the agencies made several significant changes to FPA, but these changes went beyond those recommended by the review, and the reasons for several of the changes were not fully documented. The agencies do not expect to use preliminary FPA results to develop their budget requests until 2009—3 years later than they had initially planned—but the cost of completing FPA appears in line with previous estimates.

Concerns During FPA's Initial Implementation Led to an Internal Review

The staff who began to develop FPA in 2002, following congressional committee direction, initially focused on developing the portion of the model that analyzed the agencies' ability to successfully contain wildland fires during initial attack. The staff selected an approach that relied primarily on a modeling technique known as optimization. Using this approach, FPA was to analyze, for any given budget level, all possible combinations and locations of the firefighting assets typically available to agency field units and identify the combination of these assets that resulted in optimal protection of communities and resources. To provide data on different potential firefighting assets and locations, the agencies divided the country into 139 interagency "fire planning units," each of which encompassed land managed by one or more of the federal agencies responsible for wildland fire.⁶ Fire management officials in each of these planning units then identified the relative importance of protecting each acre within that planning unit by assigning a weighting factor indicating each acre's importance relative to other acres. The most important acres to protect, such as those in the wildland-urban interface, were assigned a weight of 1.0, while less important acres were assigned proportionately lower weights. After analyzing historic fire occurrence and weather patterns associated with each planning unit to determine where and when fires were likely to start, and considering the relative importance of acres to be protected, FPA was to analyze, for any given budget level, all possible mixes and locations of firefighting assets typically available to those units in order to determine which mix and locations would afford the best level of protection.

⁶The number of planning units established by the agencies has fluctuated over the course of FPA development. In this report, we refer to the 139 planning units in existence at the time our review ended but recognize that the actual number at any particular time may differ.

Development of this “preparedness module” was completed in October 2004, and over the next 16 months, officials in the field began using it to analyze their preparedness assets and budgets. By February 2006, nearly all the fire planning units had submitted FPA results for their units to the agencies’ Washington offices, which in turn analyzed the FPA results in an effort to identify the optimal mix and location of firefighting assets across the country. During this time, however, senior agency officials, as well as some field officials, began to raise fundamental concerns about FPA’s modeling approach. Weighting the importance of individual acres within a fire planning unit, for example, was a central component of FPA’s early approach, and some officials believed that even where resources to be protected were similar across planning units, officials in those units assigned substantially different weights to the resources, thereby undermining the reliability of the results. Other officials were concerned that the early FPA approach placed insufficient emphasis on containing fires during initial attack, although the officials who developed this approach noted that it reflected the interagency policy of responding to fires on the basis of specific land and fire management objectives, rather than simply assuming that all fires should be suppressed as quickly as possible. Still other officials were concerned that the initial approach could result in unrealistic shifts in the mix and location of assets; a small change in budget, for example, could have led FPA to suggest moving a large quantity of assets from one planning unit to another or to dramatically change the relative proportion of firefighters, engines, and aircraft within a planning unit.

Despite these concerns, senior agency officials told us, the early development of FPA represented an important first effort, given the difficulty of the project; in hindsight, they also recognized that greater involvement by policy and budget officials and agency scientists might well have averted some of the concerns and helped FPA develop more quickly. In any case, despite having told congressional and OMB staff that they intended to use the results of this initial analysis to help develop their 2008 budget requests, agency officials decided that the concerns about FPA were too great to justify doing so, and they instead initiated a two-part review of FPA to evaluate the issues that had surfaced.

The agencies conducted this two-part review of FPA in late 2005 and early 2006. The reviews—performed by agency land managers, fire and budget officials, and scientists, as well as a representative from a state forestry agency—consisted of (1) an evaluation of the extent to which FPA helped the agencies achieve their management and policy objectives and (2) an evaluation of particular aspects of the underlying science and modeling

approach. The reviews reaffirmed FPA's original objectives as articulated in the 2001 report, but they identified several challenges to meeting these objectives and made several recommendations intended to strengthen FPA's ability to do so. The management review, for example, recommended that the agencies more fully involve senior officials and scientists, submit FPA for external peer review,⁷ and complete their analysis of the initial FPA results. The science review likewise recommended that FPA be peer-reviewed and, in addition, that the agencies further test and improve the model and the data it uses. The agencies conducted the reviews quickly, however, and did not intend them to be a comprehensive evaluation of FPA; the science review, in particular, examined only certain aspects of FPA.

The Agencies Made Significant Changes to FPA, Not All of Which Were Fully Documented

After the reviews, the agencies made several changes to the process used for developing FPA, changes that generally followed from the reviews' recommendations. In April 2006, the agencies established a new oversight body comprising senior officials from the Forest Service and Interior. This group was formed to make strategic decisions about FPA's scope, determine how FPA would be used to help the agencies make funding allocation decisions, and address any policy issues that FPA's development raised. The group also was to keep the Wildland Fire Leadership Council⁸ informed of FPA's status, including issues that the council needed to resolve. The agencies also established an interagency science team, made up of scientists from both the Forest Service and Interior, as well as university scientists outside the agencies. This science team was to assist FPA's developers by reviewing and evaluating FPA's modeling approach and identifying data sources and analytical techniques that could further FPA's development.

The agencies also changed FPA's modeling approach considerably. Rather than continue to use the initial optimization-based approach (evaluating,

⁷Peer review is a process by which scientific research or technical projects are subject to an independent assessment by scientists not involved with the project who have knowledge and expertise comparable to that of the scientists whose work they review.

⁸The Wildland Fire Leadership Council consists of senior Agriculture and Interior officials, including the Agriculture Undersecretary for Natural Resources and Environment; the Interior Assistant Secretary for Policy, Management, and Budget; and the heads of the five federal firefighting agencies. Other members include representatives of the Intertribal Timber Council, the National Association of State Foresters, and the Western Governors' Association, and a local fire department chief.

for a given budget level, all possible combinations and locations of firefighting assets typically available to local units and identifying the asset combination that provided optimal protection of communities and resources), the agencies switched to a simulation modeling approach that evaluates a much smaller number of potential asset combinations along with different options for fuel reduction treatments and ranks them according to certain performance criteria—which also differ from those used previously. The new approach is no longer to simply assess the extent to which each asset combination protects the areas field officials have identified as most important. Instead, it is to evaluate each combination’s predicted performance against five separate performance measures the agencies have established:

- total projected cost of suppressing fires;
- total number of acres burned in the wildland-urban interface;
- total number of acres meeting fire and fuels management objectives, such as reducing the likelihood of intense fires;
- total number of acres burned containing resources the agencies define as being highly valued, such as endangered species habitat or municipal watersheds; and
- percentage of fires contained while small (i.e., the initial attack success rate).⁹

The revised FPA approach encompasses both a computer model and a management system to help the agencies develop their budget requests and allocate funds. Agency officials in each of the 139 planning units are to develop, for each of a given number of budget levels, an option specifying the mix and location of firefighting assets they would choose to acquire and an option specifying the number of acres they would treat to reduce fuels. For example, officials might develop one mix and location of firefighting assets and the acreage that would be treated if their fire planning unit’s budget remained the same as the previous year, another

⁹The size threshold for fires to be considered contained while small is to vary according to criteria established by officials in each planning unit, considering the circumstances under which they typically consider a fire in their area “escaped” and then request additional firefighting assets to help suppress it. This measure also includes the number of fires the model predicts would be averted because of the agencies’ efforts to prevent human-caused fires.

option corresponding to a budget decrease from the previous year, and a third option corresponding to a budget increase from the previous year. The number of options the planning units are to develop and the budget levels to which these options correspond will depend on annual field guidance prepared by the agencies' headquarters offices. Senior agency officials told us that during FPA's initial implementation they were considering directing the units to develop three preparedness options and three fuel treatment options. These options were to correspond to each unit's 2007 budget level and plus and minus 10 percent of these 2007 levels. As of November 2008, however, the agencies had not finalized this step.

Once the planning units have developed their options and entered information about firefighting assets and fuel treatments into the FPA system, the computer model is to then analyze historical data on local fire occurrence; local vegetation, geography, and weather; and the predicted effect on fire behavior of reducing fuels. From this analysis, FPA is to model the likelihood that wildland fire will damage communities and resources within the fire planning unit, considering the different mixes of assets and fuel treatments reflected in the proposed options. To provide comparable information across planning units, FPA is to evaluate each unit's options against the five performance measures.

The FPA model is to then calculate a performance score for each of the "alternatives" developed by each planning unit. (An alternative consists of one preparedness option paired with one fuel treatment option. If planning units were directed to prepare three preparedness and three fuel treatment options, for example, nine alternatives would be possible.) FPA is to then "roll up" the performance scores for each alternative in all 139 planning units, so that senior agency officials can evaluate the effects on the agencies' performance measures nationwide of different combinations of alternatives. The senior agency officials would then use FPA results in conjunction with other budget information and processes to develop their budget requests.

The extent to which any particular alternative, or set of alternatives, is considered cost-effective relies on the weights assigned to each of the five measures. The agencies could weight these measures in several ways to reflect their relative importance. If one measure were overwhelmingly more important than the others—if the agencies wanted to minimize suppression costs regardless of any other outcome, for example—the agencies could select a mix of firefighting assets and fuel reduction options predicted to maximize their ability to achieve that measure and consider the other measures only to help them choose between different

mixes with similar outcomes for the most important measure. The agencies could also group two or more measures as more important than the others, or they could identify desired target levels for each measure and select the mix of firefighting assets projected to come closest to these targets. Senior officials will be able to use FPA to explore the modeled effects of weighting the measures differently—in effect, to evaluate the trade-offs associated with weighting any particular measure more heavily than the others—as well as to identify alternatives with high performance scores regardless of the weights ultimately selected.

The agencies will also need to determine whether the relative importance of the five measures is the same across different geographic regions of the country. Some officials and scientists involved with developing FPA have questioned whether applying a single weighting system across the country would accurately reflect national priorities or whether it is appropriate to emphasize different measures in different locations. For example, protecting the wildland-urban interface might be the most important consideration in some parts of the country, but reducing the likelihood of intense fires or protecting endangered species habitat might be more important elsewhere. FPA officials said that the model could perform this type of analysis, and agency budget officials said they would consider different approaches to weighting the measures once FPA was completed and the field units had submitted their different combinations of firefighting assets for analysis.

The leaders of FPA's science team told us that this new approach addressed specific concerns they had with the old approach. First, they said that using multiple measures to evaluate different mixes and locations of firefighting assets—rather than a single measure as in the old approach—better reflected the complexity of wildland fire management. Second, they said that the new approach is to analyze many more potential fire scenarios, thus evaluating the asset alternatives' predicted performance across a broader range of conditions than in the old approach.¹⁰ Third, they said that because the old approach relied on weighting the relative importance of acres, they were concerned that different units would weight similar resources differently, thus preventing meaningful comparisons among units, or that some units might

¹⁰The program staff who helped develop the old approach told us that they had recognized the small number of potential fire scenarios in that approach limited its capabilities and that they were considering how to improve it, but the agencies determined that a new modeling approach was needed before they could make improvements.

intentionally inflate the weights in an effort to gain advantage. Fourth, they said that because the new approach is to rely on alternatives developed by officials in the field, it can identify possible mixes and locations of assets that are likely to be more easily implemented than those identified through the old approach, which considered all possible combinations of assets typically available to local units and could suggest changes that might be unrealistic. Finally, they said that because the new approach allows field officials to identify the firefighting assets they would typically dispatch to fires burning in specific areas under certain conditions, it more closely follows how the agencies actually respond to fires.

The changes to FPA's modeling approach, however, were not among the recommendations stemming from the science review, which recommended that the agencies further test the initial model and improve it. But such testing and improvement of the initial model did not take place. The leaders of the science team told us that refining the initial model would not be useful, because the team had determined that the model was fundamentally flawed and a new approach was needed. Instead, the science team, in summer and fall 2006, developed five options for continuing to develop FPA and presented these options to the Wildland Fire Leadership Council, which selected one option in December 2006. This process was generally consistent with the management review, which recommended that an interagency science team examine the modeling approach FPA initially used.

Still, the agencies' rationale for making the changes to FPA's modeling approach was not fully documented, even though FPA is a major project whose outcome is expected to influence the allocation of billions of dollars. Although the science team's leaders told us they believed that the changes improved FPA, they provided no documents describing either the reasons for the changes or the process used to identify FPA's new approach. For example, a formal, documented comparison of the old and new approaches was never done; the science team's leaders told us they considered the relative strengths and weaknesses of the old approach and other possible approaches but did not document this consideration. In any event, each of the five development options the science team presented to the Wildland Fire Leadership Council included the same two fundamental changes in modeling approach. Without a formal, documented comparison of the old and new approaches, and without the opportunity to consider options that used other modeling approaches, the council lacked information that might have informed its choice.

FPA's Completion Has Been Delayed, but Costs Appear in Line with Previous Estimates

In addition, the changes apparently prevented the agencies from meeting their commitment to use preliminary FPA results beginning in 2006. Although FPA was not expected to be complete until late 2007, agency officials believed they would be able to make some use of its preliminary results in 2006. Accordingly, officials told congressional committee staff and OMB in early 2006 that the agencies would begin using FPA results that year to allocate their fiscal year 2007 funds and to develop their fiscal year 2008 budget requests.¹¹ Agency officials told us, however, that they subsequently decided not to use FPA's preliminary results because they did not believe it was prudent in light of the concerns that arose during the internal review. While it seems appropriate to delay using the model for budget decisions until concerns about its utility have been resolved, the agencies' position has been less than transparent; in August 2006—well after they realized that FPA would be undergoing substantial changes—they repeated their commitment to begin using FPA results in September of that year.

The agencies now expect that the FPA model will be completed in November 2008—about a year later than initially estimated—and that they will begin using FPA's results in 2009 to develop their 2011 budget requests, a delay of about 3 years from their initial goal of using preliminary results in 2006. When they began developing FPA in 2002, the agencies reported that FPA would be completed by the end of 2007. After the internal review, the agencies reported that a fully functional FPA system would be developed by June 30, 2008, and used in spring 2009 to inform the agencies' fiscal year 2011 budget requests. In spring 2008, the agencies repeated their commitment to this time frame. Agency officials attribute the delay in completing FPA to the project's complexity. When our review ended, agency officials said they expected fire planning units to begin using FPA in late 2008; about half the field units are expected to complete their alternatives by February 2009, with the remaining units completing their alternatives by June 2009. Meeting this time frame, however, will require the agencies to complete both the model and the guidance directing the field on how to develop the options the FPA model will analyze—both of which have experienced recent delays. Nonetheless, the agencies' Washington offices remained committed to using FPA results beginning in 2009. Agency field officials, however, have worried that the

¹¹The agencies have provided brief updates on the status of FPA to Congress in their annual budget justifications, and have provided periodic briefings to congressional committee and OMB staff.

delay in completing FPA places an undue burden on the field by shortening the time available for planning units to develop their alternatives. Field officials also observed that senior agency officials have not clearly articulated how the results from FPA’s first year would be used, although senior agency officials have stated that 2009 is to be a “learning year” and that they do not expect FPA to influence substantial changes to funding allocations in the first year.

The expected cost for completing FPA has been little affected by the substantial changes it has undergone since 2006. FPA’s project development costs are expected to total about \$43.9 million, according to an April 2008 estimate by the senior project manager responsible for FPA’s budget.¹² This cost is generally in line with the agencies’ previous estimates, particularly those developed after the agencies began to determine FPA’s full scope (see table 1). Agency salaries and benefits, which were not included in yearly estimates of project development costs, represent an estimated \$9.7 million in additional costs—for a total of about \$53.6 million. According to the senior project manager, the agencies did not begin to develop FPA’s second phase until 2005 and were still determining the scope of that phase when they submitted projected cost estimates in 2003 and 2004. The increase from 2003 to 2005 in the estimated cost for the second phase therefore reflects the agencies’ better understanding FPA’s scope and not a cost overrun, the project manager said.¹³

Table 1: Agencies’ Cost Estimates for Developing FPA

Dollars in millions			
Year of cost estimate	Phase 1 (fiscal years 2002-2006)	Phase 2 (fiscal years 2005-2010)	Total (fiscal years 2002-2010)
2003	\$11.9	\$22.0	\$33.9
2004	12.2	30.0	42.2
2005	12.1	36.2	48.3
2006	11.6 ^a	31.2	42.8

¹²These figures include the cost of developing FPA and operating and maintaining it through fiscal year 2010.

¹³Similarly, the project manager said that the decrease in estimated cost for the second phase from 2005 to 2006 was also due to a better understanding of the project’s scope.

FPA Shows Promise in Achieving Some Objectives but Falls Short of Others, Although the Agencies Are Considering Changes That May Improve Its Performance

FPA Is to Provide the Foundation for an Interagency Framework for Analyzing Needed Firefighting Assets and Is to Examine Key Fire Management Program Activities and Objectives

Dollars in millions

Year of cost estimate	Phase 1 (fiscal years 2002-2006)	Phase 2 (fiscal years 2005-2010)	Total (fiscal years 2002-2010)
2007	11.6 ^a	32.3	43.9
2008	11.6 ^a	32.3	43.9

Source: GAO analysis of Forest Service data.

Note: Costs do not include salaries and benefits for all agency employees who worked on the FPA project. The senior project manager responsible for FPA's budget estimated these costs at \$9.7 million.

^aActual, not estimated; the agencies completed phase 1 of FPA in 2005 at a cost of \$11.6 million.

Although FPA is not yet complete and our review was limited, FPA shows promise in achieving some key objectives, including establishing a common, interagency budget framework that includes important wildland fire program activities. Nevertheless, FPA is unlikely to achieve all its key objectives, including the critical objectives of analyzing the effect over time of different funding allocation strategies and identifying the most cost-effective mix of firefighting assets. The agencies recognize that FPA will not fully meet all its key objectives in 2008 and are considering several changes that may improve its ability to meet certain objectives in the future. But because the modeling approach the agencies selected for FPA involves considerable discretion on the part of agency decision makers, transparency is particularly vital.

If implemented as currently developed, FPA will provide the foundation for a single framework for the five federal agencies to develop their budget requests and allocate funds, a key objective. It is also likely to help the agencies achieve another key objective by analyzing the most important wildland fire management activities. The agencies have developed FPA so that it can recognize the presence of nonfederal firefighting assets that may be available to respond to fires on federal land—a third key objective—although the extent to which these assets will be included in the analysis is not yet clear. And finally, FPA should help the agencies move toward a fourth key objective—responding to wildland fires in ways that meet specific land and fire management objectives, rather than simply assuming that all fires should be suppressed as quickly as possible—although its ability to fully achieve this objective is likewise uncertain.

FPA Is to Provide the Foundation for an Interagency Budgeting Framework

As the agencies are developing it, FPA is to provide the foundation for a single framework for the five federal agencies to help develop their wildland fire budget requests and allocate their fire management funds, as envisioned in congressional guidance and the 2001 agency report—a significant step forward. In implementing FPA, officials are to work across agencies, both in the field and at headquarters. In the field, officials from each agency will need to work together to identify different mixes and locations of firefighting assets—information that will enable the FPA model to analyze the effect of different mixes of firefighting assets without regard to agency jurisdictional boundaries. At headquarters, agency officials are to work together to determine how to weight the five performance measures FPA incorporates to identify the best mix of firefighting assets.

FPA Is to Analyze the Three Most Important Fire Management Program Activities

FPA also substantially moves the agencies toward achieving another key objective by analyzing the three most important fire management activities: preparedness, fuel reduction, and suppression. FPA is to directly analyze preparedness and fuel reduction and then model the effects that varying investments in these activities might have on suppression costs.¹⁴ Together, these activities constitute most of the agencies' overall fire management budgets.

To analyze the agencies' preparedness for wildland fires, FPA is to model the potential effect of wildland fire on communities and resources, depending on the mix and location of firefighting assets that would be stationed in an area. FPA is to consider historical fire occurrence and weather patterns to model the likelihood that a fire might occur in specific areas. Using an interagency database known as LANDFIRE to identify the fuel types and topography in the location where a fire is predicted to ignite,¹⁵ FPA is to then model a fire's likely intensity and rate of spread. Finally, FPA is to identify the location of specific firefighting assets

¹⁴FPA is also to help the agencies model their investment in preventing fires. The agencies carry out activities, such as increased law enforcement patrols and public education programs, intended to reduce the number of human-caused wildland fires. FPA is to predict the number of fires that would have started if not for the agencies' prevention activities.

¹⁵LANDFIRE is a geospatial data and modeling system designed to assist the agencies in identifying the extent, severity, and location of wildland fire threats to the nation's communities and ecosystems. At the time of our review, LANDFIRE data were not available for the eastern United States or for Alaska and Hawaii. FPA officials said that until LANDFIRE data are available nationwide, they are using other available data to provide similar information. FPA officials expect that LANDFIRE data will be available nationwide by 2009.

available for initial attack and, considering the fire's intensity and rate of spread, determine whether firefighters are likely to contain the fire before it grows too large and whether the fire is likely to damage communities or resources.

To analyze the effect of fuel reduction treatments within FPA, officials in the field are to begin by identifying the attributes of the fuel reduction treatments they most often undertake in their area, including vegetation type (such as trees, shrubs, or grasses) and the treatments' effect on vegetation density, height, and other characteristics. The FPA model is to then predict the effect of those treatments on fire behavior and compare the effectiveness of fuel treatments at reducing fire damage in different areas.

Finally, to analyze suppression costs, FPA is to consider different levels of investment in preparedness and fuel reduction and, for each investment level (including the mix and location of firefighting assets), estimate the number of fires likely to escape initial suppression efforts. For each such "large" fire, FPA is to use another model the agencies have developed to predict the cost of suppressing the fire on the basis of the costs from previous fires with similar characteristics, including fire size, fuel types, fire intensity, physical terrain, proximity to the nearest community, and total value of structures close to the fire. The costs of past fires with similar characteristics vary widely, however, which limits the model's ability to accurately predict suppression costs. Moreover, the model is based on historical costs, and since the agencies have recently begun emphasizing less aggressive strategies, it may not accurately predict suppression costs for fires.¹⁶ The agencies are continuing to improve this model, however, which could improve the accuracy of the cost estimates.

¹⁶We have previously reported limitations of the model the agencies use to predict suppression costs. See GAO, *Wildland Fire Management: Lack of Clear Goals or a Strategy Hinders Federal Agencies' Efforts to Contain the Costs of Fighting Fires*, [GAO-07-655](#) (Washington, D.C.: June 1, 2007).

FPA Is to Be Able to Analyze Nonfederal Firefighting Assets, but the Extent to Which the Agencies Will Include These Assets in Their Analysis Is Unclear

Although the agencies are developing FPA to recognize the presence of nonfederal firefighting assets that may be available to respond to fires on federal land¹⁷—a key objective of FPA—the extent to which these assets will be included in the analysis is not yet clear. When officials in the field enter into FPA the different combinations of federal firefighting assets they would acquire for a given budget level, they can also include nonfederal firefighting assets that are stationed nearby, such as firefighters or fire engines belonging to state agencies or area communities. FPA is then to consider the availability of these nonfederal assets when it analyzes the effect of different combinations of federal assets on the five performance measures.

FPA officials recognize, however, that some nonfederal entities may object to federal agencies' including nonfederal assets in their analysis, for fear that doing so would lead to fewer federal firefighting assets stationed in certain locations, which in turn could lead to an additional workload for nonfederal entities in those locations. The inclusion of nonfederal assets raised significant concerns among nonfederal entities when the first FPA analysis was conducted in 2006. And while FPA guidance to planning units in the field generally directs them to include nonfederal assets, FPA officials acknowledged the likelihood that field units would receive "strong objections" to this direction from some nonfederal entities. Such objections might cause field units to omit nonfederal assets from the FPA analysis to satisfy the concerns of their nonfederal partners, with whom they must maintain relationships. FPA officials said they expect concerns from nonfederal officials to lessen over time, as those officials become more knowledgeable about how FPA operates. Ultimately, however, if agency planning units do not include nonfederal assets that may be available to respond to fires, FPA will model fewer firefighting assets than are actually present—and may therefore underestimate the effectiveness of a given set of federal assets. In addition, if some planning units include nonfederal assets and others do not, FPA's ability to identify the best combination of federal firefighting assets nationwide is likely to be compromised.

¹⁷In some cases, federal firefighting assets are also available to respond to fires on nonfederal land.

FPA Is to Consider Land and Fire Management Objectives, but Some Shortcomings Remain to Be Addressed

FPA should also help the agencies move toward achieving a fourth key objective—responding to wildland fires so as to meet specific land and fire management objectives, as suggested by the 1995 federal wildland fire management policy, rather than simply assuming that all fires should be suppressed as quickly as possible—although some agency officials have concerns about how well FPA will consider land management objectives. FPA should help the agencies move closer to this objective in two ways. First, officials in the field are to be responsible for identifying the number and type of firefighting assets they would typically dispatch to a fire that ignited in a particular location under particular conditions. The intent is to recognize that agency responses vary from fire to fire, and fire managers are more likely to dispatch more assets to a fire that threatens communities or highly valued resources or ignites under conditions conducive to rapid spread than to a fire ignited where it threatened few important resources or was unlikely to spread. The FPA model is to use this information to identify locations where stationing proportionately more firefighting assets might be helpful. Second, officials in the field are also to estimate the fire intensity beyond which resources in a particular area are likely to be damaged. In some areas, for example, officials might establish a relatively high intensity threshold to recognize that moderate, or even severe, fires might be acceptable, while in other areas—such as the wildland-urban interface—officials would likely determine that any fire is undesirable. In evaluating different mixes and locations of firefighting assets, FPA is to take into account this variation in acceptable fire intensity. In determining both the firefighting assets they would dispatch and the intensity threshold, field officials are expected to use information contained in local land and fire management plans, which the agencies are required to develop.¹⁸

Several issues, however, must be addressed for FPA to move the agencies more fully toward achieving their objective of responding to fires according to specific land and fire management objectives. First, one of the measures FPA is to use in evaluating alternative mixes and locations of firefighting assets is the predicted success of containing fires before they become large. Although containing fires when they are small is desirable in many circumstances, the agencies themselves have also recognized that their legacy of successful suppression has contributed substantially to the

¹⁸We have previously reported on the status of the agencies' development of these plans. See GAO, *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).

current increase in burned acres and fire intensity. As noted, it is not clear how the agencies will weight the relative importance of containing fires early (or indeed how they will weight any of the five measures) in FPA, but early guidance to the field indicates that early containment may be weighted heavily, which would keep FPA from fully recognizing the potential benefits of fire in some areas. Second, officials from the Fish and Wildlife Service and National Park Service have expressed concern that FPA is to evaluate the effects of reducing fuels solely by how the reduction affects the likelihood of a severe fire, without considering whether the fuel reduction treatment helps the agencies achieve broader land management objectives, such as improving the ecological condition of the land over time, as the 2001 report envisioned. A senior Fish and Wildlife Service official also noted that many wildlife refuges consist of small parcels of federal land interspersed among larger parcels of nonfederal land and that FPA is not designed to consider the effects of fragmented ownership.

Third, although FPA is to consider specific local land and fire management objectives that recognize that some areas are more important to protect than others, it will likely not allow the agencies to consistently identify the locations that are most important to protect from a national perspective. Within the five performance measures evaluating the effects of different mixes and locations of firefighting assets and fuel treatment options, FPA is to consider all acres as equally important, despite significant variation in the resources on those acres. For example, the agencies have established protection of the wildland-urban interface as one of their most important policy objectives, and FPA is to treat all interface acres identically, regardless of whether an acre contains one or several houses. Similarly, the agencies intend to increase the number of acres that are meeting fire and fuel management objectives, such as reducing the likelihood of uncharacteristically intense fires, and FPA is to consider all acres within this measure identically. For example, FPA is to consider an acre of a relatively common forest type, such as ponderosa pine, the same as a relatively rare type, such as giant sequoia—even though agency managers may place a much greater priority on the condition of a sequoia forest. As a result, FPA will not likely allow the agencies to give high priority to meeting objectives in particularly important or rare areas. FPA is also to predict the percentage of fires likely to be contained in initial attack. In evaluating the effect that different mixes and locations of firefighting assets have on this measure, however, FPA is to weight all fires equally, regardless of the fires' potential to damage communities or valuable natural or cultural resources. Agency officials analyzing FPA results may therefore consider it more important to try to contain multiple fires that do not pose a great threat than to try to contain a single fire that does. The

presence of the other measures helps to mitigate this shortcoming, because if an uncontained fire damages communities or valuable resources, the agencies' ability to meet the other objectives will be compromised. The relative weights of the five measures, however, have not yet been determined, and it is not clear how the measures' interactions will play out.

One of the five measures the agencies will ultimately use to evaluate different mixes and locations of firefighting assets specifically considers resources the agencies regard as highly valued, which could improve the agencies' ability to identify some of the most important resources to protect. Nevertheless, FPA would still consider all acres within a particular performance measure identically and therefore not recognize that it is more important to protect some acres than others. In August 2008, the agencies decided to include only two types of resources in this measure in their 2009 analysis: municipal watersheds and habitat for some endangered species. Senior officials from the four Interior agencies, however, have criticized the approach the agencies are developing for FPA to consider highly valued resources because it does not sufficiently consider their agencies' land management objectives.

As Designed, FPA Will Not Achieve All Its Key Objectives, Including Examining the Effects over Time of Differing Funding Allocation Strategies and Identifying the Most Cost-Effective Mix of Firefighting Assets

FPA's Ability to Examine the Temporal Effects of Differing Funding Allocation Strategies Appears Limited

Even though FPA is likely to achieve several of its key objectives, it is unlikely to help the agencies achieve others. In particular, the modeling approach the agencies are taking has limited ability to examine the effects over time of different funding allocation strategies and is unlikely to allow them to identify the most cost-effective mix of firefighting assets. Other aspects of FPA, including the lack of an external peer review of the model, may complicate its further development and implementation.

FPA was envisioned as a way to help the agencies determine the extent to which, in the short term, increasing or decreasing funding for fuel reduction treatments and responding more or less aggressively to fires would affect the expected cost of responding to wildland fires over the long term. Although FPA is to analyze funding for both preparedness and fuel reduction, its ability to evaluate the trade-offs associated with increasing or decreasing one of these activities appears to be limited to short-term effects. Spending funds to reduce fuels, however, is generally considered a long-term investment, one whose value increases over time as more of the landscape is treated. If FPA considers only short-term

effects, it may underestimate the benefit of reducing fuels and may lead the agencies to place greater emphasis on suppressing fires than warranted—with potentially far-reaching consequences.

FPA officials told us in September 2008 that they were working with the interagency science team to develop an approach that would allow FPA to better analyze the long-term effect of reducing fuels; the officials expected to incorporate this approach into FPA by November 2008.¹⁹ Because the agencies had begun to develop this approach only toward the end of our review, we were unable to evaluate it. On the basis of our discussions with FPA officials and members of the interagency science team, and from our review of the limited documentation describing the approach, it appears that FPA's ability to help the agencies achieve this objective will be limited.

Moreover, FPA is unlikely to examine the effects over time of different firefighting strategies. Since adopting the 1995 fire management policy, the agencies have increasingly emphasized appropriate management response. FPA is to recognize that fire managers choose to respond less aggressively in some cases; for example, it is to allow field officials to model dispatching fewer firefighting assets to fires that are unlikely to threaten important resources. Fires responded to less aggressively are likely to burn many more acres than fires suppressed quickly. Less aggressive strategies may therefore reduce fuels on more acres—which in some cases could lower the risk from future large fires. FPA does not recognize this benefit, however, and will therefore be unable to help agency officials understand how responding less aggressively now may reduce the size and intensity of fires later, which could in turn help the agencies protect communities and resources and lower the cost of suppressing fires.

More broadly, FPA's limited ability to examine the effect over time of reducing fuels and implementing appropriate management response could also limit its ability to help the agencies develop a long-term, cohesive strategy for responding to wildland fires. We have long recommended that the agencies develop a cohesive strategy identifying available long-term options and associated funding for reducing hazardous fuels and

¹⁹The interagency science team in 2006 proposed an option for developing FPA that might have helped the agencies to better achieve this objective, but the Wildland Fire Leadership Council did not approve this option out of concern that the agencies would be unable to complete it within the time and budget available. Interagency science team members told us they could, if directed, continue to develop that option and incorporate it into FPA later.

FPA Is Unlikely to Allow the Agencies to Identify the Most Cost-Effective Mix of Firefighting Assets

responding to wildland fires.²⁰ Such a strategy is fundamental if the agencies and Congress are to fully understand the potential choices, and associated costs, for addressing wildland fire problems. The agencies have consistently concurred with our recommendation,²¹ and agency officials cited FPA as a key step in enabling them to develop a cohesive strategy. In its current state of development, however, FPA lacks important capabilities to help inform strategic decisions about how to invest the agencies' limited funds.

A primary objective of FPA, established by the 2001 agency report, is to identify the most cost-effective fire management program for a given budget. Accomplishing this objective requires the agencies to define the fire management objectives they are trying to achieve and then to identify the combination of fuel reduction treatments and suppression strategies, including the best mix and location of firefighting assets, that would result in the most effective use of program funds. The modeling approach the agencies are using in FPA, however, does not allow the agencies to meet this objective. Rather than analyzing all possible combinations of assets typically available to local units, as well as fuel reduction and fire suppression strategies, to identify the most cost-effective combination, the approach the agencies are taking allows them to compare only a limited number of asset mixes and firefighting strategies (including fuel reduction options) to determine whether one mix of assets and strategies is more or less cost-effective than another. Because FPA is to compare only a limited number of alternatives, the evaluated alternatives are unlikely to include the most cost-effective mix of assets nationwide. Further, because the evaluated alternatives are likely to reflect minor variations in budget levels (e.g., plus and minus 5 percent or 10 percent of the prior year's budget for each planning unit), the present FPA approach is likely to generate results that differ only incrementally from the asset mixes and strategies already in place, rather than evaluate whether significantly different alternatives could yield significantly better results.

²⁰GAO, *Western National Forests: A Cohesive Strategy Is Needed to Address Catastrophic Wildfire Threats*, GAO/RCED-99-65 (Washington, D.C.: Apr. 2, 1999); *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); and GAO-06-671R.

²¹In 2008, however, we reported that the agencies had begun retreating from their commitment to develop a cohesive strategy. See GAO, *Wildland Fire Management: Federal Agencies Lack Key Long- and Short-Term Management Strategies for Using Program Funds Effectively*, GAO-08-433T (Washington, D.C.: Feb. 12, 2008).

Agency officials, including key scientists involved in FPA development, told us they believed that although the modeling approach has not been designed to identify the single most cost-effective mix of firefighting assets, FPA would nevertheless provide useful information to help the agencies develop their budget requests. In fact, several officials told us they preferred the flexibility currently built into FPA, which allows them to consider multiple potential budget scenarios—what one official termed a “family of solutions”—over the rigidity built into the old approach, which resulted in a single solution. Officials told us that it would be unrealistic to expect that the complexities of wildland fire management could be modeled accurately enough to yield a single solution that is truly optimal and that by examining multiple possible budget scenarios developed by officials in the field, FPA’s new approach would yield results that would be “among the most cost-effective solutions,” according to one official. Nevertheless, it is not clear that examining only a small number of alternatives for each planning unit will generate results that are among the most cost-effective, particularly given current guidance to the field to consider only slight variations from current funding levels when developing alternatives.

Moreover, in analyzing trade-offs among different mixes and locations of firefighting assets, FPA is to consider only those assets that are stationed at individual management units, not those that are centrally located and under regional or national control. These central assets, which include large air tankers and helicopters and many of the most qualified firefighters, are some of the agencies’ most costly, representing about \$200 million of their budgets, according to agency estimates. The agencies use these assets in two ways: to assist local units with initial attack on small fires and to help suppress large fires. FPA is to consider the presence of these central assets when analyzing the likelihood that firefighters will be able to contain a fire during initial attack—important because otherwise the model would suggest that more firefighting assets would be needed at local planning units. FPA is to consider the number of centrally located assets as a given, however—that is, as a fixed input to the model, not a variable—rather than analyze the effects of changing the number of centrally located assets or the proportion of assets under local or national control. As a result, the model is not likely to determine the effect of changing the number or type of these assets on the agencies’ firefighting abilities and costs, thus further limiting its ability to identify the most cost-effective mix of assets nationwide.

Other Aspects of FPA
Complicate Further
Development and
Implementation

Although FPA is a new system, it will rely on many data sources, models, and systems the agencies developed earlier, some of which have known shortcomings. For example, FPA is to use data from the LANDFIRE system to identify the fuel types across the country; yet the accuracy of LANDFIRE data has been questioned, as has the frequency with which the system will be updated to recognize changes in fuel conditions over time due to insect outbreaks, large wildland fires, or other disturbances. Over the past several years, FPA and LANDFIRE project officials have worked together to develop a process to update LANDFIRE data, which should benefit FPA. It is too early to tell how effective the planned LANDFIRE improvements will be.

To predict how quickly a fire may spread in different fuel, weather, and geographical conditions, FPA is to use the results of FSPro, a fire growth model developed by Forest Service scientists. Fire officials have recognized that the spread rate predicted by the model is not always consistent with the rate of spread they observe during real fires. To help compensate for this difference, the FPA model is to allow field officials to calibrate the data used by FSPro to model spread rates so that they more closely reflect conditions typically observed in a particular area. It is not clear, however, how the agencies will ensure that the calibrations are made consistently or what the effects may be on the mix of firefighting assets FPA identifies as most appropriate.

Even with their known shortcomings, some of FPA's component elements are well-established applications that have been used by wildland fire managers for many years and, in some cases, are based on peer-reviewed science. The FPA model as a whole, however, including its component parts, has not been externally peer-reviewed. This lack comes in part because documentation on FPA's development and capabilities has not been sufficiently developed to allow for peer review; instead, according to agency officials, project staff have been devoting time to model development. Until the model is peer-reviewed—including validation that the overall logic is sound, the methods used are state of the art, the results are consistent with empirical evidence, and the system is adequate for its intended purpose—neither the agencies nor outside parties will have a full understanding of FPA's strengths and limitations or know how much confidence they should place in the model's analysis. A peer review, moreover, may identify limitations not revealed by our review.

Finally, the utility of FPA in identifying the best mix of firefighting assets will depend heavily on the alternatives and data developed by officials in the field, but some field officials expressed concerns about this

component of FPA. For example, some field officials are concerned that they will receive little training on how to use FPA, which may prevent them from developing the most realistic options, and that the time needed to enter data into FPA and develop alternatives for national consideration will substantially increase their workload. Other officials told us that they are concerned that field staff may try to “game” FPA in an attempt to get the model to identify their area as needing more assets. Staff could, for example, develop a less-effective alternative for their low-budget scenario to make their mid- or high-budget scenarios appear more effective; similarly, staff may find it expedient to develop alternatives that ensure that each agency in their planning unit gains or loses comparable quantities of firefighting assets in order to promote equity among the agencies, rather than develop alternatives likely to best protect important resources but which might affect one agency more than another. Senior agency officials told us that gaming is a concern with any budgeting system and that they are planning to establish a two-stage process to review field submissions. In the first stage, officials from other field units would review the alternatives to ensure that interagency guidance was followed and information entered correctly; in the second, regional officials would review the results to ensure they met regional priorities. The exact steps this review process would follow, however, have not been determined, so it is not yet clear whether this process will ensure that only appropriately developed alternatives are submitted.

The Agencies Are Considering Changes That May Increase FPA’s Ability to Meet Certain Key Objectives, Although These Changes Do Not Address All Shortcomings

Senior agency officials told us they recognize that in 2008 FPA will not fully meet all its key objectives but said they are considering making several changes that may improve its ability to meet certain key objectives, including the following:

- submitting FPA for an external peer review;
- continuing to develop FPA’s process for identifying the resources the agencies consider to be highly valued and assessing the agencies’ ability to protect these resources; and
- working with the interagency science team to improve how FPA is to consider land management objectives, such as improving the ecological condition of the land over time, when evaluating the benefits of reducing fuels.

Although these steps have the potential to move FPA closer to meeting some of its key objectives, it is too early to determine how successful they will be. Moreover, these steps do not address all shortcomings we or

others have identified, and taking these or other steps to improve FPA will carry an additional cost, which is not included in current agency estimates. The approximately \$54 million estimated cost for FPA includes basic operation and maintenance through fiscal year 2010 but, according to agency officials, does not include funds to make the above improvements.

The Approach Selected for FPA Increases the Importance of Transparency in Decision Making

The approach the agencies have taken in developing FPA allows for considerable discretion on the part of agency decision makers in three key areas: determining the relative importance (that is, the weights) of the five performance measures used to evaluate locally developed alternatives; using FPA results in combination with other information to develop agency budget requests; and using FPA results, likewise in combination with other information, to allocate funds to the field. Although it is important that decision makers have the flexibility to consider various options, that same flexibility makes it essential for the agencies to ensure that these processes are fully transparent. Otherwise, Congress, the public, and agency officials cannot be assured of fully understanding the rationale behind decisions or FPA's role in them. Although any changes to the existing allocation of funds among agencies or across different geographical areas are likely to be incremental at first, the agencies could consider larger funding reallocations as their understanding of FPA increases—which would make transparent decision making even more important.

First, as noted, the extent to which any particular alternative or set of alternatives is considered cost-effective will depend on the relative importance assigned to the five performance measures, including any variation in their relative importance in different regions of the country. FPA officials and the leaders of the interagency science team said that FPA is being designed to allow for the agencies to evaluate different weighting schemes, which senior agency officials referred to as “exploring the decision space.” Others, however, have raised concerns that the flexibility inherent in setting weights for the different performance measures will allow the agencies to manipulate these weights until they reach a predetermined outcome. Without understanding the weights assigned to each measure and the rationale for assigning those weights—that is, without transparency in this process—Congress and others will find it impossible to understand and evaluate the reasonableness of FPA's results, and skepticism about FPA's usefulness will be difficult to quell.

Second, senior agency officials emphasized that, despite its importance, FPA will not be the sole determining factor in developing their budget

requests and allocating appropriated funds; rather, senior agency officials would consider FPA results along with other information and exercise managerial discretion in making these decisions. Agency officials said, for example, that they would continue to involve national and regional officials from the various agencies to help ensure that their budget requests reflected differences in priorities among the agencies or regions, although they recognized that this process might lead FPA results to be used differently by different agencies or in different regions. Although considering these factors is important, as with the setting of the weights, it will also be important for the agencies to clarify the additional factors beyond FPA that they consider in developing their budget requests, so that Congress and others can understand FPA's role in the process.

And third, once Congress has appropriated funds to the agencies, it is not clear how the agencies will use FPA to help allocate these funds to the field. If one agency allocated funds differently than suggested by FPA—or if one agency's field unit acquired a different mix of assets than it modeled—it could affect the other agencies' ability to protect important resources, as well as the overall effectiveness of the agencies' fire management program. Agency officials said they intended for each agency to consider FPA results in allocating its funds and for field units to consider FPA results in acquiring firefighting assets. They also said they would not decide how much to deviate from the allocation suggested by FPA until they had begun to analyze the first year's results. Officials also said that it is important to recognize that more than 2 years could elapse between field units' developing their alternatives and Congress's appropriating funds on the basis of that information—and that priorities could change substantially in the interim, leading the agencies to allocate funds differently than suggested by FPA. Agency officials also said that, in addition to FPA results, they would consider specific congressional earmarks and appropriations guidance when allocating funds. Moreover, the agencies have existing systems outside of FPA for allocating fuel reduction funds, which they have been working in recent years to improve.²² As of November 2008, agency officials did not know how they would consider the information from FPA in relation to the agencies' other systems in allocating fuel reduction funds.

²²For information on the agencies' approaches to allocating fuel reduction funds, see GAO, *Wildland Fire Management: Better Information and a Systematic Process Could Improve Agencies' Approach to Allocating Fuel Reduction Funds and Selecting Projects*, [GAO-07-1168](#) (Washington, D.C.: Sept. 28, 2007).

Conclusions

As fires become more severe and development in fire-prone lands continues, the Forest Service and Interior agencies face difficult decisions about how to best protect the nation's communities and natural and cultural resources. In particular, the agencies must determine the best mix and location of firefighting assets to respond to wildland fires, and they must balance the need to spend money preparing for and fighting fires against the need to invest in reducing potentially hazardous fuels so as to lower both the cost of suppressing future fires and the risk to communities and important resources. Complicating these decisions, our nation's long-term fiscal challenges have constrained agency budgets, simultaneously limiting available choices and making it even more important to spend funds efficiently and effectively. The agencies believe that FPA can be a useful tool in making these difficult choices, which will drive billions of dollars in federal expenditures each year and directly affect millions of citizens living in fire-prone areas. By establishing an interagency budget framework that analyzes trade-offs among the most important fire management program activities, FPA represents an important first step in improving the agencies' cost-effectiveness.

Achieving the full potential of FPA, however, will depend on the extent to which the agencies improve FPA's ability to live up to the promises that were made on its behalf—namely, that it would allow the agencies to develop rational budgets and allocate funds in a way that maximizes the agencies' ability to manage wildland fire. Living up to these promises presents a daunting challenge, given the inherent difficulty of modeling the complexities and uncertainties of wildland fire and given that FPA remains a work in progress. Nevertheless, an early assessment of the model's capabilities raises several issues. The overall modeling approach the agencies have chosen does not allow them to identify the most cost-effective mix and location of firefighting assets, one of FPA's key objectives. Moreover, without improvements, FPA will be unable to identify, from a national perspective, the most important resources to protect or the relative priority of different values at risk; to evaluate the effect of different investments in fuel reduction treatments and firefighting strategies over time; or to analyze the effect of changes in the number of aircraft and experienced firefighters that are under regional or national control. Without such improvements, the agencies will continue to lack important information on which to base decisions about how best to allocate scarce funds. Further, the agencies have not yet determined how they will weigh the relative importance of FPA's five performance measures or exactly how they will use FPA to develop their budget requests and allocate funds. Given the importance of and the uncertainty surrounding these decisions, Congress—as well as the agencies and other

interested parties—would benefit if these fundamental budget decisions were made in a transparent manner. And finally, an external peer review by an independent entity, such as the National Academy of Sciences, would achieve one of FPA’s objectives and help the agencies identify the strengths and limitations of the model, which could increase confidence in their decisions and help them make needed changes more quickly.

Recommendations for Executive Action

We recommend that the Secretaries of Agriculture and the Interior take four actions to improve their agencies’ abilities to develop their budget requests and allocate funds using FPA.

First, to improve the FPA model’s ability to identify needed firefighting assets and the best locations for these assets—and recognizing that developing FPA will be an iterative process that will require the agencies’ continued effort to improve—we recommend that the Secretaries of Agriculture and the Interior direct the agencies to develop a strategic plan for the continued development of FPA, which would (1) include an evaluation of FPA’s ability to meet its key original objectives; (2) identify ways to improve the model to better meet these objectives; (3) clearly state whether the agencies believe any of the original objectives are no longer appropriate, and why; and (4) identify the steps the agencies plan to take to improve FPA and the expected time frames and associated budget needs for completing these steps. To allow the agencies sufficient time to identify issues that may arise as they implement FPA, the Secretaries of Agriculture and the Interior should submit this plan to Congress no later than September 30, 2010. In particular, we believe that the strategic plan should, at a minimum, address ways to improve FPA’s ability to

- evaluate different mixes and locations of firefighting assets, so that FPA recognizes the relative priority of different values at risk when assessing how best to protect the wildland-urban interface and increase the number of acres meeting fire management objectives;
- identify the most highly valued resources, such as endangered species habitat or important cultural sites, that the agencies seek to protect;
- model the effects over time of different investments in fuel reduction treatments and firefighting strategies on the cost of suppressing future wildland fires; and
- analyze trade-offs between increases and decreases in firefighting assets that are under national or regional control.

Second, we recommend that the Secretaries of Agriculture and the Interior report annually to Congress on (1) their progress in completing the steps outlined in the strategic plan for the continued development of FPA and (2) FPA's ability to meet each of its key objectives.

Third, to increase agency transparency in using FPA to develop their budget requests and allocate funds, we recommend that the Secretaries of Agriculture and the Interior report annually to Congress on FPA's role in the budget development and allocation process. This report should include, at a minimum, information on (1) how the agencies weighted the measures FPA uses to evaluate different mixes and locations of firefighting assets and the rationale for those weights, (2) how FPA results were used in conjunction with other information in developing the agencies' budget requests, and (3) the extent to which the agencies' funding allocations to their field units reflected the FPA results for a given year.

Fourth, to increase Congress's and the agencies' understanding of the strengths and limitations of FPA—including the extent to which it achieves the key objectives envisioned by the 2001 report—and to fulfill one of the original objectives established for FPA, we recommend that the Secretaries of Agriculture and the Interior direct the agencies to submit the FPA model to external peer review. This review should be initiated as soon as FPA is complete enough to allow for a thorough review, but no later than November 2009, so that its results can inform decisions about how FPA may be improved and the extent to which additional funding should be provided to the project.

Agency Comments and Our Evaluation

In written comments on a draft of this report, the Forest Service and Interior disagreed with our finding that FPA is unlikely to allow the agencies to identify the most cost-effective mix of firefighting assets. The Forest Service commented that it fundamentally agreed with our recommendations and described the steps the agency intended to take in addressing them, but we do not believe that the steps outlined in the letter are specific and transparent enough to meet the intent of our recommendations. Interior disagreed with our recommendation that the agencies develop a strategic plan for the continued development of FPA but concurred with our other recommendations.

The Forest Service and Interior commented that they believe FPA will allow them to meet the goal of cost-effectiveness. As their letters state, we previously discussed our conclusions on this issue with the agencies but

did not resolve the differing points of view. As stated in our report, FPA compares only a limited number of mixes of firefighting assets and firefighting strategies, and the alternatives it evaluates are likely to reflect only minor variations in budget levels. Given this structure, we continue to believe that FPA is unlikely to allow the agencies to identify the most cost-effective location and mix of assets and strategies nationwide—an objective the agencies themselves established in their 2001 report. In their responses, both agencies raised questions about this objective. The Forest Service's comments seek to invalidate the objective altogether, stating that identifying the single most cost-effective mix of assets and strategies is not realistic. Interior did not question the validity of the objective but stated that the approach FPA is taking is more realistic than the approach the agencies had taken when they first began developing FPA. While we are not altering our conclusion that FPA's current approach will likely keep the agencies from identifying the most cost-effective solution, we are modifying our first recommendation to state that in the strategic plan, the agencies not only identify ways to improve the model to better meet FPA's original objectives, but also clearly state whether they believe any of the original objectives are no longer appropriate—and, if not, why not—in order to ensure that Congress and other interested parties are fully informed about what they can reasonably expect from FPA.

Regarding our recommendation that the agencies develop a strategic plan for the continued development of FPA, the Forest Service concurred with our recommendation and stated that it has a strategy for completing FPA, although it is not clear from the letter whether this strategy is or will be articulated in a written document directly addressing the elements of our recommendation. In contrast, Interior disagreed with this recommendation, stating that developing a strategic plan would delay the deployment and increase the cost of FPA. Regarding Interior's position, we are not suggesting that the agencies delay implementing FPA until they have developed the strategic plan we recommend; rather, we believe that such a plan can be developed concurrently with implementation and in fact may benefit from incorporating lessons learned during early use of FPA. More broadly, because of FPA's importance and the concerns about its development—including the questions raised in our review about its ability to meet its key objectives—we believe it is important for the agencies to create a strategic plan for FPA's continued development that directly and transparently evaluates FPA's ability to meet its original objectives, identifies ways to improve FPA to better meet those objectives, and identifies the steps the agencies plan to take to improve FPA. Given the agencies' comments about FPA's cost-effectiveness objective,

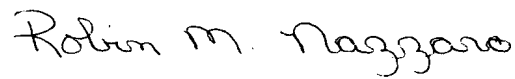
however, we modified the language of our recommendation on developing a strategic plan, as discussed above.

The Forest Service and Interior generally agreed with our recommendations to report annually to Congress on the continued development of FPA and on FPA's role in the budget development process, and to submit the FPA model to external peer review. The Forest Service, however, also provided clarifications on two of our recommendations that did not appear to be fully responsive in terms of the amount of information and transparency we believe is warranted. Specifically, in response to our recommendations that the agencies report annually to Congress on (1) their progress in completing the strategic plan for FPA's continued development, and on FPA's current ability to meet each of its key objectives, and (2) FPA's role in the agencies' budget development and allocation process, the Forest Service stated that it has always been—and will continue to be—responsive to congressional requests for information and that it would include information on FPA's role in budget development and allocation in its annual budget requests. We are not convinced, however, that this approach will furnish Congress with the consistent, transparent, and complete information we believe it needs—particularly given FPA's importance in helping the agencies manage their \$3 billion wildland fire program and the concerns about its development. We continue to recommend, therefore, that the Secretaries of Agriculture and the Interior prepare an annual report to Congress about the status of FPA's development and how the agencies have used FPA to help develop their budget requests and allocate funds. The Forest Service's and Interior's letters are reprinted in appendixes II and III, respectively, along with our evaluation of specific comments.

We are sending copies of this report to interested congressional committees, the Secretaries of Agriculture and the Interior; the Chief of the Forest Service; the Directors of the Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and National Park Service; and other interested parties. The report is also available at no charge on the GAO Web site at <http://www.gao.gov>.

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

Sincerely yours,



Robin M. Nazzaro
Director, Natural Resources and Environment

Appendix I: Scope and Methodology

To determine how the agencies have developed the fire program analysis (FPA) budget-planning system to date, we reviewed agency documents from each stage of FPA's development. To identify the key objectives originally established for FPA, we reviewed congressional committee and Office of Management and Budget guidance to the agencies; a 2001 report, commissioned and later adopted by the agencies, that established the vision, key objectives, time frames, and rationale for what FPA was intended to accomplish; the interagency memorandum of agreement and project charter that established FPA as an interagency project; and other agency documents. To further our understanding of the broader context for the shortcomings FPA was intended to address, we reviewed key agency documents, including the 1995 and 2001 federal wildland fire management policies, the national fire plan, and related documents. To identify changes the agencies made to FPA in 2006, and the reasons for those changes, we reviewed the report the agencies issued after their review of FPA's policy and scientific approaches; a response to that report prepared by those who had helped to develop FPA; and internal agency briefing materials about the changes. To identify the likely capabilities of FPA as the agencies have been developing it since 2006, we reviewed the draft interagency science team report that formed the basis for FPA's new modeling approach and numerous technical papers and other documentation describing particular aspects of FPA. To further our understanding of FPA's development at each of these stages, we interviewed Forest Service and Department of the Interior officials in Washington, D.C.; FPA project staff in Boise, Idaho; and agency officials in the field familiar with FPA. We also interviewed agency and other scientists who have helped develop FPA.

To determine the extent to which FPA meets its original objectives, we compared—to the extent possible—the capabilities of FPA as the agencies developed it with those envisioned in congressional committee guidance and the 2001 report. At the time of our review, however, substantial portions of the model remained incomplete, and the agencies had not sufficiently documented the model to allow a comprehensive evaluation. We therefore limited our review to a broad examination of FPA's various components and how they interact. We also interviewed senior agency officials, FPA project staff, agency field officials, and agency and other scientists to obtain their views on the extent to which FPA appears capable of meeting its key objectives, as well as possible changes that could improve the model's ability to meet those objectives.

We conducted this performance audit between September 2007 and November 2008 in accordance with generally accepted government

auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the Department of Agriculture, Forest Service

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



Forest Service
Washington Office

1400 Independence Avenue, SW
Washington, DC 20250

File Code: 1420/5100

Date:

NOV 19 2008

Ms. Robin M. Nazzaro
Director, Natural Resources and Environment
United States Government Accountability Office
4441 G Street, N.W.
Washington, DC 20548

Dear Ms. Nazzaro:

Thank you for the opportunity to comment on the draft Government Accountability Office (GAO) report, GAO-09-68, "Wildland Fire Management: Interagency Budget Tool Needs Further Development to Fully Meet Key Objectives." The Fire Program Analysis (FPA) project is a very significant and challenging undertaking by the Federal wildland fire agencies. We were pleased the audit team discussed the complexities inherent in developing an interagency planning and budget system. While we generally view the audit as supportive, we respectfully disagree with GAO's conclusion that our approach hampers FPA from meeting the key objective of cost effectiveness. We discussed this with the audit team; they were receptive to the discussion and recommended that we document our concern.

As indicated, we worked closely with GAO, commenting and clarifying statements; however, not all of these have been reflected in key aspects of the draft report. We believe GAO has not accurately portrayed the system's ability to meet the cost effectiveness objective and actions we have taken to assure that FPA is a useful planning and budgeting tool. GAO takes exception to FPA system design modifications in 2006 that it says compromises the agencies' ability to fully achieve key goals. We strongly disagree that these modifications compromise cost effectiveness.

GAO contends that the analytical approach developed by the agencies cannot identify the most cost effective mix and location of federal firefighting assets for a given budget, but rather can only compare the relative cost effectiveness of a small set of alternatives. This assertion fails to recognize or acknowledge several key points. First, the notion of a single most cost-effective solution is conceptual; it is not based in reality. Any reasonable alternative can be shown to be optimal under a hypothetical set of assumptions about fire occurrence, weather, and values placed on the consequences of individual fires. That same alternative would be judged inferior to other alternatives under differing sets of assumptions, even if the differences are minor. Furthermore, building an optimization model requires gross simplification of the system being modeled in order to calculate a solution. This simplification can lead to distorted or inaccurate representations of the relationships between actions and outcomes, which reduces the confidence placed in a given solution. These and other shortcomings of the classical optimization approach were manifest in the first phase of FPA and led the agencies to change their approach.

See comment 1.



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Ms. Robin Nazzaro

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See comment 2.

The analytical approach recommended by the Interagency Science Team and adopted by the agencies remains faithful to the goal of improving firefighting effectiveness. It also improves the ability to: A) address the uncertainty inherent in wildland fire due to random variations in weather, fuels, and topography; B) more realistically model fire behavior and the strategic and tactical choices made by wildland fire managers and; C) build upon the corporate intelligence gained from decades of firefighting by the agencies and their partners.

This approach will allow us to systematically evaluate alternative investment strategies and identify options that best reduce fire losses, improve ecological conditions and increase cost efficiency. The system is designed to explicitly address uncertainty and risk in predicting future wildland fires. A combination of simulation models and goal programming will array alternatives using quantitative performance measures that display inherent risks and trade-offs at both local and national levels. This approach is a more robust basis for modeling real-world complexities than the linear optimization approach originally used in FPA, while maintaining the ability to compare the performance and effectiveness of alternative funding decisions.

We would also like to offer comments relative to the system's ability to evaluate fuel reduction investments over time. GAO states that we are working "to develop an approach that would allow FPA to better analyze the long-term effect of reducing fuels" but that due to the development time frame they were unable to evaluate it, reaching the opinion "it appears that FPA's ability to help the agencies achieve this objective will be limited." GAO concludes that "without improvements FPA will be unable to evaluate the effect of different investments in fuel reduction and firefighting strategies over time." We want to reaffirm our commitment to ensure that the system is useful and that it supports, both near-term and long-term, fire planning and budgeting. To that end, our development and science teams are aggressively analyzing temporal modeling approaches for fuel treatments which could be released later this year. In addition, the performance metric "proportion of land meeting or trending toward the attainment of fire and fuels management objectives" will recognize and consider acres managed under the appropriate management response. The system now being deployed is within the scope approved by the Agency. However, the Forest Service has recognized the potential for a more comprehensive analysis of vegetation and fuel treatments that will address the concerns expressed by GAO.

See comment 3.

GAO Recommendations - The report identifies four recommendations to improve FPA and its use in the budget process. The Forest Service fundamentally agrees with GAO's recommendations, but believes there are better alternative approaches for implementing three of the recommendations than those proposed by GAO.

Recommendation 1: The Secretaries of Agriculture and the Interior direct the agencies to develop a strategic plan for the continued development of FPA, which would include: 1) an evaluation of the strengths and weaknesses of FPA; 2) identify ways to improve the model to better meet its intended objectives, and; 3) identify the steps the agencies plan to take to improve FPA and expected time frames and associated budget.

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See comment 4.

Enclosure not reprinted.

Response - The Forest Service has a strategy for completing development and implementation of the FPA system consistent with the project's charter, and its associated plans. The Forest Service has recognized the need to implement FPA in an adaptive manner in FY 2009 through a staged approach that allows for system adjustments as experience dictates. This approach is both helping to avoid workload issues for the system and development of personnel and facilitating our ability to address system issues as they arise. The enclosed graphic displays the schedule and methodology for implementation across all Fire Planning Units. As we use the system and review and analyze its outputs, its strengths and weaknesses will be identified and documented through existing business processes. In addition, the planned external peer review will provide insight into FPA's strengths and weaknesses.

Major development of FPA will be complete in FY 2009 when the system will transition from development to operation and maintenance. The system's Operation and Maintenance Plan will provide for some enhancements to the system's models. In addition, the Forest Service has recognized other modeling components, such as a focused analysis of national resources or an expanded analysis of fuels and vegetative treatments, which could be useful and potentially provide a more comprehensive range of alternatives. These will be considered as the system is deployed and insights into outputs, and their utility, become known. The FPA Executive Oversight Group will consider these and other enhancements and provide guidance relative to their future inclusion and development.

Key aspects of these actions and activities will be conveyed in accordance with the Forest Service's response to Recommendations 2 and 3.

Recommendation 2: The Secretaries of Agriculture and the Interior report annually to Congress on: 1) their progress in completing the steps outlined in the strategic plan for the continued development of FPA; and, 2) FPA's ability to meet the key objectives initially established for it.

Response - The Forest Service agrees with informing Congress about the progress in implementing FPA and how the results of FPA are being used in agency decision processes. The agency has always been responsive to Congressional requests for information through informal briefings, responses to written questions, and formal testimony. The Forest Service will continue to respond to any requests for information by members and committees. In addition, the results and use of FPA information will be clearly highlighted in the Agency's formal annual budget requests to Congress.

Recommendation 3: To increase agency transparency in using FPA to develop their budget requests and allocate funds, the Secretaries of Agriculture and the Interior report annually to Congress on FPA's role in budget development and allocation process.

Response - Please see response to recommendation 2.

See comment 5.

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Recommendation 4: The Secretaries of Agriculture and the Interior direct the agencies to submit the FPA model to external peer review.

Response - The Forest Service agrees with the recommendation. An external peer review is planned as part of the FY 2009 development and implementation strategy.

Please contact Sandy T. Coleman, Forest Service Assistant Director for GAO/OIG Audit Liaison staff, at 703-605-4699, with any questions.

We look forward to working with GAO in the future.

Sincerely,



ABIGAIL R. KIMBELLE
Chief

cc: Sandy T Coleman, Clarice Wesley, Tom Harbour, Bill Breedlove, Rick Prausa

The following are GAO's comments on the Department of Agriculture, Forest Service's letter dated November 5, 2008.

GAO Comments

1. As the Forest Service's comment letter indicates, we have had extensive discussions with the agency on FPA's ability to identify the most cost-effective mix of firefighting assets, without resolving our differing points of view. As we describe in our report, FPA compares only a limited number of mixes of firefighting assets and firefighting strategies, and further, the alternatives it evaluates are likely to reflect only minor variations in budget levels. Given this structure, we continue to believe that FPA is unlikely to allow the agencies to identify the most cost-effective location and mix of assets and strategies—an objective the agencies themselves established in their 2001 report. Rather than directly contradicting our conclusion, however, the Forest Service's letter seeks instead to invalidate this objective altogether. The Forest Service commented that identifying the most cost-effective mix of assets and strategies is not a realistic objective and that FPA's current combination of simulation models and goal programming is a preferable approach. We did not compare the agencies' current approach with their initial approach, nor have we concluded whether one approach is more suitable or realistic than the other. Rather, in accordance with the objectives of our review, we simply evaluated the extent to which FPA as it is currently being developed is likely to meet the objectives originally established for it. While we are not altering our conclusion that FPA's current approach will likely not result in identifying the most cost-effective solution, we are modifying our first recommendation to suggest that the agencies clarify which of FPA's original objectives they believe are no longer appropriate and why. See comment 4 below.
2. The Forest Service stated that FPA remains faithful to the goal of improving firefighting effectiveness and that FPA's approach will provide a more robust basis for systematically evaluating alternative investment strategies. As discussed above, however, and as we noted in our draft report, the objective originally established for FPA was to identify the most cost-effective mix and location of firefighting assets and strategies, not simply to improve firefighting effectiveness.
3. The Forest Service's letter reaffirmed the agency's commitment to ensuring that FPA is able to support both near-term and long-term planning considerations in evaluating fuel reduction investments. In reaffirming this commitment, the Forest Service stated that FPA, as it is being developed, fulfills the scope that has been approved by the

agency. This approved scope, however, has evolved during FPA's development and is not fully consistent with the objectives initially established for FPA. Our conclusions about FPA are based on our comparison of its current capabilities with the objectives originally established for it. We did not determine whether the agencies were developing FPA in a manner that fulfilled the scope approved by the agencies in subsequent documents.

4. The Forest Service stated that it has a strategy for completing FPA "consistent with the project's charter and its associated plans." It is not clear from the letter, however, whether this strategy is, or will be, articulated in a written document directly addressing the elements of our recommendation. Because of FPA's importance, and the concerns that have arisen during its development, we believe it is important for the agencies to develop a single document that addresses these issues transparently. Given the agencies' comments, however, we modified our recommendation to suggest that the agencies use this plan not only to identify ways to improve the model to better meet FPA's original objectives, but also to clearly state whether they believe any of the original objectives are no longer appropriate, and why, in order to ensure that Congress and other interested parties are fully informed about what they can reasonably expect from FPA.
5. The Forest Service stated it would respond to any requests for information by Congress and would highlight how FPA's results were used in the agency's annual budget request. We are not convinced, however, that this approach will provide Congress with the consistent, transparent, and complete information we believe it needs—particularly given FPA's importance in helping the agencies manage their \$3 billion wildland fire program and the concerns about its development. We continue to recommend, therefore, that the Secretaries of Agriculture and the Interior prepare an annual report to Congress about the status of FPA's development and how the agencies have used FPA to help develop their budget requests and allocate funds.

Appendix III: Comments from the Department of the Interior

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



THE ASSOCIATE DEPUTY SECRETARY OF THE INTERIOR
WASHINGTON

NOV 5 2008

Ms. Robin M. Nazzaro
Director, Natural Resources and Environment
Government Accountability Office
441 G Street, NW
Washington, D.C. 20548-0001

Dear Ms. Nazzaro:

We appreciate the opportunity to review and comment on the draft Government Accountability Office report entitled, "*Wildland Fire Management: Interagency Budget Tool Needs Further Development to Fully Meet Key Objectives*," (GAO-09-68). The Fire Program Analysis project is a very significant and challenging undertaking by the Federal wildland fire agencies. We were pleased the audit team engaged in numerous and constructive discussions to understand the complexities inherent in developing an interagency planning and budget system. While we view the audit as supportive of our effort, we respectfully disagree with GAO's conclusion that our approach hampers FPA from meeting key objectives. We discussed this concern with the audit team; they were receptive to the discussion and recommended that we document our concern.

We are concerned that our comments and clarifying information have not been reflected in the report. In particular, we believe that FPA will allow us to meet the cost effectiveness objective and that actions we have taken will ensure that FPA will be a useful planning and budgeting tool. The FPA will be useful in meeting the cost effective objective and be a useful budgeting and planning tool, because FPA is an interagency analysis that is based on collaboration at the local level. The results of the collaborative analysis process will display efficiencies and effectiveness identified at the local planning level. We also believe that the 2006 system modifications support the goal of cost effectiveness. The cost effectiveness is based on quantitative performance measures that display trade-offs locally and nationally between various budget levels. The FPA system allows the local planning unit to determine the most effective mix of resources and fuel treatments at various budget levels. The FPA does not provide one finite answer but instead evaluates the changes in modeled effectiveness for each investment level analyzed.

We believe that one of FPA's greatest strengths is the capability to evaluate alternative investment strategies and identify options that best reduce fire losses, improve ecology conditions, and increase cost efficiency. This ability to array alternatives that display risks and trade-offs at the local and national levels provide a robust basis for comparing

See comment 1.

See comment 2.

potential performance and cost effectiveness will optimize the use of resources. We believe this is a much more realistic approach than the single-dimensional optimization approach for the most cost effective mix and location of firefighting asset for a given budget. Our Interagency Science Team has recommended the more analytical approach that we are now developing.

With respect to the system's ability to evaluate fuel reduction investments over time, it is important to note that our development and science teams are analyzing temporal modeling approaches for fuel treatments, which may be released later this year. We agree with GAO that there is potential for a more comprehensive analysis of vegetation and fuel treatments.

Our comments on the recommendations are as follows:

Recommendation 1—The Secretaries of Agriculture and the Interior develop a strategic plan for the continued development of FPA, which would (1) include an evaluation of the strengths and weaknesses of FPA, (2) identify ways to improve the model to better meet its intended objectives, and (3) identify the steps the agencies plan to take to improve FPA and expected time frames and associated budget needs for completing these steps.

See comment 3.

Response— The results of the reviews of FPA that were conducted by the science team and the management team support the current course of action. The system is expected to provide results that can be used in 2009 and to be available in time to develop the fiscal year 2011 budget request. The fire community is anxiously awaiting access to this system that will give them new tools to use in decision-making and improve their ability to allocate resources in a cost effective manner. Development of a strategic plan will further delay system deployment and result in increased costs. We would prefer to continue forward with the planned, staged approach that allows for adaptive use and modification. We believe that this approach will allow us to ensure that the system optimizes capabilities for evaluation of different mixes and locations of firefighting assets, protection of valued resources, modeling investments, and analyzing trade-offs in the allocation of firefighting assets. In addition, our planned external peer review is expected to further assist in identifying improvements to the system.

Recommendation 2— The Secretaries of Agriculture and the Interior report annually to Congress on (1) their progress in completing the steps outlined in the strategic plan for the continued development of FPA, and (2) FPA's current ability to meet each of the key objectives initially established for it.

Response— The Department concurs with GAO's recommendation to report annually to Congress on progress and achievement of objectives.

Recommendation 3—Increase agency transparency in using FPA to develop their budget requests and allocate funds by reporting to Congress on FPA's role in budget development and allocation process.

Response— The Department concurs with GAO's recommendation and will ensure that the results and use of FPA information is clearly depicted in the budget request to Congress.

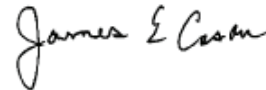
Recommendation 4—Submit the FPA model to external peer review.

Response— The Department concurs with GAO's recommendation and is planning an external peer review.

We have closely coordinated our response with the U.S. Forest Service and hold concurrent views. If you have any questions or concerns, please contact Barbara Loving at the Office of Wildland Fire Coordination at 202-606-3108.

We look forward to working with GAO in the future.

Sincerely,



James E. Cason

Enclosure not reprinted.

Enclosure

The following are GAO's comments on the Department of the Interior's letter dated November 5, 2008.

GAO Comments

1. As Interior's comment letter indicates, we have had extensive discussions with agency officials on FPA's ability to identify the most cost-effective mix of firefighting assets without resolving our differing points of view. Interior commented that FPA will allow the department to meet FPA's cost-effectiveness objective by evaluating alternative investment strategies and identifying options that best reduce fire losses, improve ecological conditions, and increase cost efficiencies and that the agencies' current approach is much more realistic than the approach taken initially. As we describe in our report, FPA compares only a limited number of mixes of firefighting assets and firefighting strategies, and further, the alternatives it evaluates are likely to reflect only minor variations in budget levels. Given this structure, we continue to believe that FPA is unlikely to allow the agencies to identify the most cost-effective location and mix of assets and strategies—an objective the agencies themselves established in their 2001 report. And as noted in our response to the Forest Service's comments, we did not compare the agencies' current approach with their initial approach, nor do we conclude whether one approach is more suitable or realistic than the other. Rather, in accordance with the objectives of our review, we simply evaluated the extent to which FPA as it is currently being developed is likely to meet the objectives originally established for it. While we are not altering our conclusion that FPA's current approach will likely keep the agencies from identifying the most cost-effective solution, we are modifying our first recommendation to suggest that the agencies clarify which of FPA's original objectives they believe are no longer appropriate and why. See comment 3 below.
2. Interior commented that the agencies are continuing to analyze how FPA evaluates fuel reduction investments over time and may begin using a new modeling approach later in 2008. It is not clear from Interior's letter whether it believes the new approach will allow the agencies to meet FPA's original objective of modeling the effects over time of differing strategies for responding to wildland fires and treating lands to reduce hazardous fuels. Our review of the limited documentation describing this approach suggests that this approach is unlikely to allow FPA to fully meet this key objective.

3. Interior stated that developing a strategic plan for the continued development of FPA, as we are recommending, would further delay deployment and increase the cost of FPA. We recognize it is important for the agencies to continue to develop FPA, and we are not suggesting that the agencies delay implementing FPA until they have developed the strategic plan we recommend. On the contrary, we believe that such a plan can be developed concurrently with implementation and that the agencies may benefit from incorporating lessons learned during FPA's early use into the plan. In any event, our review raised questions about FPA's ability to meet certain of its key objectives, even with the changes the agencies are considering making to FPA—and because of FPA's importance, and the concerns about its development, we believe it is important for the agencies to develop a single document that directly and transparently evaluates FPA's ability to meet its original objectives and identifies ways to improve FPA to better meet those objectives. Given the agencies' comments, however, we modified our recommendation to suggest that the agencies use this plan not only to identify ways to improve the model to better meet FPA's original objectives, but also to clearly state whether they believe any of the original objectives are no longer appropriate, and why, in order to ensure that Congress and other interested parties are fully informed about what they can reasonably expect from FPA.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

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

Staff Acknowledgments

In addition to the contact person named above, Steve Gaty, Assistant Director; David P. Bixler; Ellen W. Chu; Jonathan Dent; Richard Johnson; Chester Joy; Mehrzad Nadji; Jacqueline Nowicki; and Dae Park made key contributions to this report.

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